

**DESIGN AND FINITE ELEMENT ANALYSIS OF 100 TONS
HYDRAULIC PRESS STRUCTURES AND CYLINDER AT
T.M.C INDUSTRIAL PUBLIC CO., LTD. THAILAND**

FINAL PROJECT REPORT

**Submitted to Departement of Mechanical Engineering
Faculty of Industrial Technology in Partial Fulfillment of the Requirement
for the Degree of Sarjana Teknik Mesin at
Universitas Islam Indonesia**



Arranged by :

**Name : Ulil Fawaaid
Student Number : 13525064
NIRM : 2013070913**

**DEPARTMENT OF MECHANICAL ENGINEERING
FACULTY OF INDUSTRIAL TECHNOLOGY
UNIVERSITAS ISLAM INDONESIA
YOGYAKARTA
2017**

DECLARATION LETTER

I hereby declare that the project work entitled “DESIGN AND FINITE ELEMENT ANALYSIS OF 100 TONS HYDRAULIC PRESS STRUCTURES AND CYLINDER AT T.M.C INDUSTRIAL PUBLIC CO., LTD THAILAND” submitted to Department of Mechanical Engineering Faculty of Industrial Technology in Partial Fulfillment of the Requirement for the Degree of Sarjana Teknik Mesin at Universitas Islam Indonesia, is a final project done by me under the guidance of my advisor, Dr.Eng Risdiyono S.T., M.Eng after the completion of three months’ work at TMC Industrial Co., Ltd. and Rajamangala University of Tawan-Ok (RMUTTO), Thailand

If someday this project to prove as a plagiarism, Universitas Islam Indonesia has right to revoke its confession.

Yogyakarta, August 5th, 2017



Ulil Fawaaid

13525064

ADVISOR VALIDATION PAGE

**DESIGN AND FINITE ELEMENT ANALYSIS OF 100 TONS
HYDRAULIC PRESS STRUCTURES AND CYLINDER AT
T.M.C INDUSTRIAL PUBLIC CO., LTD. THAILAND**

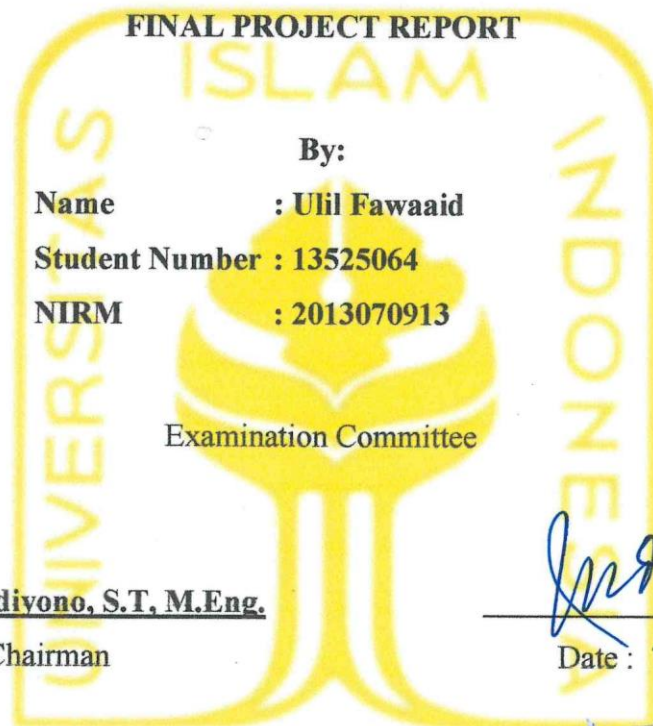


Advisor,

Dr. Eng. Risdiyono, S.T, M.Eng.

THESIS APPROVAL OF EXAMINATION COMMITTEE

**DESIGN AND FINITE ELEMENT ANALYSIS OF 100 TONS
HYDRAULIC PRESS STRUCTURES AND CYLINDER AT
T.M.C INDUSTRIAL PUBLIC CO., LTD. THAILAND**



FINAL PROJECT REPORT

By:

Name : Ulil Fawaaid

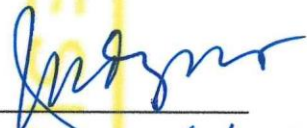
Student Number : 13525064

NIRM : 2013070913

Examination Committee

Dr. Eng. Risdiyono, S.T, M.Eng.

Chairman



Date : 22/8/2017

Tassaphan Suwannat

Examiner I



Date : 22/8/2017

Santo Ajie Dhewanto, S.T., MM.

Examiner II

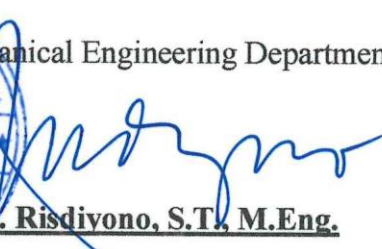


Date : 22/8/2017



Head of Mechanical Engineering Department

Dr. Eng. Risdiyono, S.T, M.Eng.



DEDICATION PAGE

“This Bachelor thesis is dedicated to my parents, Abdul Salam and Fatkhiyatul Husnah, and My Sister Abdau Salamah.”

“And I also dedicated to all people who help, supports and prays for my bachelor thesis”

MOTTO

“ The Believer is kind and gracious, for there is no goodness in one who is neither kind nor gracious. The best of people are those who are most beneficial to people.”

ACKNOWLEDGMENTS



Thank Allah SWT The Almighty who has given Rahmat to the author for completing the final project report entitled " Design and Finite Element Analysis of 100 Tons Hydraulic Press Structures and Cylinder at T.M.C Industrial Public Co., Ltd. Thailand ". This project is one requirement to obtain a bachelor degree in Department of Mechanical Engineering, Faculty of Industrial Technology, Universitas Islam Indonesia.

The author wants to express my sincere thanks to:

1. The author's beloved family, who always supports, motivates and prays for my success.
2. Mr. Tassaphan Suwannatat for his valuable guidance, worthy, correction, and suggestion to improve the quality of this research and thank you very much for his time to share his great knowledge and experiences.
3. Dr. Risdiyono as our advisor who has given help and chance to do a final project in Thailand.
4. Mr. Arif Budi Wicaksono as our advisor who always gives motivation and helps during we do a final project.
5. All lectures of Mechatronics Engineering of RMUTT-OK, who have accepted our presence very well. For guidance, instruction and help during the study at the university.
6. All people of TMC Industrial Co., Ltd, who have provided a lot of new knowledge for the author and thanks to all the help that has been given.
7. All of our wonderful friends from Thailand who help and take care of us during in Thailand. We had unforgettable moments.
8. Heroist Group (Fauzan, Dana, Wisnu, Indri, Rey, Yoga, Bobby, and Prayoga), who always give me support and motivation during the making of the final report.

The Authors also thanks, all of the concerned parties who have helped in completing this report and the building suggestions and critics are also fully expected.

Yogyakarta, August 5th, 2017

Author

ABSTRACT

A hydraulic press is a machine using a hydraulic cylinder to generate a compressive force. Frame and cylinder are the main components of the hydraulic press. In this project press frame and cylinder are designed by the design procedure. Press frame and cylinder are analyzed to improve its performance and quality for press working operation. Structural analysis has become an integral part of the product design. The frame and cylinder are modeled by using modeling software Autodesk Inventor 2015. The designed hydraulic press machine should pass through calculation, 3D imaging and be simulated to get a safe hydraulic press machine design. The calculation of each component comprising it was conducted by using simulation feature of Autodesk Inventor 2015 software. From the design, calculation, and simulation processes, the strength of every machine component could be estimated, so that the selection of shape, size, and material of every component could be decided more effectively. The machine employed a hydraulic mechanic system with two actuator cylinders having 100-ton capacities.

Keywords: Hydraulic Press Machine, Design, Finite Element Analysis.

TABLE OF CONTENT

Cover	i
Declaration Letter	ii
Thesis Approval of Supervisor	iii
Thesis Approval of Examination Committee	iv
Dedication Page	v
Motto	vi
Acknowledgments	vii
Abstract.....	ix
Table of Content	x
List of Table	xii
List of Figure	xiv
List of Notation.....	xv
CHAPTER I INTRODUCTION	1
1.1 Background	1
1.2 Problem Formulation	2
1.3 Scope of Research.....	2
1.4 Objective of Research	2
1.5 Research of Benefit.....	3
1.6 Systematics of Writing.....	3
CHAPTER 2 LITERATURE REVIEW	4
2.1 Literature Review	4
2.2 Basic Theory	4
2.2.1 Hydraulic System	4
2.2.2 Double Acting Cylinder	6
2.2.3 Steel	6
2.2.4 Material JIS 3101 SS400	7
2.2.5 Material ST52	8
2.2.6 Pump.....	9
2.2.7 Electric Motors	10
2.2.8 Computer-Aided Design.....	11

2.2.9	Finite Element Method	12
2.2.10	Safety Factor	13
2.2.11	Autodesk Inventor 2015	13
CHAPTER 3	METHODOLOGY	14
3.1	Research Flow	14
3.2	Equipment and Materials	15
3.3	Design	15
3.3.1	Design and Calculation.....	15
CHAPTER 4	RESULTS AND DISCUSSION	24
4.1	Modelling.....	24
4.1.1	Modeling of Hydraulic Cylinder	24
4.1.2	Modeling of Hydraulic Press Machine Structure	25
4.2	Analysis and Discussion	26
4.2.1	Loading Analysis of Main Cylinder	27
4.2.2	Stress Analysis of Hydraulic Press Machine.....	33
CHAPTER 5	CONCLUSIONS	48
5.1	Conclusion	48
5.2	Recommendation	49
REFERENCES	50

LIST OF TABLE

Figure 2. 1 Hydraulic Cylinders	5
Figure 2. 2 Pascal Law	5
Figure 2. 3 Double Acting Cylinder	6
Figure 2. 4 Steel.....	7
Figure 2. 5 Centrifugal Pump	9
Figure 2. 6 Positive Displacement Pump.....	9
Figure 2. 7 Classification of the Main Types of Electric Motors	10
Figure 2. 8 Rotor and Stator	11
Figure 3. 1 Research Flow Diagram.....	14
Figure 3. 2 Hydraulic cylinder section	16
Figure 4. 1 3D Model of Main Cylinder.....	24
Figure 4. 2 3D Model of Hydraulic Cylinder	25
Figure 4. 3 Explode of Hydraulic Cylinder	25
Figure 4. 4 3D Model of Machine Structure	26
Figure 4. 5 Main Cylinder	28
Figure 4. 6 Fixture of Main Cylinder	28
Figure 4. 7 The loading of Main Cylinder.....	29
Figure 4. 8 Mesh Type of Main Cylinder.....	30
Figure 4. 9 Analysis Result of Main Cylinder.....	31
Figure 4. 10 Safety Factor of Main Cylinder	32
Figure 4. 11 Displacement Value of Main Cylinder	32
Figure 4. 12 Construction of Hydraulic Press Machine	33
Figure 4. 13 Fixture of Frame.....	34
Figure 4. 14 Loading on Frame	35
Figure 4. 15 Mesh Type on Frame	36
Figure 4. 16Analysis Results of Frame	37
Figure 4. 17 Safety Factor of Frame.....	38
Figure 4. 18 Displacement Value of Frame.....	39

Figure 4. 19 Fixture of Work-Bench	40
Figure 4. 20 Loading on Work-Bench.....	40
Figure 4. 21 Mesh Type of Work-Bench.....	41
Figure 4. 22 Analysis Result of Work-Bench.....	41
Figure 4. 23 Safety Factor of Work-Bench	42
Figure 4. 24 Displacement Value of Work-Bench	43
Figure 4. 25 Fixture of Die	44
Figure 4. 26 Loading of Die	44
Figure 4. 27 Mesh Type of Die	45
Figure 4. 28 Analysis Result of Die	45
Figure 4. 29 Safety Factor of Die	46
Figure 4. 30 Displacement Value of Die	47

LIST OF FIGURE

Table 2. 1 Chemical Composition	7
Table 2. 2 Mechanical Properties	7
Table 2. 3 Comparision of steel grades	7
Table 2. 4 Chemical analysis - % by mass of ST52 steel.....	8
Table 2. 5 Mechanical Properties of ST52 Steel	8
Table 3. 1 Engine Specifications	15
Table 3. 2 Specification of Cylinder Rod	18

LIST OF NOTATION

CHAPTER I

INTRODUCTION

1.1 Background

Development of science and technology are currently progressing very rapidly. Technological advances that can not be separated from the support of the manufacturing industry where there is a large industry, small and medium.

T.M.C Industrial Company Co., Ltd. is one of the largest manufacturing companies in Thailand that manufactures various machines with hydraulic and mechanical systems. For approximately 45 years standing, this company has been producing many kinds of hydraulic tools. Generally, these hydraulic machines are widely used to perform special jobs, such as cutting plates, bending the plate, and destroying the remains of steel pieces [1].

One of the excellent products of T.M.C Industrial Co., Ltd. is a hydraulic press machine. A hydraulic press machine is a machine that uses a hydraulic cylinder to produce a compressive force. The basis of a hydraulic press is Pascal's theory which states that the constant pressure given by liquid in a confined space will be forwarded in all directions of equal value [2].

Making the design is one of the important stages in the manufacture of the hydraulic press machine. Creating engineering from the form of a product allows the designer to learn how the product will behave so that the design can be refined and optimized.

In this research, will be designed for the manufacture of hydraulic press machine with a capacity of 100 tons with specifications that have been determined. This design is done to make a product with same specification but different shape and size. The performance of a hydraulic press depends, largely, upon the behavior of its structure during operation. However, these welded structures are becoming complicated and their accurate analysis under given loading conditions is quite important to the structural designer. Structural analysis has been applied on frame hydraulic press structure by using analyzing software Autodesk Inventor 2015.

It is hoped that the concept of hydraulic press machine design can be used as a new literature on T.M.C Industrial Public Co., Ltd. in order to support the manufacture of hydraulic press machines are effective and optimal.

1.2 Problem Formulation

Based on the problems of the background of the emerging research questions :

1. How to design structure, hydraulic cylinder, motor and pump on a hydraulic press machine.
2. What things are produced after doing the design using finite element method.

1.3 Scope of Research

Based on the explanation above in points 1.1 and 1.2 it is necessary to determine the scope basis the purpose of the research conducted in order to focus.

While the scope of research is :

1. This design study was conducted at T.M.C Industrial Company Limited Thailand.
2. Design using Autodesk Inventor 2015 Software.
3. The calculations performed are limited to the determination of hydraulic cylinders, pumps, and motors to be used.
4. Analyses are performed only digitally without making the product.

1.4 Objective of Research

This research aims to make Hydraulic Press Machine with 100T Capacity Using Finite Element Analysis. This design process is done to support the making of hydraulic machine design more effective and optimal.

1.5 Research of Benefit

Regarding this research, the benefit is :

1. As a new design concept for T.M.C Industrial Public Co., Ltd. Thailand.
2. The design is done to support the design of hydraulic machine more effective and optimal.

1.6 Systematics of Writing

Systematics of writing this final project is arranged in order to facilitate the discussion. The writing of this final project is described as follows :

CHAPTER I INTRODUCTION

This chapter describes the background, problem formulation, problem definition, research objectives, research benefits and systematics of writing.

CHAPTER II LITERATURE REVIEW

This chapter will describe inductive and deductive studies. Inductive studies are especially important for determining literature studies from previous studies. The deductive study needs to be elaborated to provide a basic support theory for developing benchmarking assessments.

CHAPTER III RESEARCH METHODOLOGY

This chapter will describe the methodology which is applied in the study. It consists of several parts: flow diagram, Tools and materials, and calculations on design.

CHAPTER IV RESULTS AND DISCUSSION

This chapter contains the results and discussion based on research and design that has been done.

CHAPTER V CONCLUSIONS

This chapter contains the conclusions of the discussions and suggestions for further research.

CHAPTER 2

LITERATURE REVIEW

2.1 Literature Review

A hydraulic system is a form of change or transfer of power by using a liquid carrier conducting medium to obtain power greater than the initial power released [3].

Hydraulic press system, transmission power generation, and amplification are achieved by using fluid under pressure. The liquid system exhibits solid characteristics and generates highly positive and rigid transmission and power amplification media. In simple applications, smaller pistons transfer fluid under high-pressure cylinders that have larger piston areas, thus strengthening the force. There is the ease of transmitting large amounts of energy with unlimited power amplification. It also has a very low inertia effect [4].

(Wibowo et. al., 2014), designs and analyzes the strength of Hydraulic plate bending machine construction using Solidworks 2012 software. The design and analysis are done by modeling machine components, then performing static analysis through finite element method in the software [5].

2.2 Basic Theory

The basic theory is one important component. The theoretical basis is used as a foundation to broaden and deepen the researcher's knowledge in uncovering research problems.

2.2.1 Hydraulic System

A hydraulic system is a form of change or transfer of power by using a liquid carrier conducting medium to obtain power greater than the initial power released. The conductor fluid is driven by pressure-generating pressure pumps and then forwarded to the working cylinder via pipelines and valves. The translational movement of the piston rod from the working cylinder resulting from the fluid

pressure in the cylindrical chamber is utilized for forward and backward motion [6].

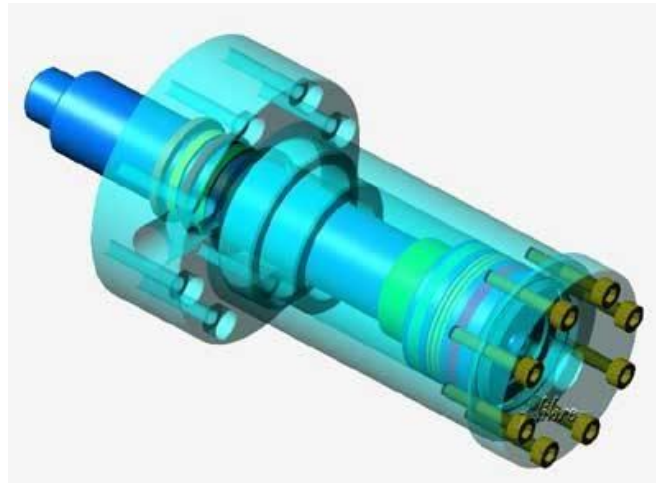


Figure 2. 1 Hydraulic Cylinders

The basic principle of the hydraulic system comes from the Pascal law, where the pressure in the static fluid must have the following properties:

1. Pressure acts perpendicular to the surface of the plane.
2. Pressures at each point are the same for all directions
3. Pressure applied to the fluid in a closed place, propagating uniformly to another part of the fluid.

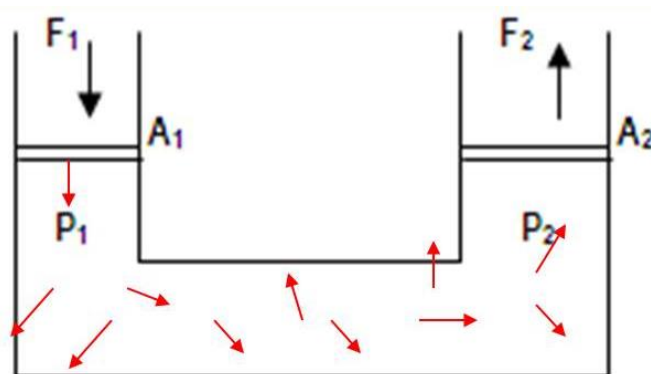


Figure 2. 2 Pascal Law

If the suction on the A_1 cross section is pressed with the F_1 force than the suction on the A_2 cross section arises pressure. So the applicable law is:

$$P_1 = P_2$$

$$\frac{F_1}{A_1} = \frac{F_2}{A_2}$$

The above equation shows that if the ratio of A_2 to A_1 is large, the ratio of force F_2 to F_1 is also large.

2.2.2 Double Acting Cylinder

A double-acting cylinder is a cylinder in which working fluids work alternately on both sides of the piston. It has a port on each end, fitted with a hydraulic fluid for removal and piston extension. A double working cylinder is used where the external force is not available to pull back the piston or where high force is required in both directions. This condition is usually said to be a retract condition [7].

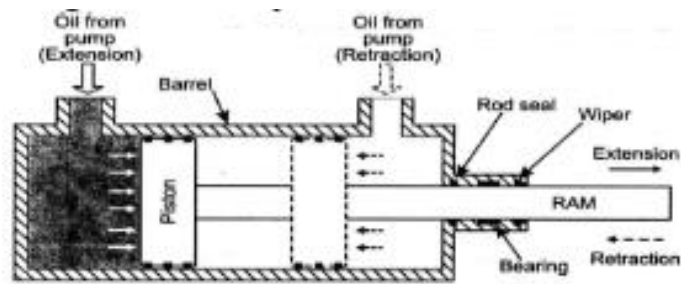


Figure 2. 3 Double Acting Cylinder

2.2.3 Steel

Steel is a metal alloy, iron metal as a basic element with carbon as the main alloying element. Carbon element content in steel ranges from 0.2% to 2.1% by weight according to its grade. The function of carbon in steel is as a hardener by preventing dislocations from shifting to the crystal lattice of iron atoms. This carbon steel is known as black steel because it is black, widely used for agricultural equipment such as crescent and home. Other commonly added alloying elements other than carbon are titanium, chromium (chromium), nickel, vanadium, cobalt, and tungsten (wolfram). By varying the carbon content and other alloying elements, different types of steel qualities can be obtained. The addition of carbon

to the steel can increase hardness and tensile strength, but on the other hand, it makes it brittle and ductility [8].

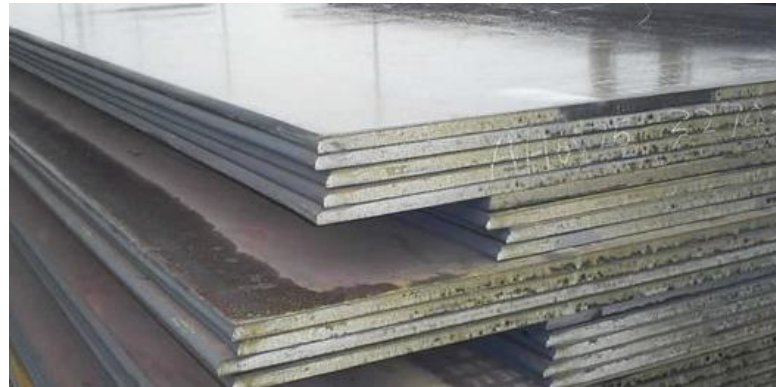


Figure 2. 4 Steel

2.2.4 Material JIS 3101 SS400

Material JIS 3101 SS400 is Japanese steel production category Rolled Steel for a general structure with JIS standard (Japanese Industrial Standard). This material is a type of material that is widely used in building ships, bridges, and structures that require high strength [9]. This is a specification of the SSIS JIS Material :

Table 2. 1 Chemical Composition

Grade	Chemical Composition, % by weight				
	C. max	Si. Max	Manganese	P. max	S. max
SS400	-	-	-	0.050	0.050

Table 2. 2 Mechanical Properties

Grade	Yield Strength min. (MPa)		Tensile Strength (MPa)	Elongation min. %			Impact Resistance min. (J)
	Thickness <16 mm	Thickness ≥ 16 mm		Thickness <5 mm	Thickness 5-16 mm	Thickness ≥ 16 mm	
	SS400	245		235	400-510	21	

Table 2. 3 Comparison of steel grades

SS400 JIS 3101	Comparison of steel grades	
	BS 4360	40 (A) B
	CSAG40-21	230 G

	IS	IS 226
	JIS 3106	SM 400 A
	ISO 630	Fe 360 B
	ASTM	A 36/ A 283 C

2.2.5 Material ST52

Steel DIN17135 ST52 is a type of material widely used for boilers and pressure vessel steels. DIN17135 ST52 is characterized by a minimum yield strength of 280-355 MPa and with good welding capability, so ST52 steel is widely used for boiler manufacturing, pressure vessels and pipes carrying hot liquids [10]. This is a specification of the ST52 material:

Table 2. 4 Chemical analysis - % by mass of ST52 steel

Grade	C. %	Mn. %	S.	N	Cu	Nb	Ti.
A ST52	0.10-0.22	0.10-1.70	0.015	0.012	0.30	0.020	0.03
	Si.	P.	AL	Cr.	Mo.	Ni	Vi
	0.60	0.025	0.020	0.30	0.08	0.30	0.02

Table 2. 5 Mechanical Properties of ST52 Steel

Grade	Type	Thickness (mm)	Yield Strength (MPa)	Tensile Strength (MPa)	Elongation %	Impact Energy (KJ) (min)		
						-20°	0°	+20
ST52	Normalized	≤ 16	355	510-650	20	27	34	40
		16 >to ≤ 40	345	510-650	20	27	34	40
		40 >to ≤ 60	335	460-580	20	27	34	40
		60 >to ≤ 100	315	490-630	20	27	34	40
		100 >to ≤ 150	295	480-630	20	27	34	40
		150 >to ≤ 250	280	470-630	20	27	34	40

2.2.6 Pump

A pump is a machine that adds energy to the liquid in order to increase the pressure or to move the liquid through a pipe [11]. In general, there are 2 types of pumps are:

1. Centrifugal pump is a pump that transfers liquid by utilizing the centrifugal force generated by impeller rotation. The centrifugal pump converts the velocity energy into pressure energy. Centrifugal pumps are also referred as speed machines because the faster the round of the pump will be the higher the pressure is generated.



Figure 2. 5 Centrifugal Pump

2. The Positive Displacement Pump is a type of pump which the fluid is pressed by elements in a pump with a certain volume so that it will produce intermittent capacity for fluid flow. This pump works by moving the incoming fluid into the side of the exhaust so there is no backflow or leak from the side of the flue to the entry side.



Figure 2. 6 Positive Displacement Pump

2.2.7 Electric Motors

An electric motor is an electromagnetic device that converts electrical energy into mechanical energy. Electric motors are also called industrial "working horses" because it is estimated that motors use about 70% of the total electrical load in the industry [12].

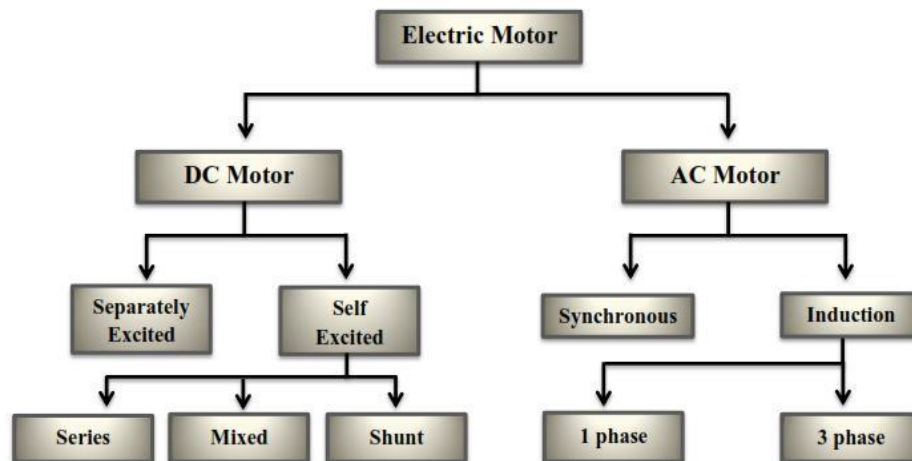


Figure 2. 7 Classification of the Main Types of Electric Motors

Generally, electric motors are classified into 2. Those are:

1. Motor DC

The DC motor is a one-way current motor. This type of motor uses direct-unidirectional. DC motors are used in special applications where high torque ignition or fixed speed is required for a wide range of speeds. The DC motor has 3 main components :

- a. Pole Magnetic field. The interaction between the two magnetic poles will cause a rotation of the DC motor. The DC motor has a stationary and dynamo field pole that moves the bearings in the space between the field poles.
- b. Dynamo. It functions to convert current into electromagnets. Dynamo rotates in a magnetic field formed by poles to the north and south poles of the magnet to change locations.
- c. Commutator. It functions to reverse the direction of electric current in the dynamo as well as to assist in the transmission of currents between the dynamo and the power source.

2. AC Motor

The AC motor is an alternating current motor that uses an electric current to reverse direction regularly over a specified time range. Electric motors have 2 main components :

- a. Rotor. It is part of an electric motor that rotates on the rotor axis. Rotation of the rotor is due to the presence of magnetic field and wire winding on the rotor. While the torque of the rotation of the rotor is determined by the number of wire windings and also its diameter.
- b. Stator. Serves as stationary of the rotor system. Placement on the stator usually surrounds the rotor. The stator can be a copper wire coil that interacts with the armature in forming a magnetic field to regulate the rotation of the rotor.

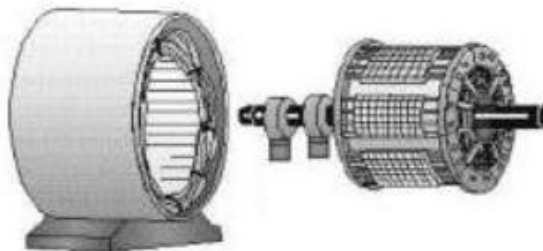


Figure 2. 8 Rotor and Stator

2.2.8 Computer-Aided Design

Computer-Aided Design or commonly called CAD is an information technology in the design process. This CAD system consists of hardware, software, and peripherals which in some specific applications is quite special. The essence of CAD systems is to use graphics to represent database products to store product models and encourage peripherals for product presentation. CAD is used to assist in creating, modifying, analyzing, and design optimization. Any computer program that enables computer graphics and application programs to facilitate engineering functions in the design process can be classified as CAD software. The greatest role of CAD is to define design geometry of mechanical parts, product assembly, architectural structures, electronic circuits, and building layout [13].

2.2.9 Finite Element Method

Finite Element Method (FEM) or Finite Element Analysis (FEA) is a numerical method for solving a differential or integral equation. The finite element method is based on the idea of constructing complex objects or simple units or dividing complex objects over easily handled small units [14]. The finite element analysis on a problem is schematic so that it can be broken down into a set of logical steps that can be implemented on a digital computer and can be used on a variety of problems simply by replacing the input data.

Finite Element Analysis (FEA) is the most widely applied computer simulation method in the manufacturing world. The Finite Element Analysis procedure consists of :

1. Preprocessor, including making, determining the type of material used, material specifications, meshing, and others.
2. The solution, including the determination of boundary conditions, types of analysis, and troubleshooting.
3. The General post processor is a facility to see the simulation results that have been done.

The types of strength testing analysis on a commonly used design are:

1. Stress Analysis or Voltage in continuum mechanics is a quantity that shows the internal forces between particles of a material against other particles. For example, a solid vertical rod that supports the load, each particle of a rod pushes another particle above and below it. The measured macroscopic force is actually the average of a large number of collisions and intermolecular forces within the bar.
2. *Torque Analysis* is a twist that occurs in a straight rod is burdened with a moment that tends to result in a rotation of the longitudinal axis of the rod, the example of a screwdriver.

2.2.10 Safety Factor

The actual strength of a structure must exceed the required strength. The magnitude of the safety factor is the ratio between the yield strength to the design stress of each material formulated as follows.

$$Sf = \frac{YS}{DS} \quad (2.1)$$

Where Sf is the safety factor, YS is the yield strength and DS is the stress design. The comparison of safety factor values should be greater than 1 to avoid failure.

2.2.11 Autodesk Inventor 2015

Autodesk Inventor 2015 is one of the CAD software (Computer Aided Design) created by the American company called Autodesk. As a CAD software, Autodesk Inventor is appropriately applied in mechanical parts design work, mechanical system design to mechanical strength analysis of mechanical components being handled. Autodesk Inventor 2015 provides feature-based, parametric, solid modeling and moves on 3-dimensional modeling. This software is also able to analyze the product to know the strength of products such as force, torque, temperature, and safety factor.

CHAPTER 3

METHODOLOGY

3.1 Research Flow

To easier this research writer, make a Research Flow Diagram in Figure 3.1 below.

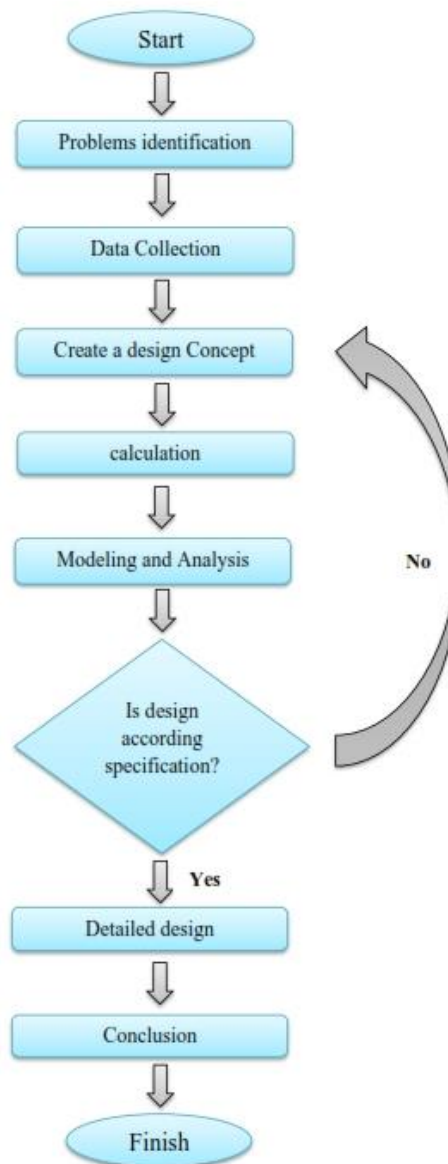


Figure 3. 1 Research Flow Diagram

3.2 Equipment and Materials

The tools and materials used for this research are as follows :

1. A set of laptops with the following specifications :
 - a. AMD A10-5750M APU with Radeon HD Graphics (4 CPUs), 2.5GHz
 - b. 4096MB of RAM memory
2. Calculator.
3. Autodesk Inventor 2015 software used to create 3D models and simulate.
4. Reference data related to hydraulic press machine design.

3.3 Design

In the process of designing requires a careful planning. This is very important in order to lead in the process of work, so as expected for limiting any issues that need to be resolved in accordance with planning.

3.3.1 Design and Calculation

The design is to design a hydraulic press machine with a capacity of 100 tons. Data specifications as follows :

Table 3. 1 Engine Specifications

MACHINE SPECIFICATIONS	
DATA	DETAIL
Model	HP 100
Max. Press Capacity	105 ton
Cylinder Type	Double Acting
Motor/Pump	(7.5 HP)/(8cc/rev)
Press Speed / Up Speed	(3-4 mm/sec) / (4-5 mm/sec)
Cylinder Stroke	334 mm
Maximum Pressure	210 bar

The design of the hydraulic press machine starts from the calculation to determine the hydraulic cylinder specifications to be used. The calculations include: determining the inner diameter of the cylinder, determining the thickness

of the cylinder, determining the outer diameter of the cylinder, and determining the length of the cylinder.

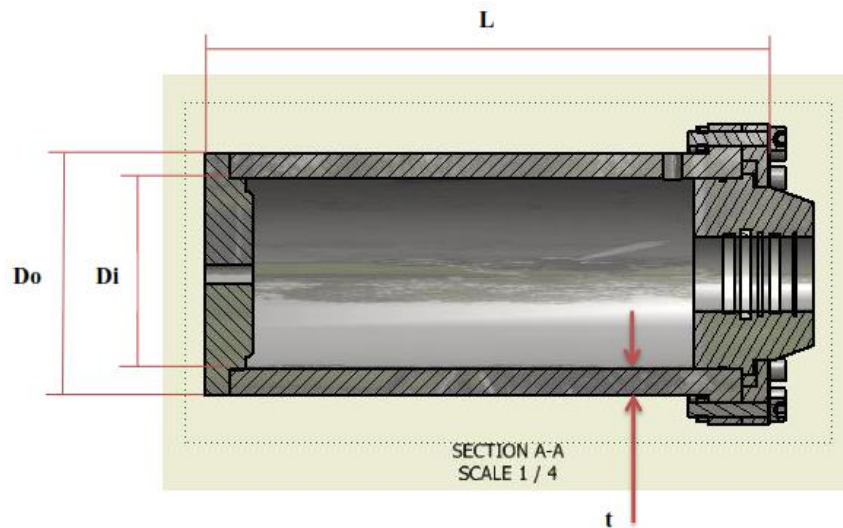


Figure 3. 2 Hydraulic cylinder section

3.3.1.1 Determine Inner Diameter of Cylinder

The known maximum capacity of pressure on data specification at design is equal to 105 Ton or equal to 105000 kg. For a given maximum pressure is 210 bar or equivalent to 210 kg / cm². From these data, so that can be determined the area of a cylinder by using pressure formula.

$$P = \frac{F}{A}$$

Where :

P = Pressure (kg/cm²)

F = Gaya (Kgf)

A = Area (cm²)

Then, the required cylinder area :

$$P = \frac{F}{A} \Rightarrow A = \frac{F}{P}$$

$$\Rightarrow A = \frac{105000\text{kgf}}{210\text{kg/cm}^2}$$

$$\Rightarrow A = 500\text{cm}^2$$

$$\Rightarrow A = \frac{1}{4} \Pi D^2$$

$$\Rightarrow D = \sqrt{\frac{4 \times A}{\Pi}}$$

$$\Rightarrow D = \sqrt{\frac{4 \times 500}{3,14}}$$

$$\Rightarrow D = 25,3\text{cm} = 253\text{mm}$$

∴ Inner Diameter of Cylinder (Di) = 253 mm

3.3.1.2 Determine thickness of Cylinder (t).

The thickness of Cylinder can be calculated using the equation of lame.

Where :

$$t_c = \frac{Di}{2} \left(\sqrt{\frac{\sigma_t + P}{\sigma_t - P}} - 1 \right)$$

t_c = Thickness of Cylinder (cm)

Di = Inner Diameter of cylinder (cm)

σ_t = Tensile Strength (kg/cm²)

P = Pressure (kg/cm²)

The type of material used in the manufacture of the cylinders is steel. DIN17135 ST52. This type of material is widely used for the boiler and vessel steel press. Steel DIN 17135 ST52 has an average rating of Tensile Strength of 580 Mpa or equivalent of 5800 kg/cm². The value of the internal diameter of the pressure was 25,3 cm and 210 bars or equivalent to 210 kg/cm². Then, the thickness of Cylinder :

$$t_c = \frac{Di}{2} \left(\sqrt{\frac{\sigma_t + P}{\sigma_t - P}} - 1 \right)$$

$$t_c = \frac{25,3}{2} \left(\sqrt{\frac{5800 + 210}{5800 - 210}} - 1 \right)$$

$$t_c = 3,4\text{cm} = 34\text{mm}$$

∴ Thickness of Cylinder (t_c) = 34 mm

3.3.1.3 Determine Outside Diameter of Cylinder (Do)

After known the inner of diameter and thickness of cylinder, then the outside diameter of the cylinder can be determined by the following equation :

$$D_o = D_i + 2t$$

$$D_o = 25,3 + 2(3,4)$$

$$D_o = 32,1\text{cm} = 321\text{mm}$$

∴ Outside diameter of Cylinder (D_o) = 321 mm

3.3.1.4 Determine Rod Diameter of Cylinder

The diameter of the rod in the Cylinder can be determined by looking at a catalog company :

Table 3. 2 Specification of Cylinder Rod

Capacity (TON)	Cylinder Rod (mm)
10	36
20	45
30	56
50	80
75	90
100	100
150	110
200	140
350	160
550	200

Based on table 3.2, known that diameter of cylinder rod which is used in the machine press capacity 100 T are 100 mm.

∴ Diameter of Cylinder Rod (D_{cr}) = 100 mm

3.3.1.5 Determine Length of Cylinder

The length of cylinder required can be determined by summing the values of the thickness of cylinder, the thickness of end-plug, cylinder stroke, the thickness of guide-bush and thickness of the flange. Therefore, we need to do calculations to determine the values:

1. End-plug

The value of end-plug thickness can be determined by this formula:

Where :

$$t_e = Di \sqrt{\frac{0.162 \times P}{\sigma_t}}$$

t = thickness of end-plug (cm)

P = Pressure (kg/cm²)

σ_t = tensile strength (kg/cm²)

Di = inner diameter (cm)

$$t_e = Di \sqrt{\frac{0.162 \times P}{\sigma_t}}$$

$$t_e = 25.3 \sqrt{\frac{0.162 \times 210}{5800}}$$

$$t_e = 1,93 \text{ cm} = 19,3 \text{ mm}$$

$$t_e \approx 2 \text{ cm}$$

∴ Thickness of End-plug is 20 mm

2. Piston

The value of piston thickness can be determined by this formula :

Where : D = Inner Diameter of Cylinder (cm)

P = Pressure (kg/cm²)

Dcr = Diameter of cylinder Rod (cm)

σ_s = Shear Stress (kg/cm²)

t_p = Thickness of Piston (cm)

$$t_p = \frac{Di^2 \times P}{4 \times Dcr \times \sigma_s}$$

$$\sigma_s = \frac{F}{A} = \frac{100000}{\frac{1}{4} \times 3,14 \times (25,3)^2} = 208 \text{ kg/cm}^2$$

$$\Rightarrow t_p = \frac{D^2 \times P}{4 \times d \times F_s}$$

$$\Rightarrow t_p = \frac{25,3^2 \times 210}{4 \times 10 \times 208}$$

$$\Rightarrow t_p = 16,16\text{cm} = 161,6\text{mm}$$

∴ Thickness of Piston is 161,6 mm

3. Guide bush

the value of Guide bush thickness can be determined by this formula :

Where :

C = Empirical constant

W = Load acting of Guide-Bush
(Capacity of Cylinder) (kgf)

σ_s = Tensile Stress (kg/cm²)

t_g = Thickness of Guide-Bush (cm)

$$t_g^2 = \frac{C \times W}{\sigma_t}$$

Empirical Constant are constants of Value that Cn is gained from a comparison between the center traction bolts with a diameter of ram. The value of C can be chosen based on the table below :

Table 3.3 value of empirical constant of guide-bush

Ratio of R/r	1.25	1.5	2	3	4	5
Value of C	0.592	0.976	1.44	1.88	2.08	2.195

$$\Rightarrow t_g^2 = \frac{C \times W}{\sigma_t}$$

$$\Rightarrow t_g = \sqrt{\frac{C \times W}{\sigma_t}}$$

$$\Rightarrow t_g = \sqrt{\frac{2.08 \times 105000}{5800}}$$

$$\Rightarrow t_g = 6.14\text{cm} = 61.4\text{mm}$$

∴ Thickness of Guide-Bush is 61.4 mm

4. Flange

The value of flange thickness can be determined by this formula :

Where :

C = Empirical constant

W = Load acting of Flange
(Capacity of Cylinder) (kgf)

σ_s = Tensile Stress (kg/cm²)

t_f = Thickness of Flange (cm)

$$t_f^2 = \frac{C \times W}{\sigma_t}$$

Empirical Constant are constant that can be gained from the comparison between diameter in a cylinder with cylinder rods diameter. Values of C can be gained based on the table below.

Table 3.4 Value of Empirical Constant of Flange

R/r	1.25	1.5	2	3	4	5
C	0.13	0.34	0.740	1.22	1.46	1.61

$$\Rightarrow t_f^2 = \frac{C \times W}{\sigma_t}$$

$$\Rightarrow t_f = \sqrt{\frac{C \times W}{\sigma_t}}$$

$$\Rightarrow t_f = \sqrt{\frac{1,22 \times 105000}{5800}}$$

$$\Rightarrow t_f = 4.6 \text{ cm} = 46 \text{ mm}$$

∴ Thickness of Flange is 46 mm

Based on the calculations above, the value of cylinder length is :

$$L = t_c + t_e + t_p + CS + t_g + t_f$$

$$L = 34 + 20 + 161.6 + 334 + 61.4 + 46$$

$$L = 657 \text{ mm}$$

∴ Length of Cylinder is 657 mm

3.3.1.6 Determine Flow Rate of Pump

Known from the specification that the desired speed of the press is 3-4 mm / s or 0.3-0.4 cm / s. Whereas, the desired speed while up condition is 4-5 mm / s or 0.4-0.5 cm / s. From these data can be calculated flow rate at the pump using the formula below :

$$Q = \frac{v \times A \times 60}{1450}$$

Where :

Q = Flow Rate of Pump (cc/rev)

V = Velocity (cm/s)

A = Area (cm²)

1. Flow Rate of Pump When Down Condition

Known: V = 0.3 cm/s

$$A_d = A_{\text{bore}} = 500 \text{ cm}^2$$

$$\Rightarrow Q_d = \frac{v \times A_d \times 60}{1450}$$

$$\Rightarrow Q_d = \frac{0.3 \times 500 \times 60}{1450}$$

2. Flow Rate of Pump when Up Condition

known: V = 0.4 cm/s

$$\Rightarrow A_{up} = \frac{1}{4} \Pi (D_i - D_{cr})^2$$

$$\Rightarrow A_{up} = \frac{1}{4} \times 3.14 (25.3 - 10)^2$$

$$\Rightarrow A_{up} = 184 \text{ cm}^2$$

$$\Rightarrow Q_{up} = \frac{v \times A_{up} \times 60}{1450}$$

$$\Rightarrow Q_{up} = \frac{0.4 \times 184 \times 60}{1450}$$

$$\Rightarrow Q_{up} = 3 \text{ cc / rev}$$

$\therefore Q_{\text{down}} = 6.2 \text{ cc/rev}$ and $Q_{\text{up}} = 3 \text{ cc/rev}$

3.3.1.7 Determine Size of Motor

Minimum motor power used can be determined using the following formula :

$$SM = \frac{Q \times \frac{1450}{1000} \times P}{600 \times 0.85 \times 0.746}$$

Where :

Q = Flow Rate of Pump (cc/rev)

P = Pressure (kg/cm²)

A = Area (cm²)

SM = Size of Motor (HP)

1. Power of required when Down Condition

Known: $Q_{\text{down}} = 6.2 \text{ cc/rev}$
 $P = 210 \text{ kg/cm}^2$

$$SM = \frac{Q_{\text{down}} \times \frac{1450}{1000} \times P}{600 \times 0.85 \times 0.746}$$

$$SM = \frac{6.2 \times \frac{1450}{1000} \times 210}{600 \times 0.85 \times 0.746}$$

$$SM = 4.9 \text{ HP}$$

2. Power of Motor required when Up Condition

Known: $Q_{\text{up}} = 3 \text{ cc/rev}$
 $P = 210 \text{ kg/cm}^2$

$$SM = \frac{Q_{\text{up}} \times \frac{1450}{1000} \times P}{600 \times 0.85 \times 0.746}$$

$$SM = \frac{3 \times \frac{1450}{1000} \times 210}{600 \times 0.85 \times 0.746}$$

$$SM = 2.4 \text{ HP}$$

$$\therefore SM_{\text{down}} = 4.9 \text{ HP and } Q_{\text{up}} = 2.4 \text{ HP}$$

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Modelling

A research in the form of design with simulation testing method is required modeling of the object to be tested. Modeling is conducted by the software of Autodesk Inventor 2015 so that can be known shape and size of machine components in the 3-dimensional form.

4.1.1 Modeling of Hydraulic Cylinder

Based on the calculation is known that to design hydraulic press machine with 100-ton capacity is needed for a cylinder with diameter value in cylinder 253 mm, cylinder thickness value 34 mm, cylinder outer diameter value 321 mm and cylinder length 567 mm. The material used in the design of this hydraulic cylinder uses ST52 Steel.

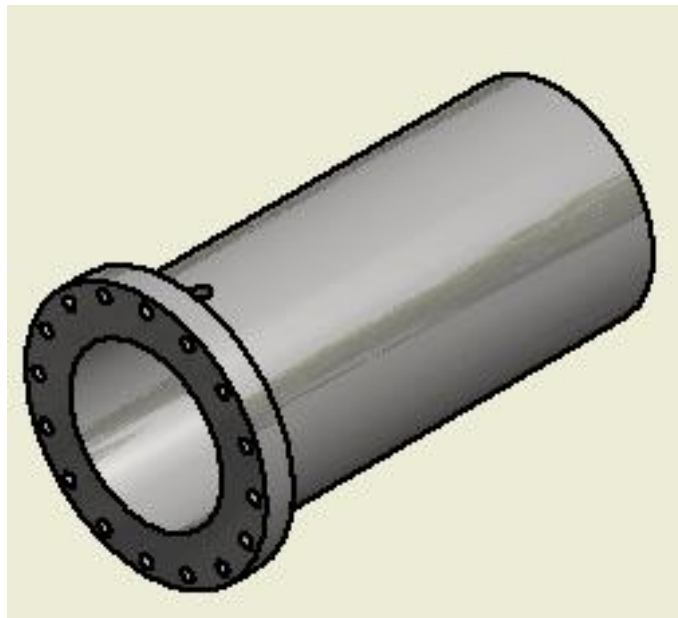


Figure 4. 1 3D Model of Main Cylinder

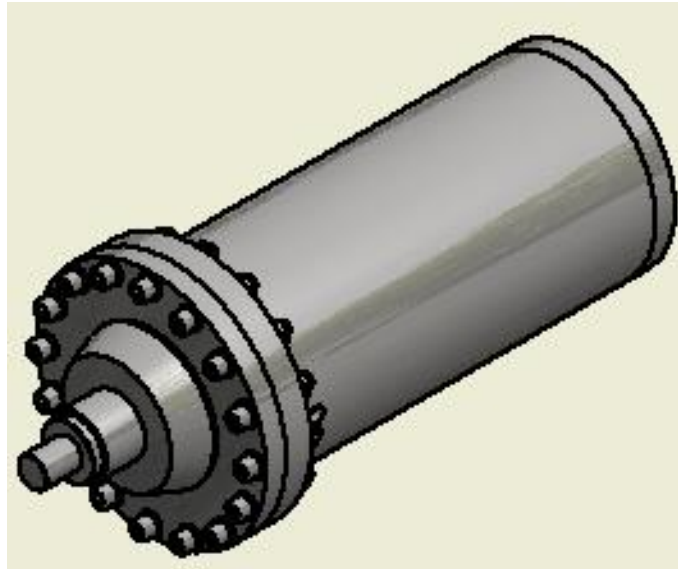


Figure 4. 2 3D Model of Hydraulic Cylinder

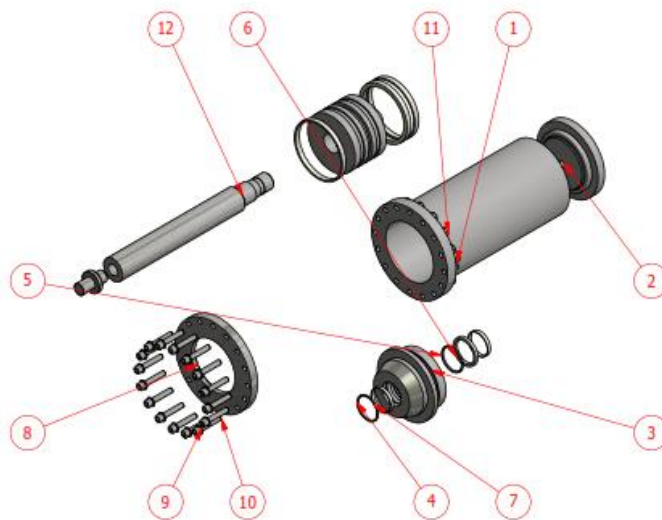


Figure 4. 3 Explode of Hydraulic Cylinder

4.1.2 Modeling of Hydraulic Press Machine Structure

Modeling of machine components is conducted based on the results of the design by providing the size and material in accordance with the actual condition. All components of the machine will be assembled to become one unit of the hydraulic press machine.

Models that have been conditioned to resemble the original design will be analyzed for the strength of construction using the same software.

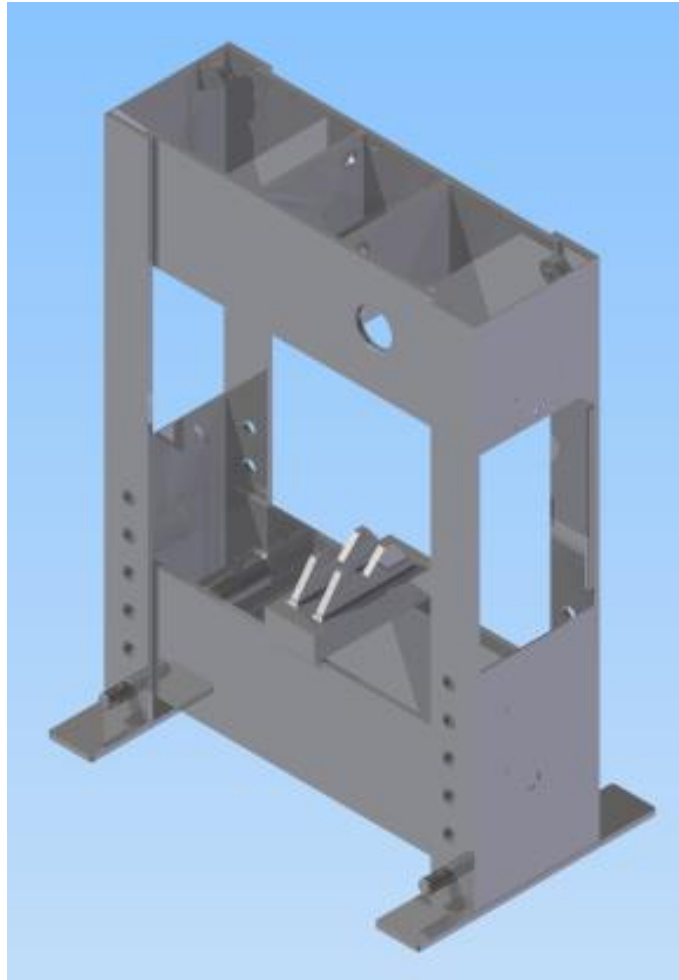


Figure 4. 4 3D Model of Machine Structure

4.2 Analysis and Discussion

The analysis is a thinking activity that contains a number of activities such as parsing, differentiating, sorting out a subject matter. After that, it is reassembled according to certain criteria. This activity aims to determine a characteristic of the specimen so that it can be used as a benchmark in the design process. The analysis performed is an analysis with the software of Autodesk Inventor 2015 based on finite element method. The test analysis is performed on the von mises stress that occurs in the construction to know the safety limits in the selection of size, shape and material type of composition components of the hydraulic press machine.

Based on the analysis can also be known the amount of deformation that occurs in the construction during loading. The following are the Analysis Steps:

1. Making a model of the component with size and material type according to the actual condition.
2. Determining the fulcrum (fixture) of the construction model will be the prop when there is the bending force.
3. Providing of style with type, direction, and magnitude on the construction model in accordance with the actual conditions.
4. The preparation of finite element meshes in the construction model to know the elements of each component to be calculated loading. This step is automatically performed by the software.
5. Analyze the calculation results.

4.2.1 Loading Analysis of Main Cylinder

The load analysis on the main cylinder aims to determine the cylinder strength of the compressive load provided. This method is used as one of the benchmarks of cylinder design. The material used in this hydraulic cylinder design is ST52 Steel Material. This type of material is widely used for boilers and pressure vessel steels. DIN17135 ST52 is characterized by a minimum yield strength of 280-355 MPa and with good welding capability, so ST52 steel is widely used for boiler making, pressure vessels, and pipes that transport hot liquids.

The first step taken on the main cylinder analysis is making the design model in accordance with the size and material that has been selected. The following is a design drawing of the main cylinder shown in Figure 4.5.

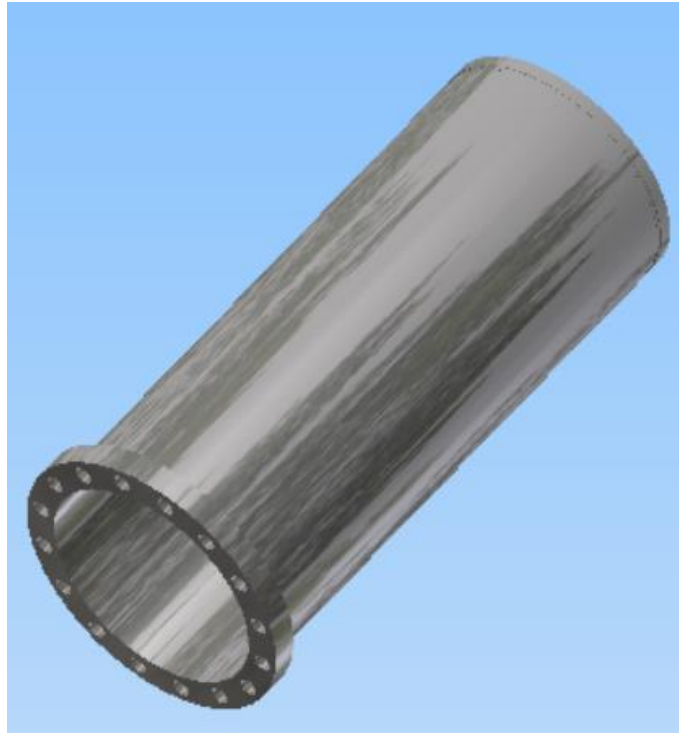


Figure 4. 5 Main Cylinder

The next step is to determine the fixture or the fulcrum of the cylinder construction that will be the prop when there is a compressive force on the cylinder. The provision of the fulcrum on cylinder construction is shown in Figure 4.6.

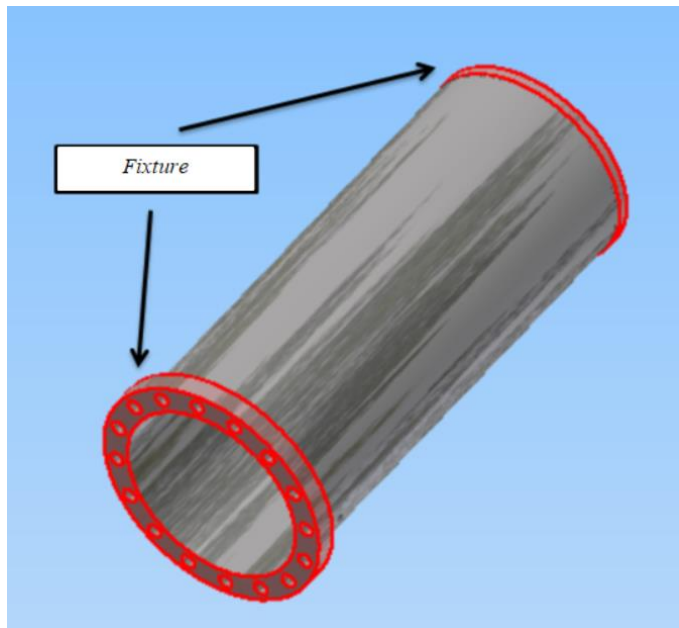


Figure 4. 6 Fixture of Main Cylinder

After the process of determining fixture, the next step is loading on the cylinder construction. The compressive load received by cylinder construction is 210 bar and equal to $2,1 \times 10^7$ Pascal. The load is simulated spreading equally on the part walls in the cylinder. so that the resulting of compressive force can also be spread evenly on each component of the cylinder composition. The loading process in cylinder construction is shown in Figure 4.7

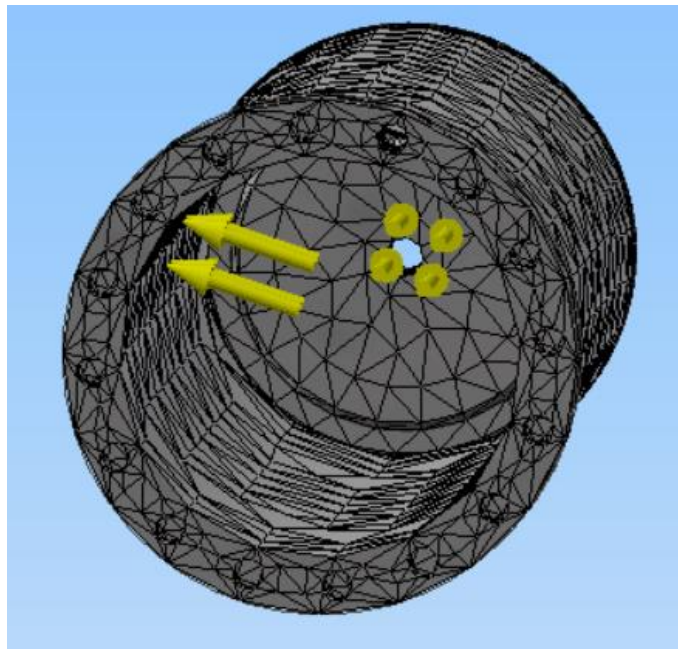


Figure 4. 7 The loading of Main Cylinder

In the analysis of the main cylinder, loading is performed making finite element methods on the construction model to know the elements of each component to be calculated loading. This step is automatically performed by the software. The mesh type in the analysis of the selected type of curvature mesh with low density for the calculation can be more thorough. The making of the finite element meshes on the cylinder is shown in Figure 4.8

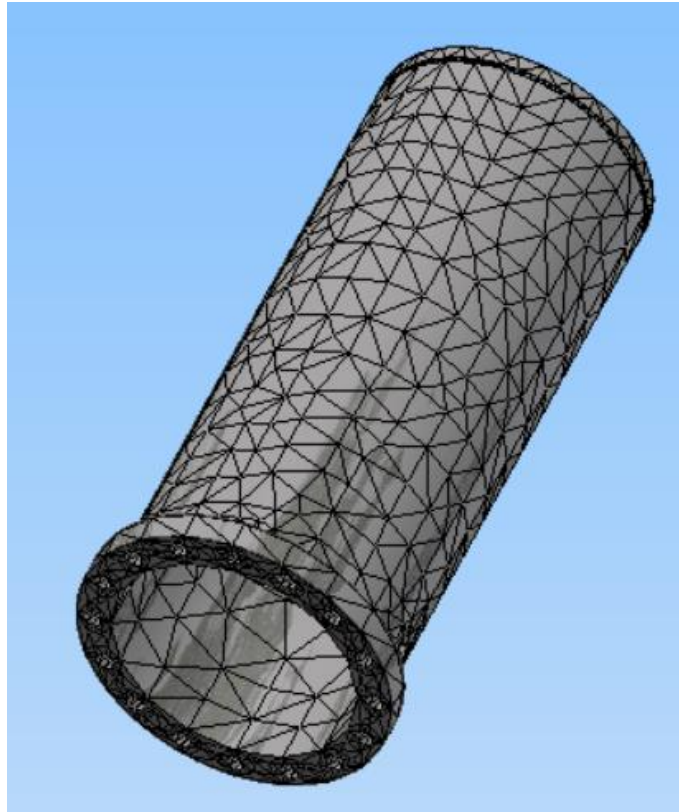


Figure 4. 8 Mesh Type of Main Cylinder

The final step is the simulation process on the main cylinder. This load testing process uses Von Mises Stress type analysis. This analysis can be used as a benchmark for a design. The design can be said to be safe when the maximum value of the analysis of Von Mises Stress is smaller than the yield stress of the material used, and the design can be said to fail when the maximum value of the Von Mises Stress type is greater than the yield stress of the material used. The result of simulation of Von Mises Stress type test analysis which has been conducted on the main cylinder is shown in Figure 4.9

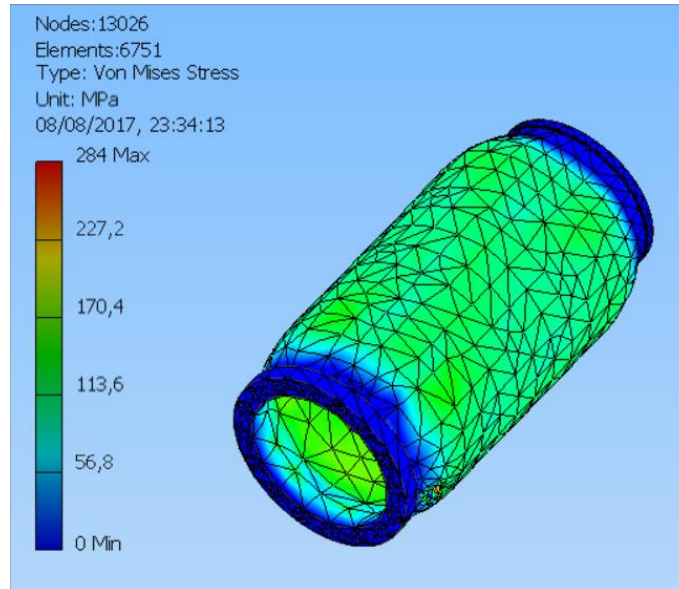


Figure 4. 9 Analysis Result of Main Cylinder

Analysis using software of Autodesk Inventor 2015 is shown in red at maximum voltage and blue at minimum voltage. Based on the simulation calculation results obtained a maximum voltage value of 284 MPa and a minimum voltage of 0 MPa. The following is calculation value of safety factor.

$$SF = \frac{\sigma_{Ijin}}{\sigma_{Max}}$$

$$SF = \frac{355MPa}{284MPa}$$

$$SF = 1,25$$

∴ The value of safety factor is 1,25.

By using the same software aid, the value of the safety factor and the deformation value of the design can also be digitally known. In Figure 4.10, it is shown that the value of the safety factor with red is the minimum value and the blue is the maximum value. Based on the simulation calculation result, the maximum safety factor value is 15 and the minimum safety factor is 1.23. The

safety factor values of the simulated load analysis on the main cylinder are shown in the figure 4.10

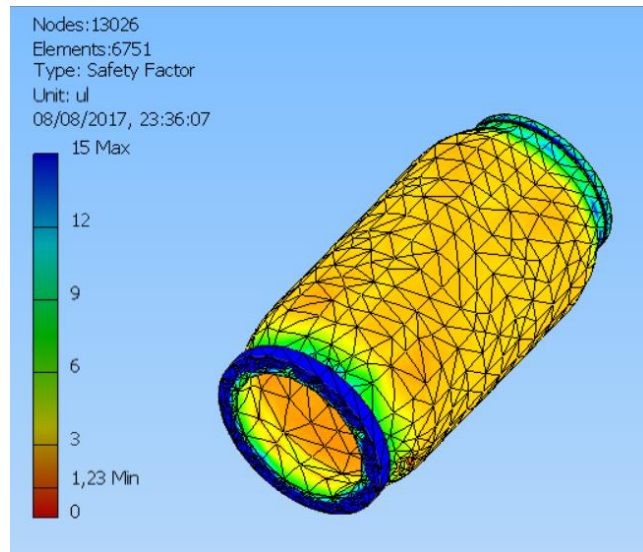


Figure 4. 10 Safety Factor of Main Cylinder

While in figure 4.11, it is shown that the displacement value in red is the maximum value and in the blue is the minimum value. Based on the simulation results, the maximum displacement value is 0.1239 mm and the minimum displacement is 0 mm.

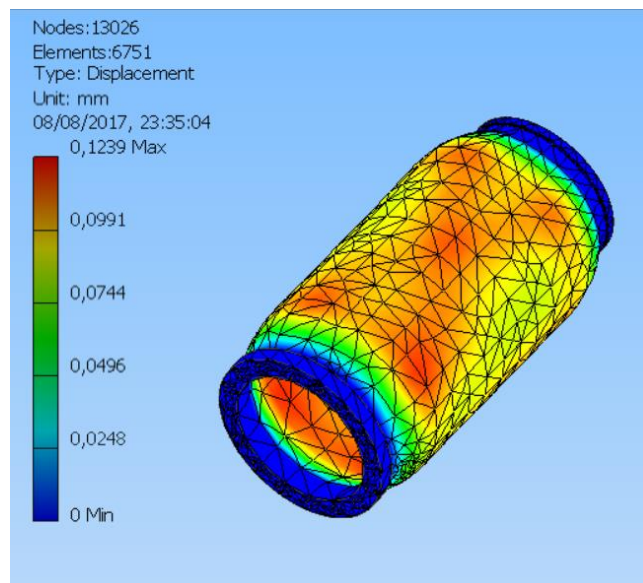


Figure 4. 11 Displacement Value of Main Cylinder

Based on the calculation and simulation, the value of safety factor is greater than 1 and the maximum displacement value is 0.1239. So it can be concluded that the material and design is safe and strong to withstand the compressive load.

4.2.2 Stress Analysis of Hydraulic Press Machine

Analysis on hydraulic press machine construction is done to know the strength of construction to the static load. The loading simulation on the hydraulic press machine is performed on the die, frame, and workbench components.

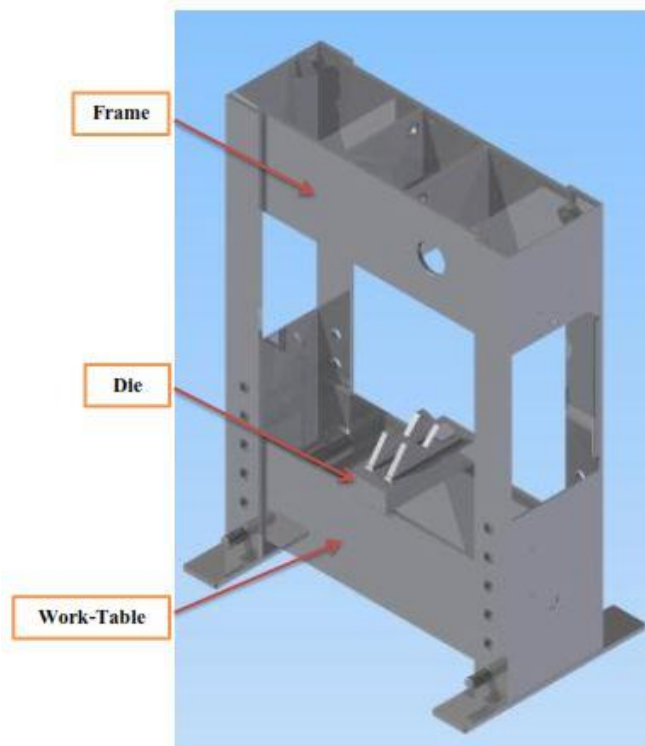


Figure 4. 12 Construction of Hydraulic Press Machine

The material of frame and work table are Material JIS 3101 SS400 which has yield strength 245 MPa and tensile strength 400-510 MPa. The frame construction is connected by the welded joint. The fixture in this construction is the leg part of the frame and the support of the workbench which serves to hold the workbench in the desired position.

4.2.2.1 Stress Analysis of Frame

The maximum force received by frame construction is 105 Ton or equivalent to 105000 kg. To simulate it, the first step is to determine the fixture of the frame which will be the support in case of loading. The provision of the fulcrum on frame is shown in Figure 4.13

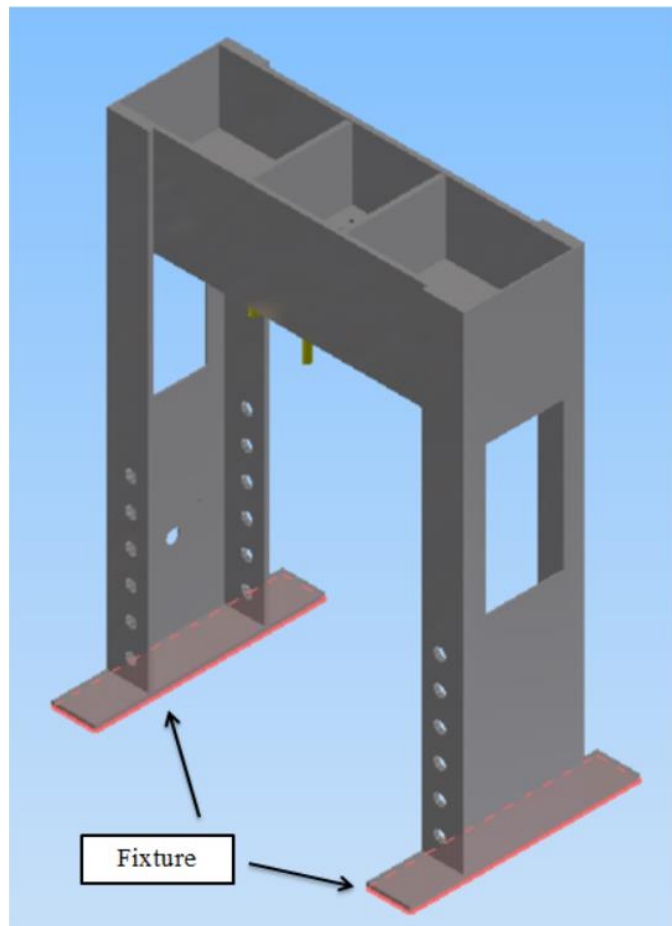


Figure 4. 13 Fixture of Frame

After the process of determining fixture, the next step is loading on the frame construction. The load is applied to the frame affected by the compressive press hydraulic pressure with a maximum capacity of 105 tons or the equivalent of 105000 kg. The loading process on the frame is shown in Figure 4.14

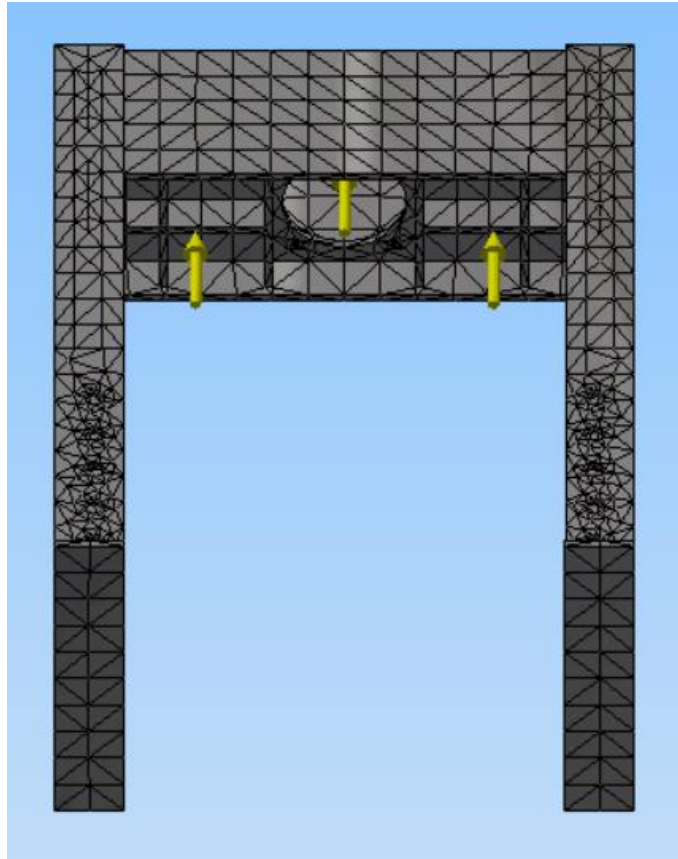


Figure 4. 14 Loading on Frame

The mesh type in the analysis of the selected type of curvature mesh with low density for the calculation can be more thorough. This step is done automatically by the software. The making of the finite element meshes on the frame is shown in Figure 4.15

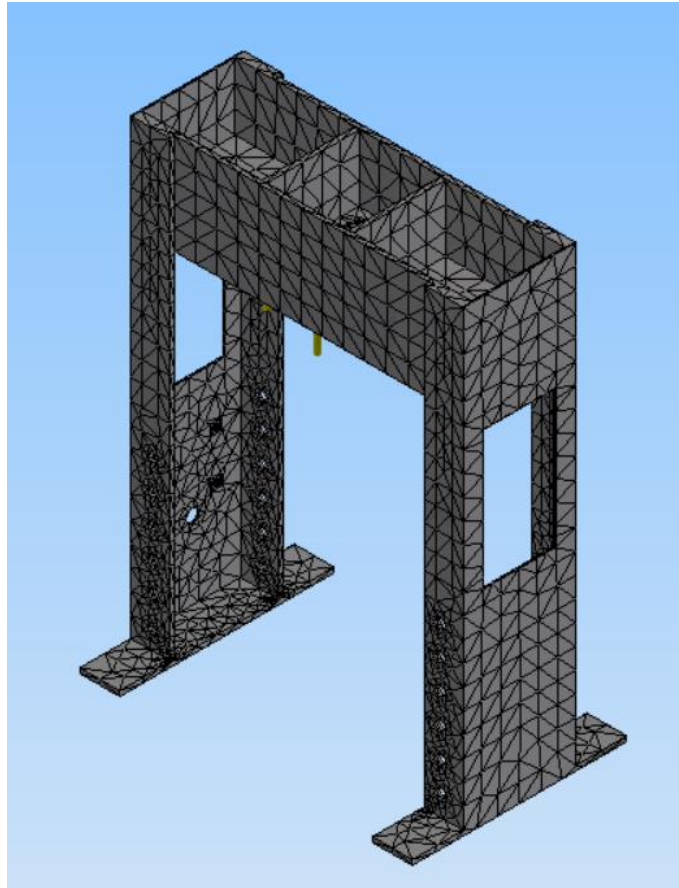


Figure 4. 15 Mesh Type on Frame

The next step is the analysis process using Von Mises Stress type analysis. The design can be said to be safe when the maximum value of the Von Mises Stress analysis is smaller than the yield stress of the material used, and the design can be said to fail when the maximum value of the Von Mises Stress type is greater than the yield stress of the material used. The results of Von Mises Stress which have been conducted on the frame is shown in Figure 4.16

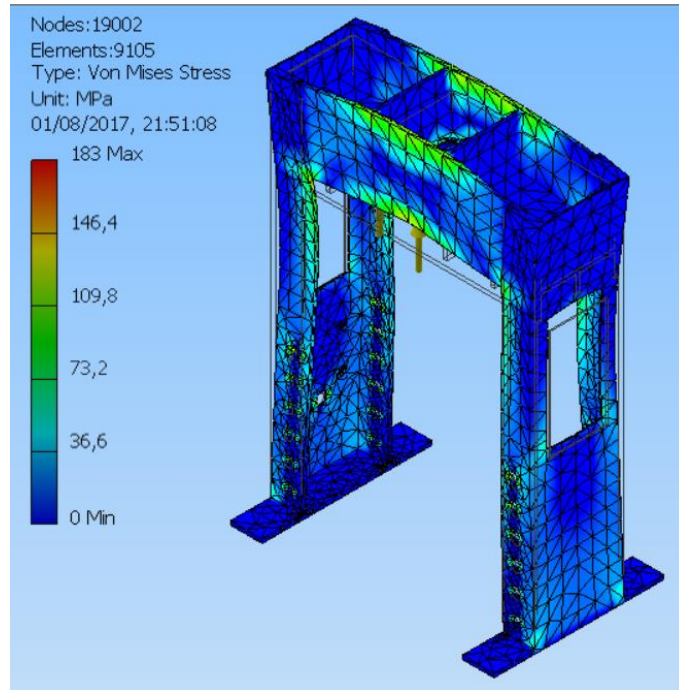


Figure 4. 16Analysis Results of Frame

Based on the results of the analysis, shown that the red is maximum stress with a value of 183 MPa and the blue is minimum stress with a value of 0 MPa. The following is calculation value of safety factor.

$$SF = \frac{\sigma_{Ijin}}{\sigma_{Max}}$$

$$SF = \frac{510MPa}{183MPa}$$

$$SF = 2,78$$

∴ The value of safety factor is 2,78.

By using the same software aid, the value of the safety factor and the deformation value of the design can also be digitally known. In Figure 4.17, it is shown that the value of the safety factor with red is the minimum value and the blue is the maximum value. Based on the simulation calculation result, the maximum safety

factor value is 15 and the minimum safety factor is 1.34. The safety factor values of the simulated load analysis on the frame are shown in the figure 4.17

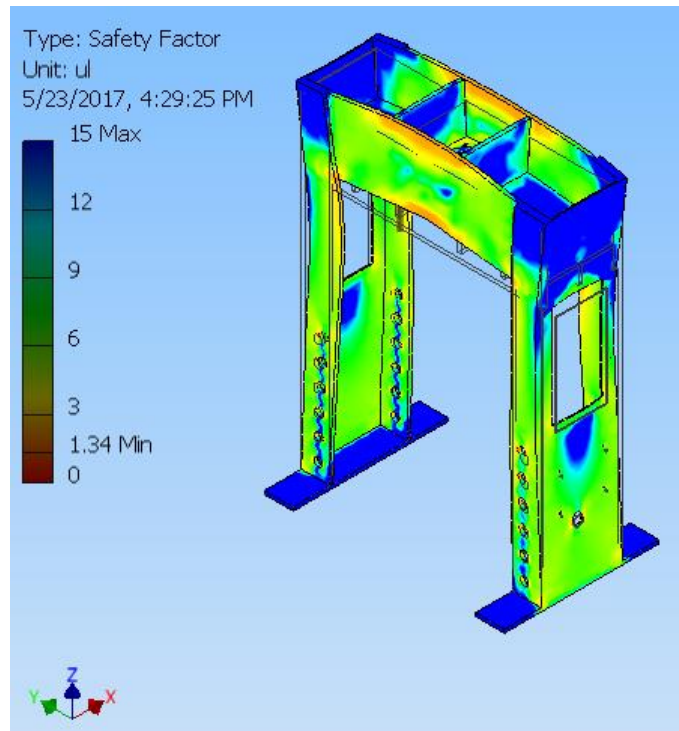


Figure 4. 17 Safety Factor of Frame

While in figure 4.18, it is shown that the displacement value in red is the maximum value and in the blue is the minimum value. Based on the simulation results, the maximum displacement value is 1,105 mm and the minimum displacement is 0 mm. The results of displacement simulation on the frame are shown in Figure 4.18

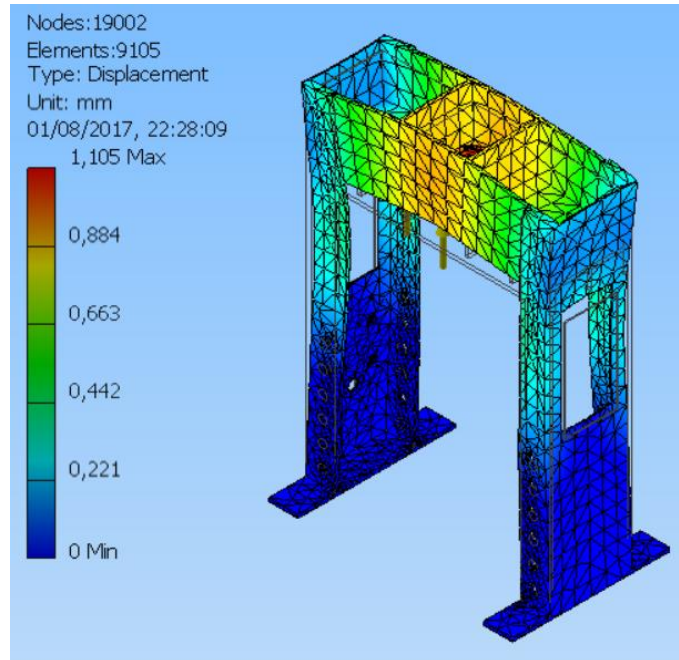


Figure 4. 18 Displacement Value of Frame

Based on the calculation and simulation, the value of safety factor is greater than 1 and the maximum displacement value is 1,106 mm. So it can be concluded that the material and design is safe and strong to withstand the compressive load.

4.2.2.2 Stress Analysis of Work-Bench

The stress analysis on the workbench aims to determine the workbench strength of the compressive load provided. To simulate the load, the first step is to determine the fixture of the workbench that will be the support in the event of loading. The provision of the fixture on workbench is shown in Figure 4.19

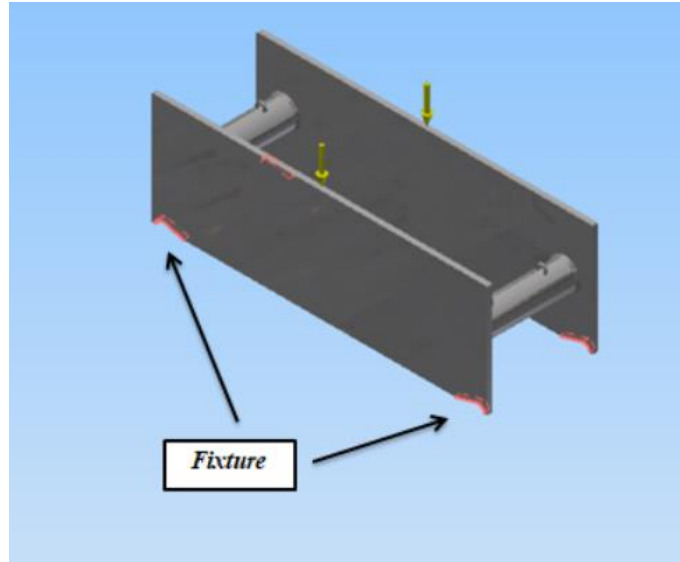


Figure 4. 19 Fixture of Work-Bench

After the process of determining fixture, the next step is loading on the frame construction. The load is applied to the workbench affected by the compressive press hydraulic pressure with a maximum capacity of 105 tons or the equivalent of 105000 kg. The loading process on the frame is shown in Figure 4.20

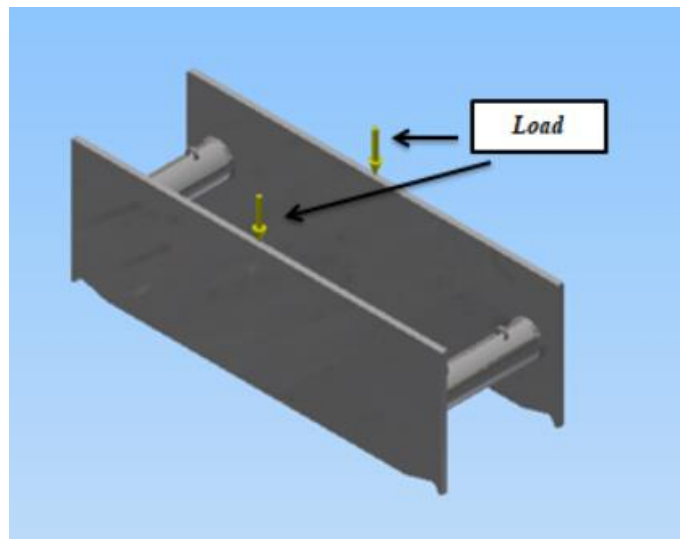


Figure 4. 20 Loading on Work-Bench

The analysis was performed using mesh type with low density so that the calculation can be more accurate. This is done automatically by the software. The making of the finite element meshes on the workbench is shown in Figure 4.21

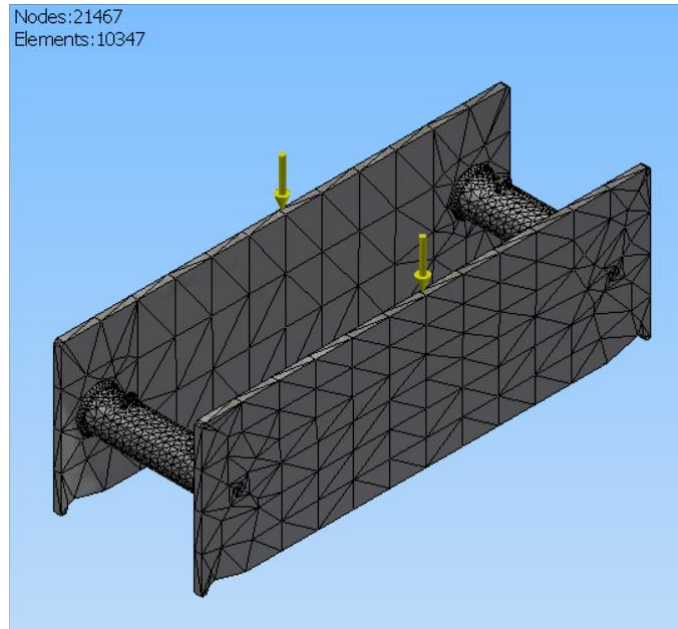


Figure 4. 21 Mesh Type of Work-Bench

The next to step in the analysis process using Von Mises Stress type analysis. The design can be said to be safe when the maximum value of the Von Mises Stress analysis is smaller than the yield stress of the material used, and the design can be said to fail when the maximum value of the Von Mises Stress type is greater than the yield stress of the material used. The results of Von Mises Stress which have been conducted on the workbench is shown in Figure 4.22

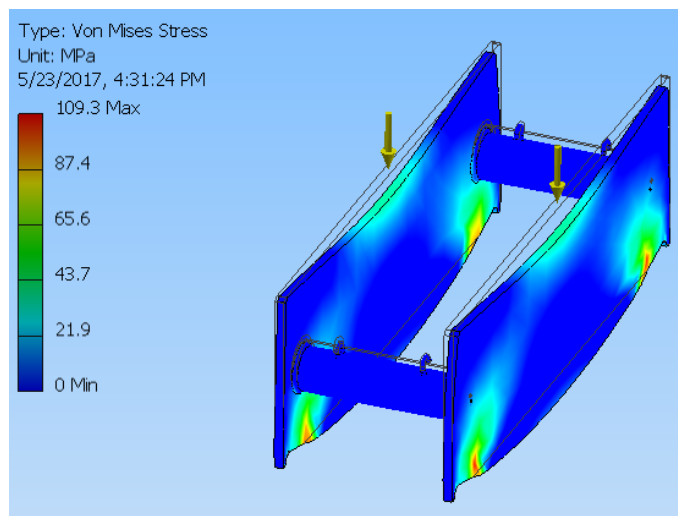


Figure 4. 22 Analysis Result of Work-Bench

Based on the results of the analysis, shown that the red is maximum stress with a value of 109,3 MPa and the blue is minimum stress with a value of 0 MPa. The following is calculation value of safety factor

$$SF = \frac{\sigma_{Ijin}}{\sigma_{Max}}$$

$$SF = \frac{510MPa}{109,3MPa}$$

$$SF = 4,67$$

∴ The value of safety factor is 4,67.

The value of the safety factor and the value of displacement in this design can also be known digitally using the same software. In Figure 4.23, it is shown that the value of the safety factor with red is the minimum value and the blue is the maximum value. Based on the simulation calculation result, the maximum safety factor value is 15 and the minimum safety factor is 2,27. The safety factor values of the simulated load analysis on the workbench are shown in the figure 4.23

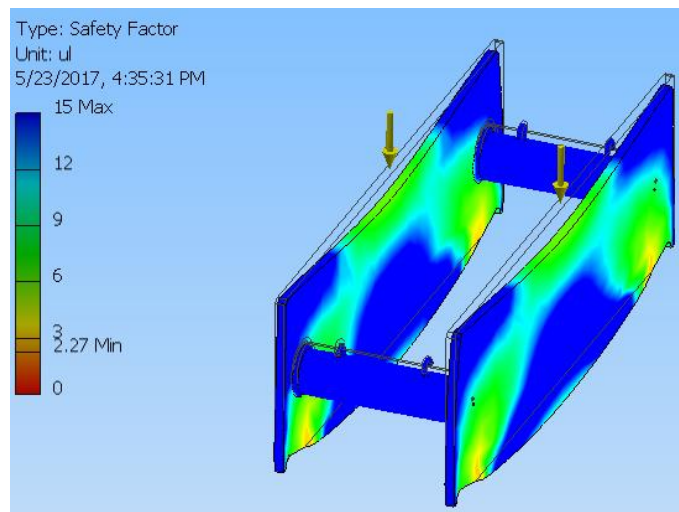


Figure 4. 23 Safety Factor of Work-Bench

While in figure 4.24, it is shown that the displacement value in red is the maximum value and in the blue is the minimum value. Based on the simulation results, the maximum displacement value is 0,2316 mm and the minimum displacement is 0 mm. The results of displacement simulation on the frame are shown in Figure 4.24

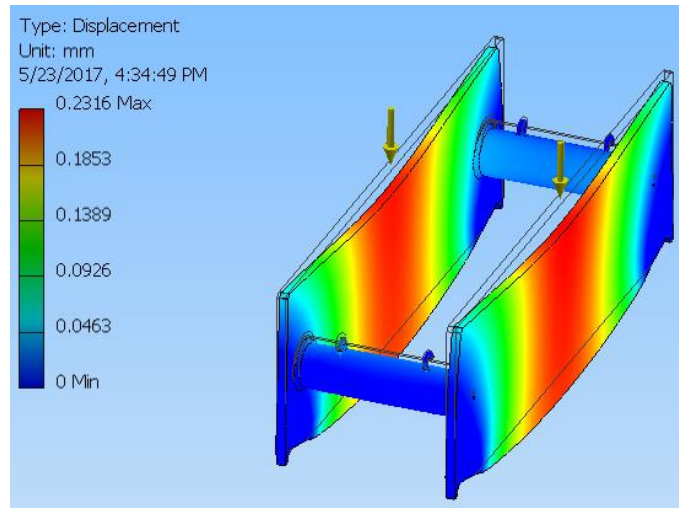


Figure 4. 24 Displacement Value of Work-Bench

Based on the calculation and simulation, the value of safety factor is greater than 1 and the maximum displacement value is 0,2316 mm. So it can be concluded that the material and design is safe and strong to withstand the compressive load.

4.2.2.3 Stress Analysis of Die

The stress analysis on the die aims to determine the die strength of the compressive load provided. To simulate the load, the first step is to determine the fixture of the die that will be the support in the event of loading. The provision of the fixture on die is shown in Figure 4.25

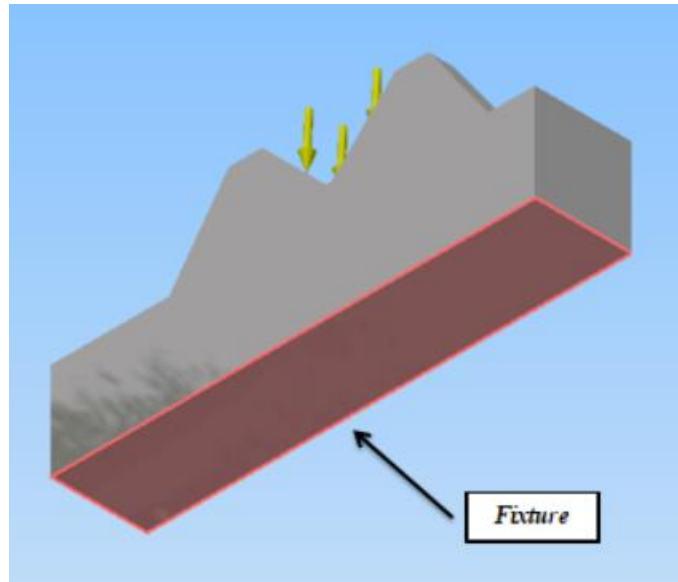


Figure 4. 25 Fixture of Die

After the process of determining fixture, the next step is loading on the die construction. The load is applied to the die affected by the compressive press hydraulic pressure with a maximum capacity of 105 tons or the equivalent of 105000 kg. The loading process on the frame is shown in Figure 4.26

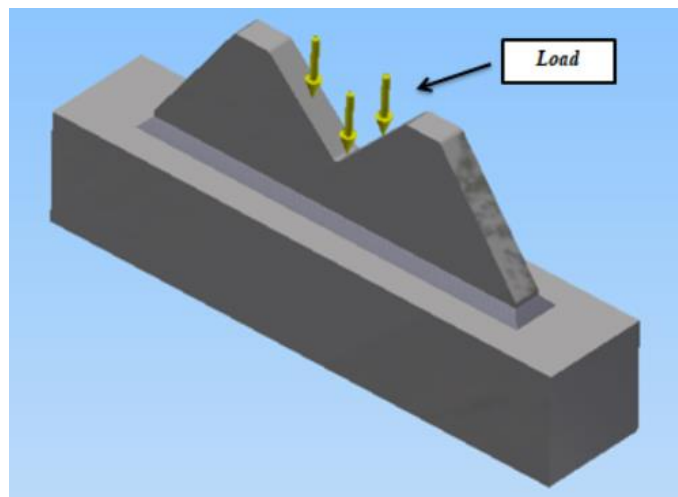


Figure 4. 26 Loading of Die

The analysis was performed using mesh type with low density so that the calculation can be more accurate. This is done automatically by the software. The making of the finite element meshes on the die is shown in Figure 4.27

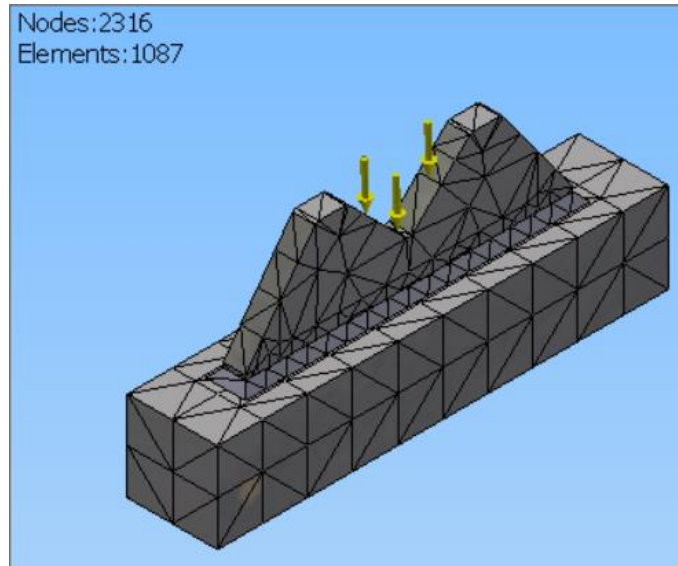


Figure 4. 27 Mesh Type of Die

The next step is the analysis process using Von Mises Stress type analysis. This analysis can be used as a benchmark for a design. The results of Von Mises Stress which have been conducted on die is shown in Figure 4.28

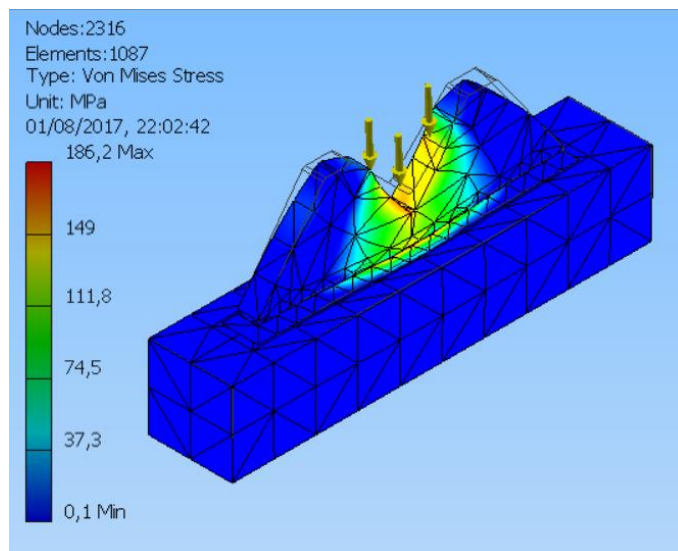


Figure 4. 28 Analysis Result of Die

Based on the results of the analysis, shown that the red is maximum stress with a value of 186,2 MPa and the blue is minimum stress with a value of 0 MPa. The following is calculation value of safety factor

$$SF = \frac{\sigma_{Ijin}}{\sigma_{Max}}$$

$$SF = \frac{510MPa}{186,2MPa}$$

$$SF = 2,74$$

∴ The value of safety factor is 2,74

The value of the safety factor and the value of displacement in this design can also be known digitally using the same software. In Figure 4.29, it is shown that the value of the safety factor with red is the minimum value and the blue is the maximum value. Based on the simulation calculation result, the maximum safety factor value is 15 and the minimum safety factor is 1,33. The safety factor values of the simulated load analysis on the die are shown in the figure 4.29

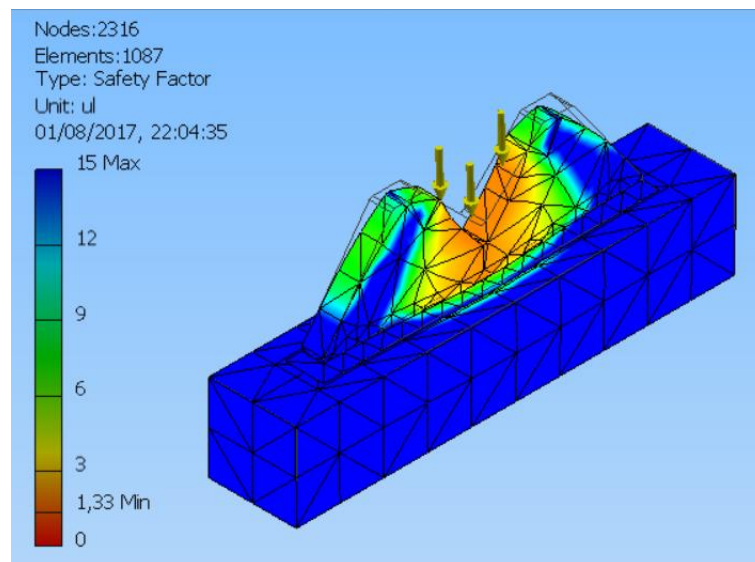


Figure 4. 29 Safety Factor of Die

While in figure 4.30, it is shown that the displacement value in red is the maximum value and in the blue is the minimum value. Based on the simulation results, the maximum displacement value is 0,208 mm and the minimum displacement is 0 mm. The results of displacement simulation on the die are shown in Figure 4.30

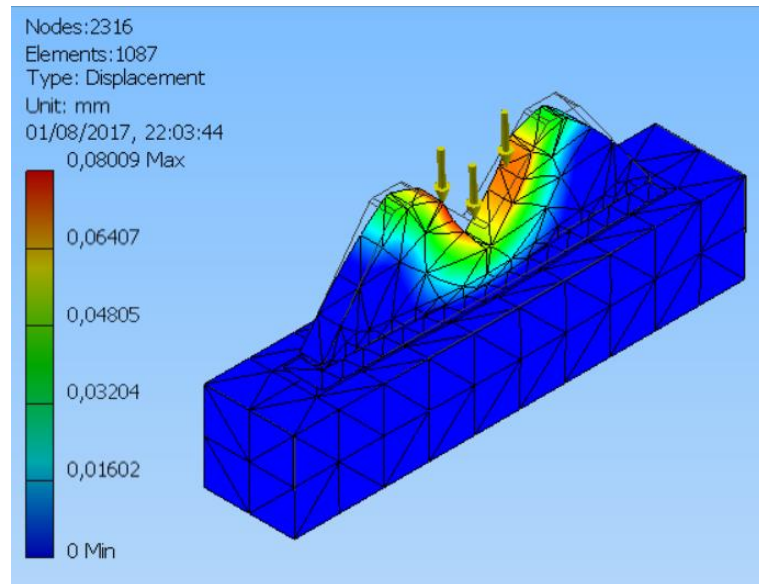


Figure 4. 30 Displacement Value of Die

Based on the calculation and simulation, the value of safety factor is greater than 1 and the maximum displacement value is 0,08 mm. So it can be concluded that the material and design is safe and strong to withstand the compressive load.

CHAPTER 5

CONCLUSIONS

5.1 Conclusion

Based on results of design, modeling, and simulation of strength testing with Autodesk Inventor 2015 software conducted in this study, it can be concluded as follows :

1. Provided hydraulic cylinder design at 100 Ton load with the following specifications:
 - a. Inner diameter of cylinder = 253 mm
 - b. Thickness of cylinder = 34 mm
 - c. Outside of cylinder = 321 mm
 - d. Length of cylinder = 657 mm
2. Based on the pump calculation, the results obtained flow rate required, namely: $Q_{\text{down}} = 6.2 \text{ cc / rev}$ and $Q_{\text{up}} = 3 \text{ cc / rev}$. With the pump specification to be used is 8 cc/rev then it can be concluded the selection of pump is stated SAFE.
3. Based on the motor calculation, obtained motor power required, namely: $SM_{\text{down}} = 4,9 \text{ HP}$ dan $SM_{\text{up}} = 2,4 \text{ HP}$. With the specifications of the motor used is 7.5 HP then it can be concluded the selection of the motor is stated SAFE.
4. Based on testing of cylinder strength and construction on Hydraulic Press machine, got the value of safety factor more than 1 and result of displacement simulation $< 3 \text{ mm}$. So it can be concluded that the selection of materials and design of hydraulic press machine are stated SAFE.

5.2 Recommendation

Based on the research that has been done, the authors have some suggestions to be conveyed :

1. To TMC Industrial Co., Ltd.
 - It is expected that the design of this hydraulic press machine can be utilized as well as possible as a machine literature making tool.
 - In order to face the society of Asian Economy (MEA), it is better for TMC Industrial Co., Ltd. Preparing its employees in English to facilitate communication with people from other countries.
2. To Universitas Islam Indonesia
 - Communication between students and campus parties needs to be improved again to help students who are carrying out the final task abroad.

REFERENCES

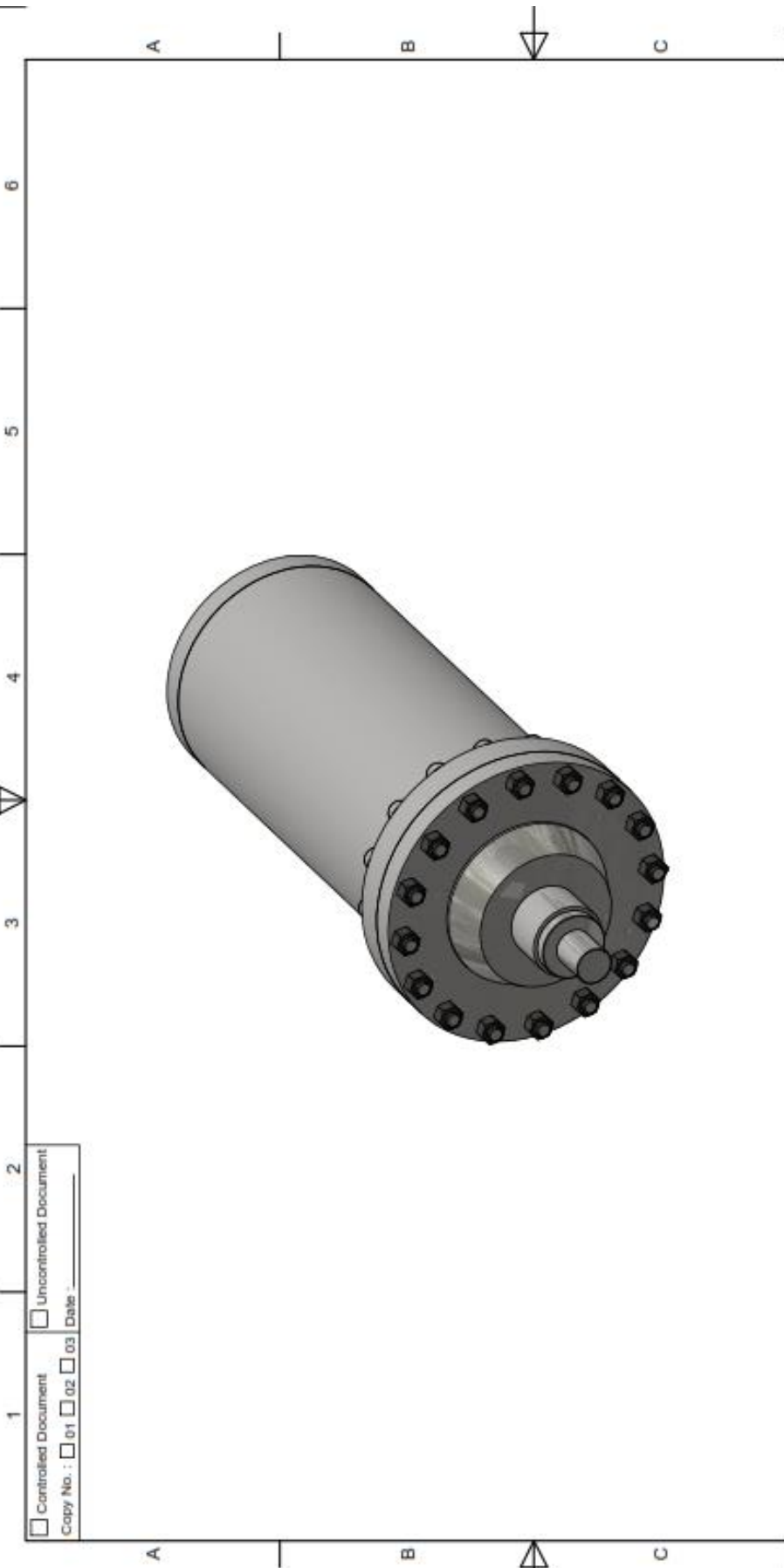
- [1] T.M.C. INDUSTRIAL PUBLIC CO., LTD.” [Online]. Available: <http://www.tmc.co.th/>. [Accessed: 15-Aug-2017].
- [2] A. T. Thomas, R. Parameshwaran, R. D. Kumar, S. Mohanraja, and M. Harishwaran, “An Investigation on Modelling and Controller Design of a Hydraulic press,” *IFAC Proc. Vol.*, vol. 47, no. 1, pp. 719–725, 2014.
- [3] A. M. Kamate and others, “Design, Development, and Analysis of A 20 Ton Hydraulic Press,” *IJITR*, vol. 4, no. 1, pp. 2560–2563, 2016.
- [4] A. Parmar, K. Zala, and A. Patel, “Design and Modification of Foremost Element of Hydraulic Press Machine,” *RSP*, vol. 3, no. 4, pp. 658–667, Jun. 2014.
- [5] T. Wibowo, W. Raharjo, and B. Kusharjanta, “Perancangan dan Analisis Kekuatan Konstruksi Mesin Tekuk Plat Hidrolik,” *MEKANIKA*, vol. 12, no. 2, pp. 63–70, Mar. 2014.
- [6] “Pengertian Sistem Hidrolik,” 15-Jan-2014.
- [7] B. Parthiban, P. Eazhumali, S. Karthi, and P. Kalimuthu, “Design and Analysis of C Type Hydraulic Press Structure,” *IJRAME*, vol. 2, no. 3, pp. 47–56, Mar. 2014.
- [8] M. M. Pasaribu, “Pengertian Baja.”
- [9] “JIS G3101 SS400 Steel Plate/Sheet for general Purpose Structural Steels.” BEBON, 2008.
- [10] “Steel Plate for Boiler Pressure Vessel DIN17135 ST52 steel.” BEBON, 2008.
- [11] “Guidebook to Energy-Related Resources for the Chemical Industry.” CIRAS, Nov-2005.
- [12] M. H. BADARUDDIN, “Pengontrol Kecepatan Motor DC Brushless pada Robot Pendeteksi Logam Menggunakan Atmega 16,” Politeknik Negeri Sriwijaya, 2015.
- [13] N. Zaharis, D. Kourtesis, D. Bibikas, and G. Inzesiloglou, “New Product Development (NPD) Guide.”
- [14] E. Barkanov, “Introduction to the finite element method,” *Int. Mater. Struct. Fac. Civ. Eng. Riga Tech. Univ.*, 2001.

ATTACHMENT

1. Design of Hydraulic Cylinder
2. Design of Hydraulic Press Structures
3. Design of Power Unit
4. Design of Hydraulic Press Machine 100 Tons

ATTACHMENT 1

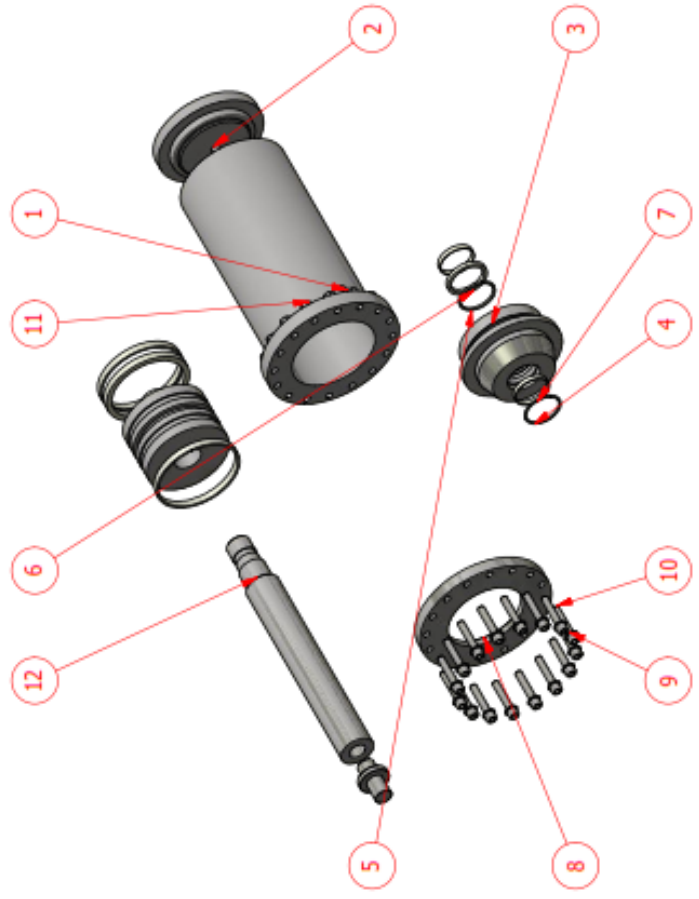
Design of Hydraulic Cylinder



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____

Machining 	Chamfering 	Welding 	General Unless Specification do not show on the drawing 	Design Check Verify	Date Name	 TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 2627 9333 WWW.TMC.CO.TH
Ref. : JIS B 0405 (Unit mm.)	Length Tolerance 0.5 3 6 30 120 400 1000 15 30 120 400 3 6 30 120 400 1000 20 30 120 400 3 6 30 120 400 1000 20 30 120 400	Angle Tolerance 10 30 120 400 1000 15 30 120 400 30 120 400 1000 30 120 400 1000	Heat Treatment Coating	Model Part Name Title	Mat. / Std. Weight	N/A Size A4 Rev.
00 - First Issue	00.1 ±0.1 00.2 ±0.2 00.3 ±0.3 00.4 ±0.4 00.5 ±0.5 00.6 ±0.6 00.7 ±0.7 00.8 ±0.8 00.9 ±0.9 01.0 ±1.0	00.1 ±0.1 00.2 ±0.2 00.3 ±0.3 00.4 ±0.4 00.5 ±0.5 00.6 ±0.6 00.7 ±0.7 00.8 ±0.8 00.9 ±0.9 01.0 ±1.0	Scale Sheet No. Dimension (mm.) Drawing No.	HPP-07-000-000 HPP-07-000-000	HPP-07-000-000 HPP-07-000-000	HPP-07-000-000 HPP-07-000-000
Revise	Revise Description	Chd.	Date	Customer :	File Name - assembly main cylinder all.dwg	F-ED-013 REV.01 DU.12.06

Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____



Item	PART NUMBER	MATERIAL	Qty	MASS
1	Main Cylinder	Steel, Carbon	1	178.260 kg
2	End-Plug	Steel, Carbon	1	32.220 kg
3	Gland Bush	Steel, Carbon	1	47.997 kg
4	O-seal 3x2	Polytetrafluoroethylene	1	0.013 kg
5	O-seal 3x6	Polytetrafluoroethylene	1	0.020 kg
6	O-seal 13x13	Polytetrafluoroethylene	1	0.091 kg
7	O-seal 13x5	Polytetrafluoroethylene	2	0.024 kg
8	flange close	Steel, Carbon	1	19.980 kg
9	JIS B 1296 - 21	Steel, Mild	16	0.017 kg
10	JIS B 1170 - M20 x 110	Steel, Mild	16	0.337 kg
11	JIS B 1181 - HN - Class 2 Semi-finished M20	Steel, Mild	16	0.007 kg
12	Assembly Piston rod	Stainless Steel AISI 440C, Welded	1	103.965 kg

General Unless Specification do not show on the drawing

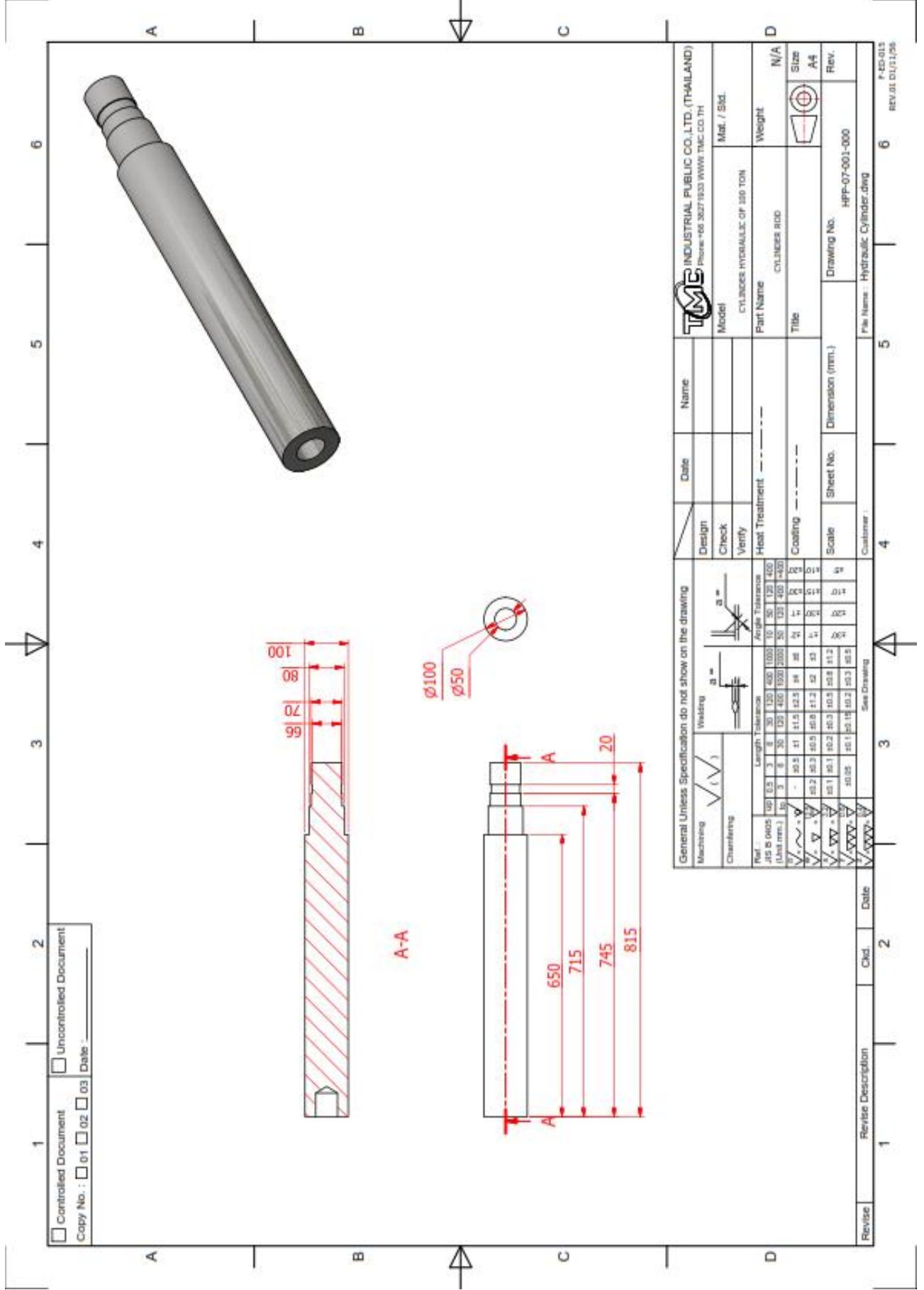
Machining	✓ (✓)
Chamfering	✓
Welding	✓

Ref.:	Length Tolerance			Angle Tolerance		
	UP	0	DN	°	'	"
JIS B 9405	3	6	30	1000	15	30
(Unit mm.)	3	6	30	1000	15	30
0	0.02	0.04	0.10	0.5	1.0	2.0
1	0.03	0.06	0.15	0.5	1.0	2.0
2	0.04	0.08	0.20	0.5	1.0	2.0
3	0.05	0.10	0.25	0.5	1.0	2.0
4	0.06	0.12	0.30	0.5	1.0	2.0
5	0.07	0.14	0.35	0.5	1.0	2.0
6	0.08	0.16	0.40	0.5	1.0	2.0
7	0.09	0.18	0.45	0.5	1.0	2.0
8	0.10	0.20	0.50	0.5	1.0	2.0
9	0.11	0.22	0.55	0.5	1.0	2.0
10	0.12	0.24	0.60	0.5	1.0	2.0
11	0.13	0.26	0.65	0.5	1.0	2.0
12	0.14	0.28	0.70	0.5	1.0	2.0

Design	Date	Name	
Check			
Verify			
Heat Treatment	-----		
Coating	-----		
Scale	Sheet No.	Dimension (mm.)	Drawing No.
Customer :	File Name : assembly main cylinder all hole line.dwg		

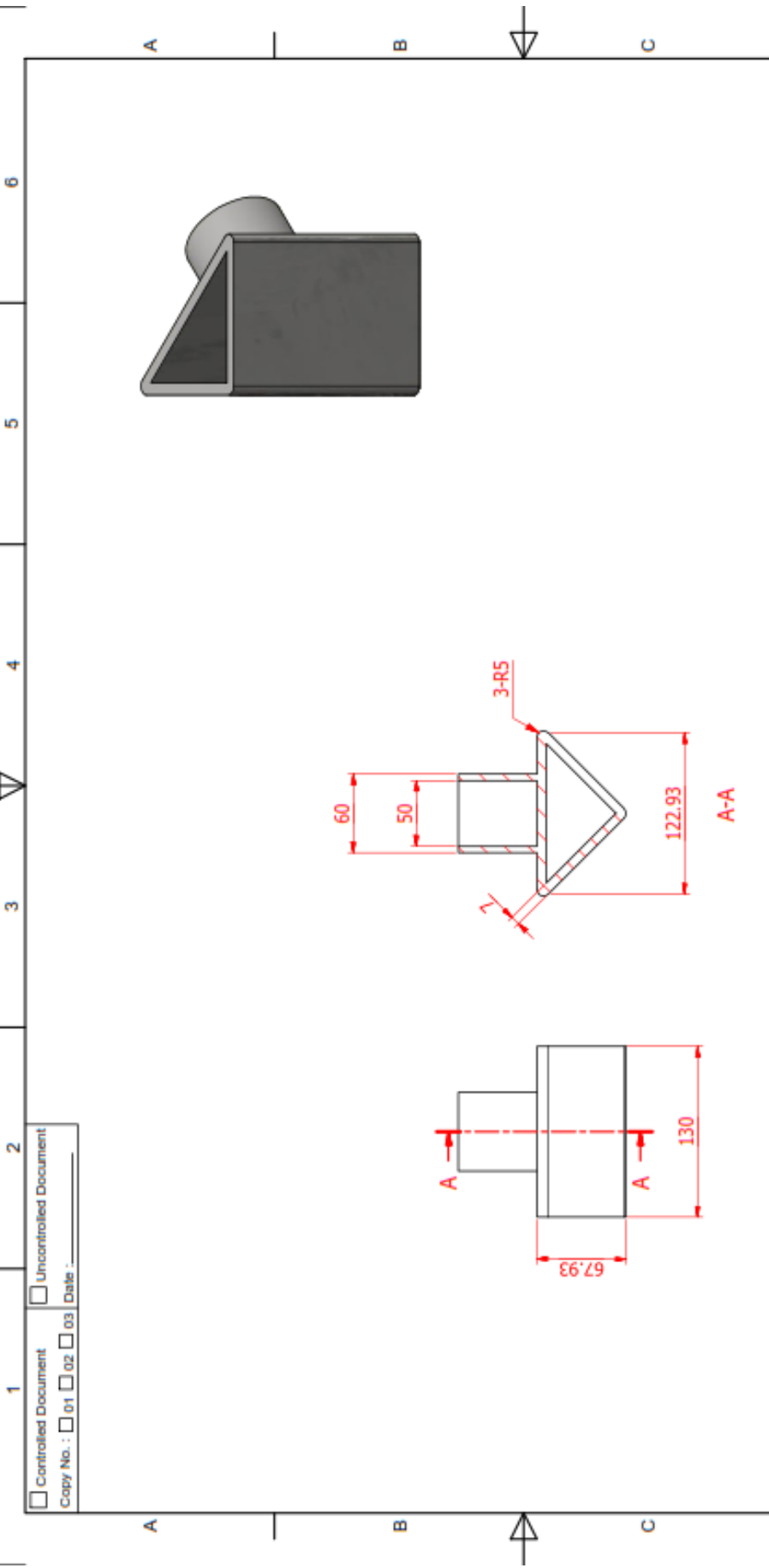
Customer : _____
 Revise : _____
 00 - First Issue

TME INDUSTRIAL PUBLIC CO., LTD. (THAILAND)
 Phone: +66 2627 9333 WWW.TME.CO.TH



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____

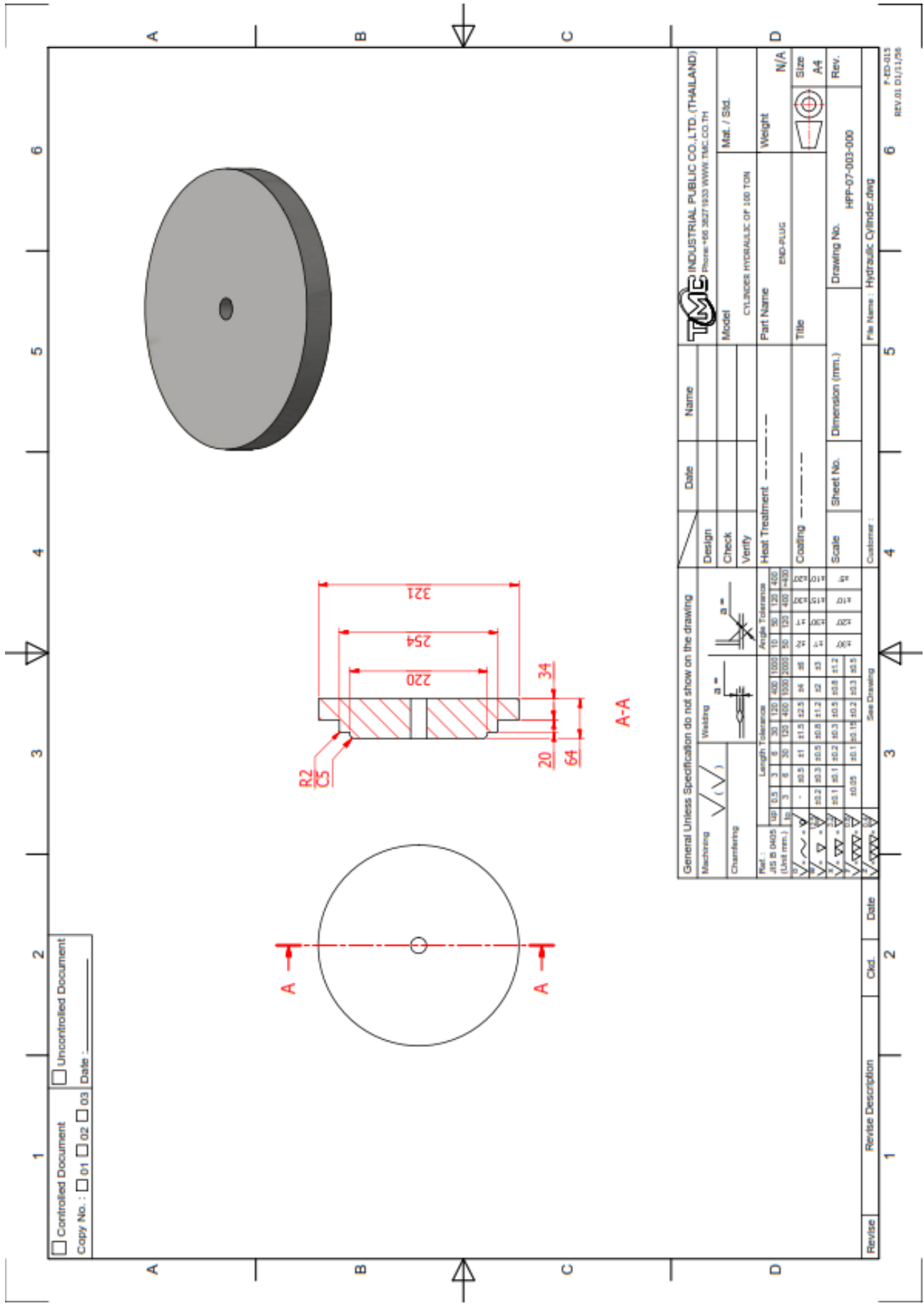
<input type="checkbox"/> Machining <input type="checkbox"/> Chamfering		<input checked="" type="checkbox"/> Welding		General Specification do not show on the drawing		Design Check Verify	Date	Name	INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Model: CYLINDERS HYDRAULIC OF 120 TON Part Name: CYLINDERS ROD Title:		Mat. / Std. Weight N/A Size A4
Ref. JIS B 0405 (Unit mm.)	Length Tolerance 3 E 30 130 400 1000 10 30 120 400 +0.00 3 E 30 130 400 1000 2000 30 120 400 +0.00	Angle Tolerance 10 30 120 400 1000 10 30 120 400 +0.00	0.1 0.2 0.3 0.5 1.0 1.5 2.0 3.0 4.0 5.0 6.0 8.0 10.0 12.0 15.0 20.0 25.0 30.0 40.0 50.0 60.0 80.0 100.0 120.0 150.0 200.0 250.0 300.0 400.0 500.0 600.0 800.0 1000.0	0.1 0.2 0.3 0.5 1.0 1.5 2.0 3.0 4.0 5.0 6.0 8.0 10.0 12.0 15.0 20.0 25.0 30.0 40.0 50.0 60.0 80.0 100.0 120.0 150.0 200.0 250.0 300.0 400.0 500.0 600.0 800.0 1000.0	0.1 0.2 0.3 0.5 1.0 1.5 2.0 3.0 4.0 5.0 6.0 8.0 10.0 12.0 15.0 20.0 25.0 30.0 40.0 50.0 60.0 80.0 100.0 120.0 150.0 200.0 250.0 300.0 400.0 500.0 600.0 800.0 1000.0	Scale Sheet No. Dimension (mm.) Drawing No. HPP-07-001-000 Rev.	Customer: Hydraulic Cylinder.dwg File Name:				
Revise	1	Revise Description	Chd.	2	Date	3	4	5	6	6	REV.01 D10126



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03
 Date : _____

Machining <input checked="" type="checkbox"/> Chamfering <input checked="" type="checkbox"/>		Welding <input checked="" type="checkbox"/> See Drawing		Angle Tolerance 15° 30° 45° 60° 75° 90° 105° 120° 135° 150°		Length Tolerance 0.1 0.2 0.3 0.4 0.5 0.6 0.8 1.0 1.2 1.5 2.0 3.0 4.0 5.0 6.0 8.0 10.0 15.0 20.0 30.0 40.0 50.0		Heat Treatment ----- Coating ----- Scale -----		Design Check Verify		Name Date		TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 2627 9333 WWW.TMC.CO.TH	
Part Name CYLINDER HYDRAULIC OF 100 TON		Model 012 PUNCH		Weight N/A		Mat. / Std.		Size A4		Drawing No. HPP-07-002-000		Rev.		File Name : Hydraulic Cylinder.dwg	
00 - First Issue		1		2		3		4		5		6		F-ED-013 REV.01 01/11/26	

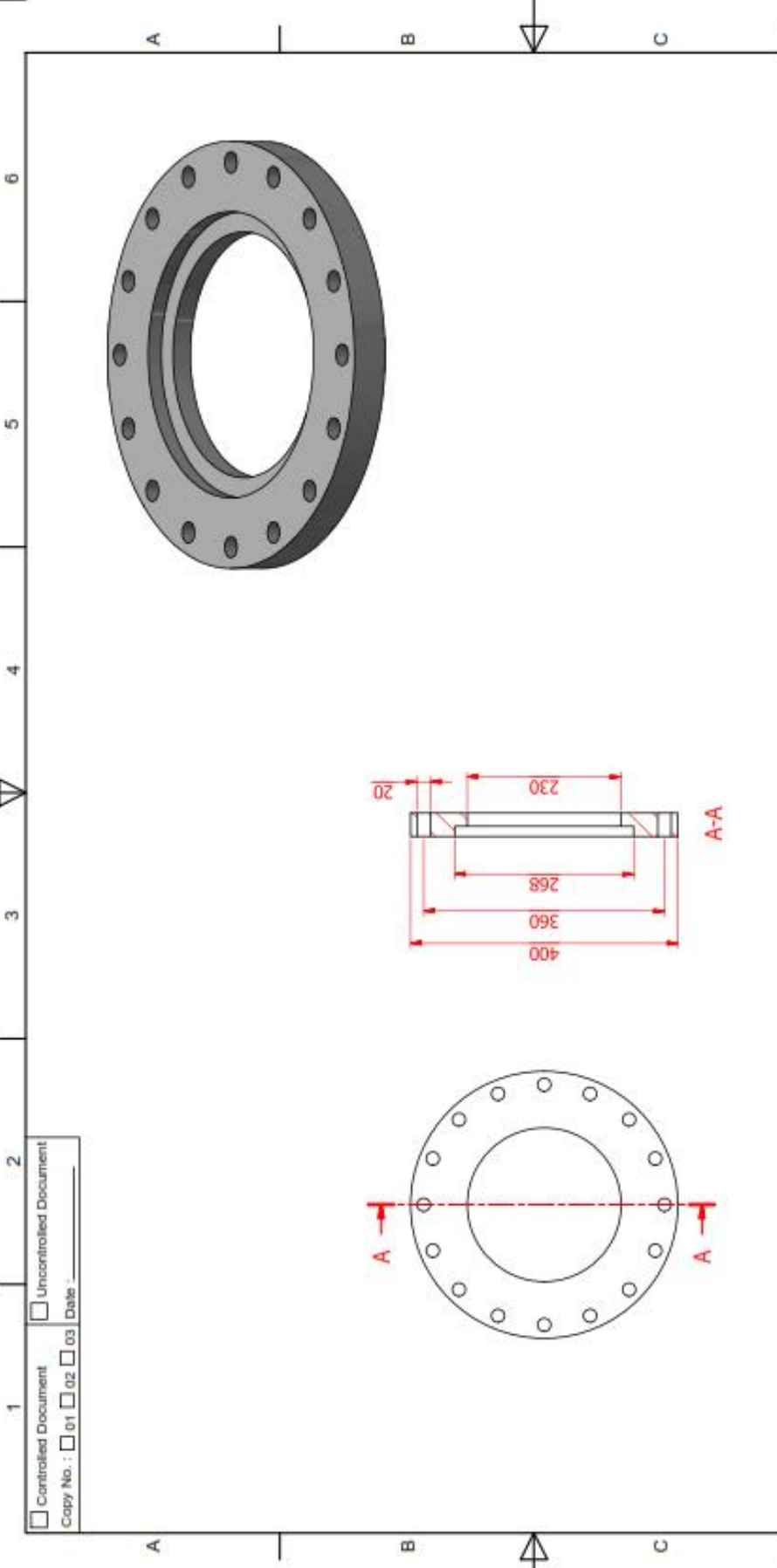
Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____



A-A

General Unless Specification do not show on the drawing		Date		Name		TME INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 3827 1933 WWW.TME.CO.TH	
Mechancing	Welding	Design	Check	Verify	Model	Part Name	Mat. / Skd.
Chamfering	See Drawing	Heat Treatment	Coating	Scale	CYLINDER HYDRAULIC OF 100 TON	END-PLUG	Weight
Ref. : JIS B 9405	Length Tolerance	110	115	120			N/A
3 6 10 15 20 30 40 50 60 70 80 90 100 120 150 200 250 300 400 500	Angle Tolerance	10'	12'	15'			Size
0 15 30 45 60 75 90 105 120 135 150 165 180 195 210 225 240 255 270 285 300	10'	12'	15'	18'			A4
0 0.05 0.1 0.15 0.2 0.3 0.5 0.8 1.2 2 3 5 10 20 30 50 100 200 300 500 1000	10'	12'	15'	18'			Rev.
0 0.05 0.1 0.15 0.2 0.3 0.5 0.8 1.2 2 3 5 10 20 30 50 100 200 300 500 1000	10'	12'	15'	18'			
0 0.05 0.1 0.15 0.2 0.3 0.5 0.8 1.2 2 3 5 10 20 30 50 100 200 300 500 1000	10'	12'	15'	18'			

Drawing No. HPP-07-003-000
 Sheet No. _____
 Dimension (mm.) _____
 Customer : Hydraulic Cylinder.dwg
 File Name :



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03
 Date : _____

General Unless Specification do not show on the drawing

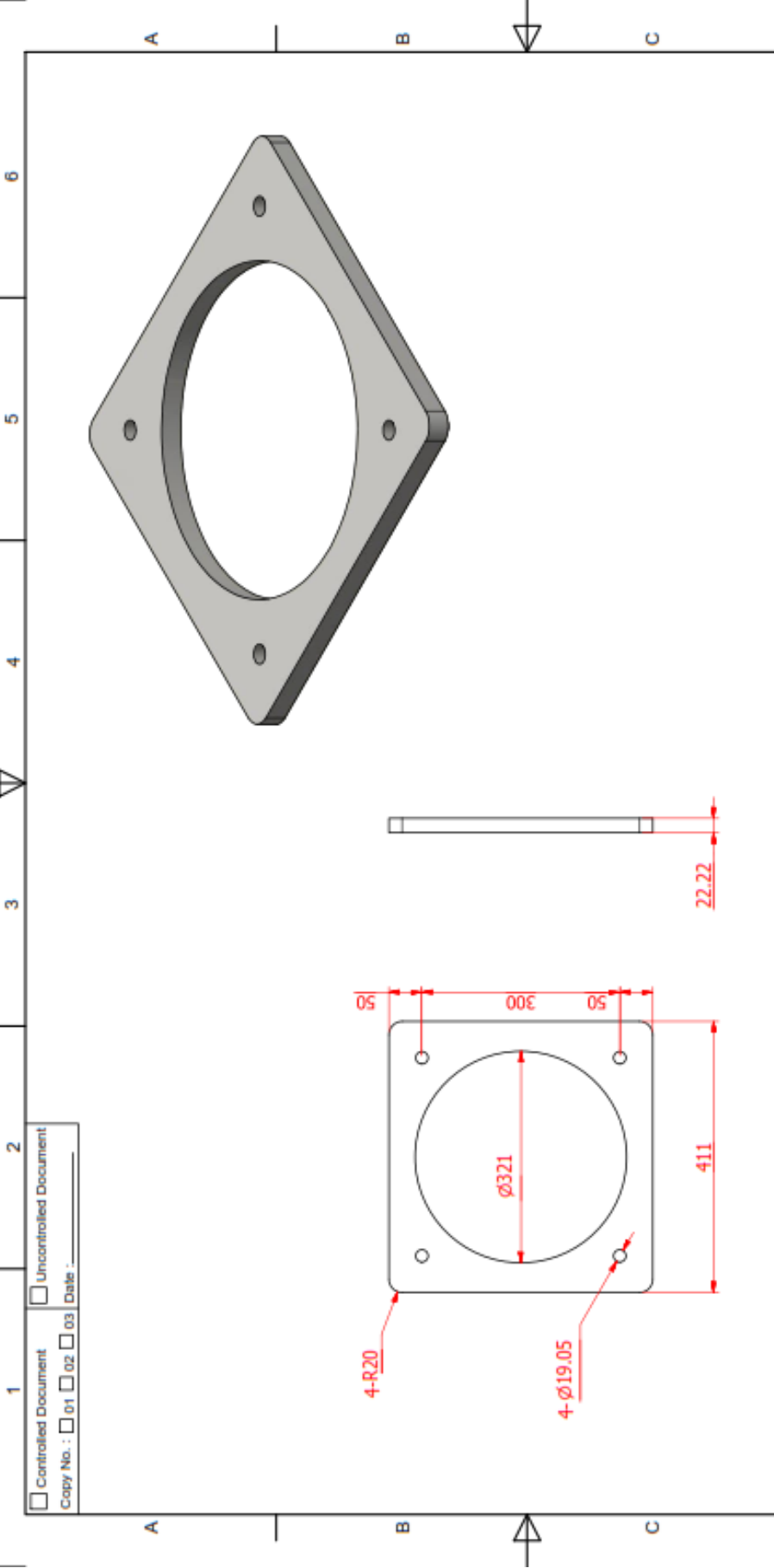
Machining	(V)	Welding	a =	Angle Tolerance	10 35 120 400
Chamfering	(V)		a =	120 400	10 35 120 400
Part :	JIS B 0405	Length Tolerance		10 35 120 400	10 35 120 400
(Unit mm.)	30	30 40 50 60 70 80 90 100 120 150 200 250 300 400		10 35 120 400	10 35 120 400
		±0.2 ±0.3 ±0.5 ±0.8 ±1.2 ±1.5 ±2.0 ±2.5 ±3 ±4 ±5 ±6 ±8 ±10 ±12 ±15 ±20 ±25 ±30 ±40 ±50 ±60 ±80 ±100 ±120 ±150 ±200 ±250 ±300 ±400 ±500		10 35 120 400	10 35 120 400
		±0.2 ±0.3 ±0.5 ±0.8 ±1.2 ±1.5 ±2.0 ±2.5 ±3 ±4 ±5 ±6 ±8 ±10 ±12 ±15 ±20 ±25 ±30 ±40 ±50 ±60 ±80 ±100 ±120 ±150 ±200 ±250 ±300 ±400 ±500		10 35 120 400	10 35 120 400
		±0.2 ±0.3 ±0.5 ±0.8 ±1.2 ±1.5 ±2.0 ±2.5 ±3 ±4 ±5 ±6 ±8 ±10 ±12 ±15 ±20 ±25 ±30 ±40 ±50 ±60 ±80 ±100 ±120 ±150 ±200 ±250 ±300 ±400 ±500		10 35 120 400	10 35 120 400
		±0.2 ±0.3 ±0.5 ±0.8 ±1.2 ±1.5 ±2.0 ±2.5 ±3 ±4 ±5 ±6 ±8 ±10 ±12 ±15 ±20 ±25 ±30 ±40 ±50 ±60 ±80 ±100 ±120 ±150 ±200 ±250 ±300 ±400 ±500		10 35 120 400	10 35 120 400
		±0.2 ±0.3 ±0.5 ±0.8 ±1.2 ±1.5 ±2.0 ±2.5 ±3 ±4 ±5 ±6 ±8 ±10 ±12 ±15 ±20 ±25 ±30 ±40 ±50 ±60 ±80 ±100 ±120 ±150 ±200 ±250 ±300 ±400 ±500		10 35 120 400	10 35 120 400

Design	Name	Date
Check		
Verify		
Heat Treatment	-----	
Coating	-----	
Scale	Sheet No.	Dimension (mm.)
Customer :		

Model	Model	Mat. / Std.
Part Name	Part Name	Weight
Title	Title	N/A
Size	Size	A4
Rev.	Rev.	Rev.
Drawing No.	Drawing No.	HPP-07-004-000
File Name - Hydraulic Cylinder.dwg		

Revise	Revise Description	Clad	Date	1	2	3	4	5	6

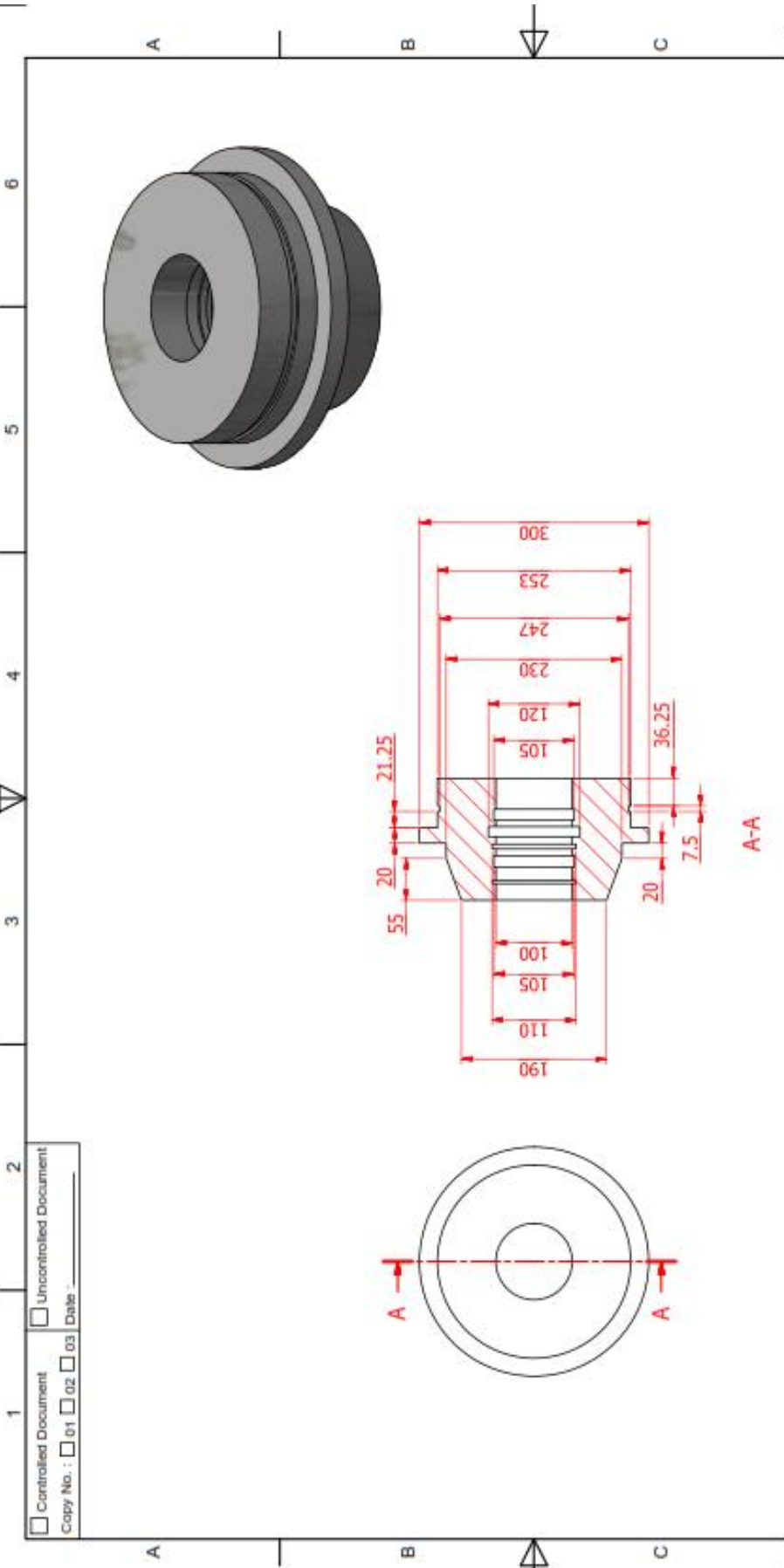
F-ED-013
REV.01 01/1/26



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03
 Date : _____

Machining <input checked="" type="checkbox"/>		Welding <input type="checkbox"/>		General Unless Specification do not show on the drawing		Design	Date	Name	TMC INDUSTRIAL PUBLIC CO.,LTD. (THAILAND) Phone: +66 3827 1933 WWW.TMC.CO.TH	
Chamfering <input checked="" type="checkbox"/>		Angle Tolerance		Angle Tolerance		Check			Model	Mat. / Std.
Ref. : JIS B 0405		UP 0.5 3 6 30 120 405 1000		10 30 120 400 1000		Verify			Part Name	Weight
(Unit mm.)		10 3 6 30 120 400 1000 2000		50 120 400 1000		Heat Treatment	-----	-----	CYLINDER FLANGE	
✓ ∇ 0.1		- 0.05 ±1 ±1.5 ±2.5 ±4 ±8		±1 ±1.5 ±2 ±4 ±8		Coating	-----	-----	Title	N/A
✓ ∇ 0.2		±0.2 ±0.3 ±0.5 ±0.8 ±1.2 ±2 ±3		±1 ±1.5 ±2 ±3 ±5 ±10		Scale	-----	-----	Dimension (mm.)	Size A4
✓ ∇ 0.3		±0.1 ±0.1 ±0.2 ±0.3 ±0.5 ±1.2		±0.3 ±0.5 ±1.2 ±2 ±3 ±5		Sheet No.	-----	-----	Drawing No.	Rev.
✓ ∇ 0.4		±0.05 ±0.1 ±0.15 ±0.2 ±0.3 ±0.5		±0.2 ±0.3 ±0.5 ±1.2 ±2 ±3		Customer :	-----	-----	HPP-07-005-000	
Revise	Revise Description	Chd.	Date	See Drawing	Customer :	4	5	6	File Name : Hydraulic Cylinder.dwg	F-ED-013 REV.01 D11126

Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____



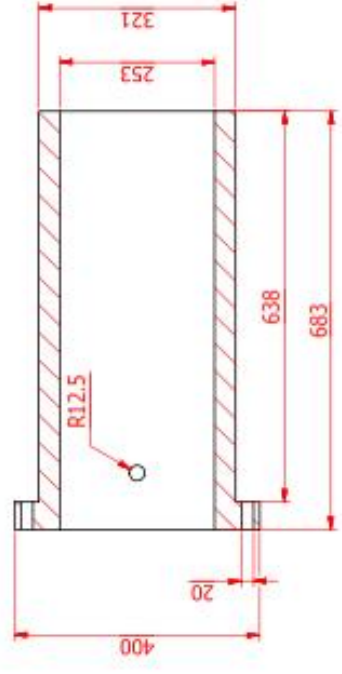
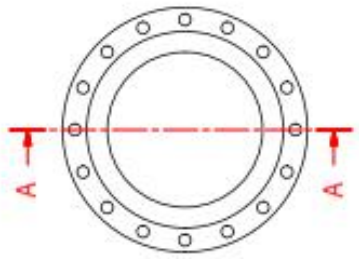
General Unless Specification do not show on the drawing

Machining	Welding	Chamfering	Angle	Welding	Angle Tolerance
UP 0.5 3 8 30 120 400 1000 10 50 120 400	a =	a =	30°	30°	30°
(Unit:mm.) L6 3 8 30 120 400 1000 2000 50 120 400 4000			45°	45°	45°
▽			60°	60°	60°
▽			75°	75°	75°
▽			90°	90°	90°
▽			120°	120°	120°
▽			150°	150°	150°
▽			180°	180°	180°
▽			225°	225°	225°
▽			270°	270°	270°
▽			315°	315°	315°
▽			360°	360°	360°

Design	Date	Name
Check		
Verify		
Heat Treatment	-----	
Coating	-----	
Scale	Sheet No.	Dimension (mm.)
Customer	File Name : Hydraulic Cylinder.dwg	

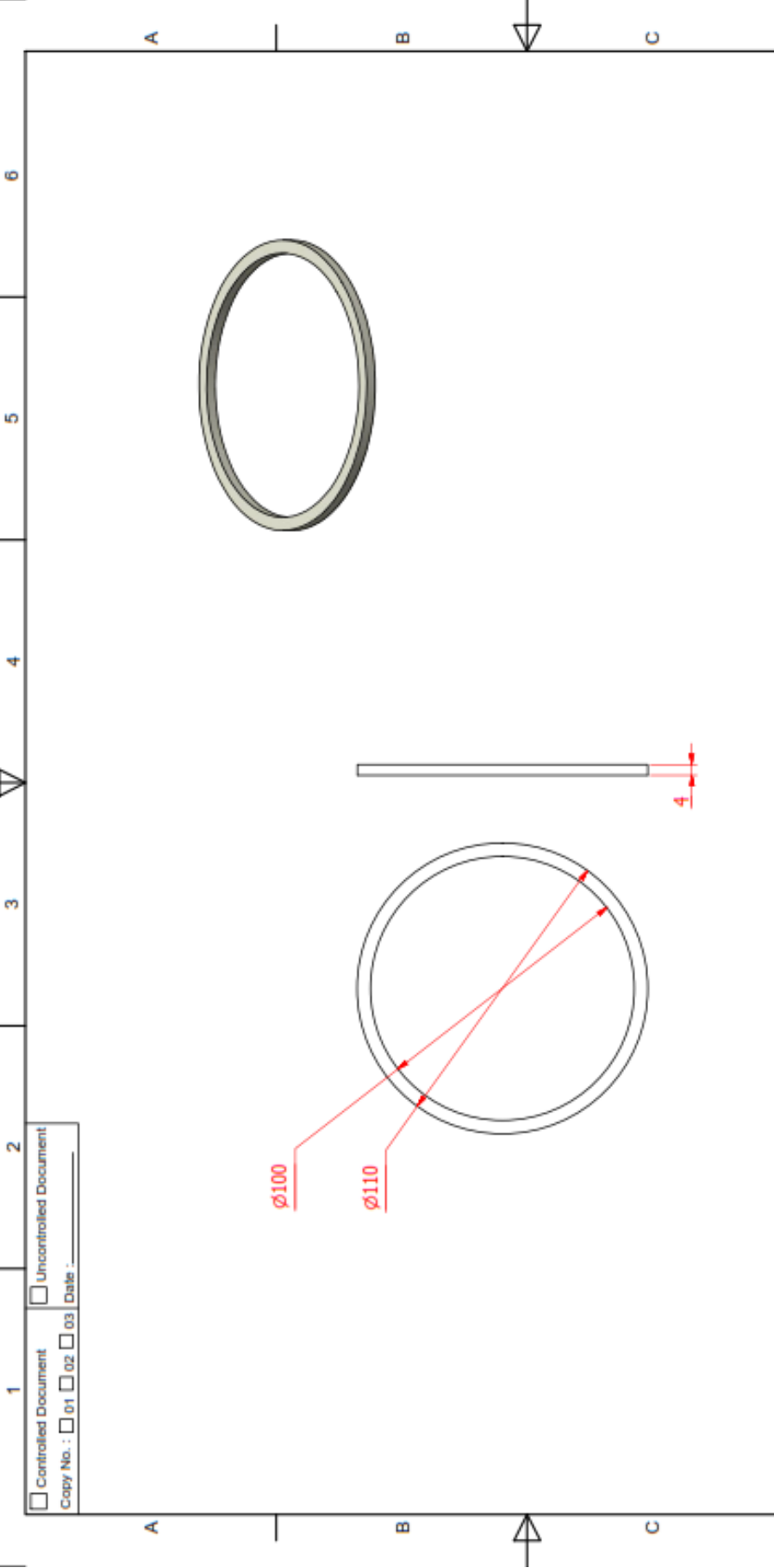
TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND)
 Phone: +66 3027 1933 WWW.TMC.CO.TH
 Model: CYLINDER HYDRAULIC OF 100 TON
 Part Name: GLAND BUSH
 Title: N/A
 Weight: A4
 Drawing No. HPP-07-006-000
 Rev:

Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 | Date : _____



A-A

Machining 		Welding 		Angle Tolerance 		Design <input type="checkbox"/> Design <input type="checkbox"/> Check <input type="checkbox"/> Verify		Date _____		Name _____		TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Model CLINDER HYDRAULIC OF 100 TON Part Name MAIN CYLINDER Title _____ Weight _____ Mat. / Std. _____	
Chamfering 		Length Tolerance 		Angle Tolerance 		Heat Treatment _____ Coating _____		Scale _____		Sheet No. _____		Drawing No. HPP-07-007-000	
Ref. : JIS B 0405 (Unit: mm.)		0.05 0.1 0.2 0.3 0.5 1 1.5 2 3 5 10 20 30 50 100 200 300 500 1000		10 15 20 30 45 60 90 120 180 270 400 600 900 1500		10 15 20 30 45 60 90 120 180 270 400 600 900 1500		10 15 20 30 45 60 90 120 180 270 400 600 900 1500		10 15 20 30 45 60 90 120 180 270 400 600 900 1500		N/A Size A4 Rev. _____	
Revise _____		Chd. _____		Date _____		1 2 3 4 5 6		1 2 3 4 5 6		File Name : Hydraulic Cylinder.dwg 1 2 3 4 5 6		F-ED-013 REV.01 01/1/206	



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03
 Date : _____

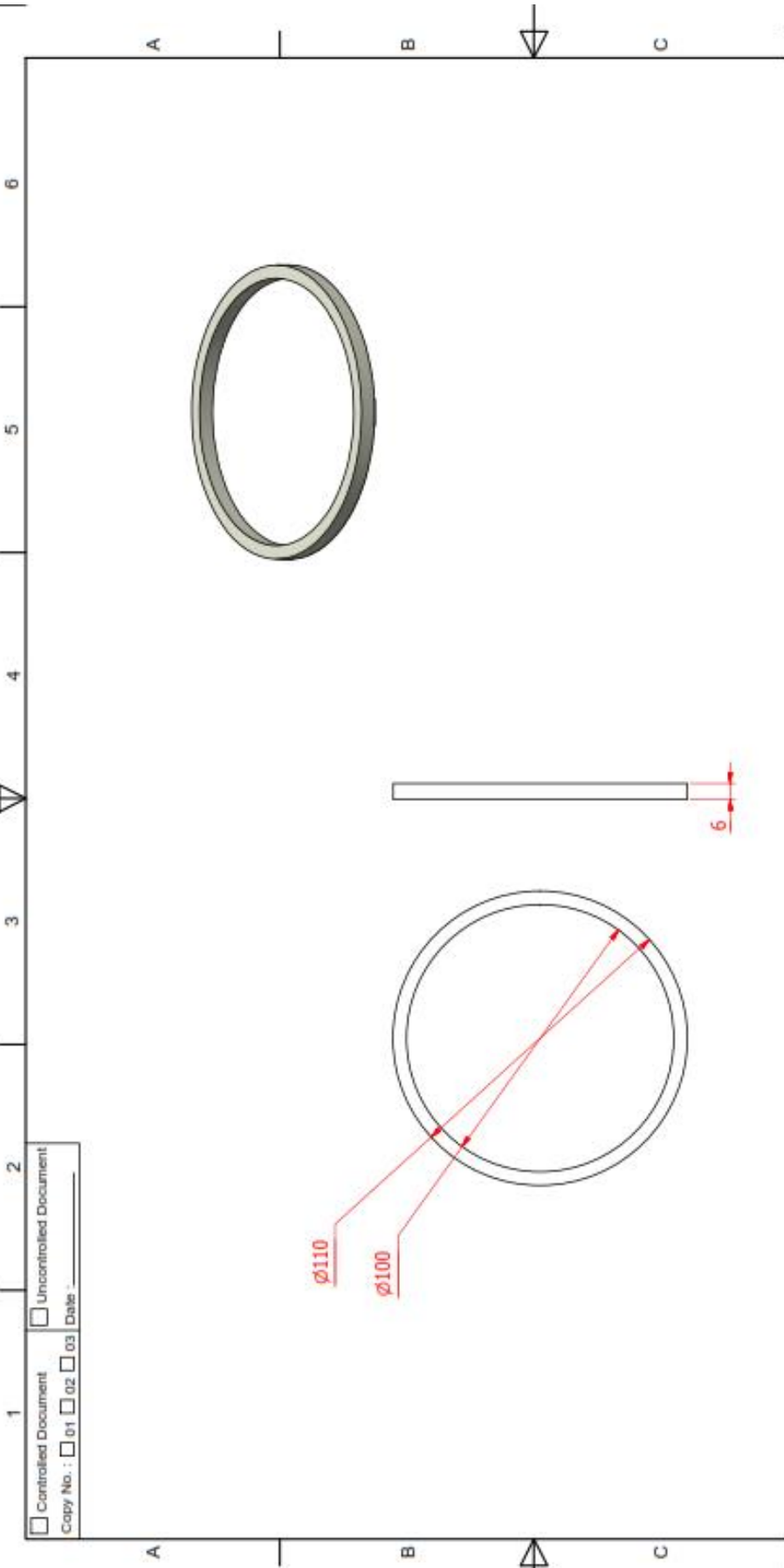
General Unless Specification do not show on the drawing

Machining	$\sqrt{(\quad)}$	Welding	$\sqrt{a=}$	Angle Tolerance	15 30 45 60 75 90 120 150 180
Chamfering	$\sqrt{a=}$				15 30 45 60 75 90 120 150 180
Part. :	JIS B 0405	Length Tolerance	10 20 30 40 50 60 70 80 90 100 120 150 200 300 400		
(Unit mm.)	10 30 60 90 120 150 200 300 400 500		10 20 30 40 50 60 70 80 90 100 120 150 200 300 400		
$\sqrt{0.1}$	0.1		0.1 0.2 0.3 0.4 0.5 0.6 0.8 1.0 1.2 1.5 2.0 2.5 3.0 4.0 5.0 6.0 8.0 10.0 12.0 15.0 20.0 25.0 30.0 40.0 50.0 60.0 80.0 100.0 120.0 150.0 200.0 250.0 300.0 400.0 500.0		
$\sqrt{0.2}$	0.2		0.2 0.3 0.4 0.5 0.6 0.8 1.0 1.2 1.5 2.0 2.5 3.0 4.0 5.0 6.0 8.0 10.0 12.0 15.0 20.0 25.0 30.0 40.0 50.0 60.0 80.0 100.0 120.0 150.0 200.0 250.0 300.0 400.0 500.0		
$\sqrt{0.3}$	0.3		0.3 0.4 0.5 0.6 0.8 1.0 1.2 1.5 2.0 2.5 3.0 4.0 5.0 6.0 8.0 10.0 12.0 15.0 20.0 25.0 30.0 40.0 50.0 60.0 80.0 100.0 120.0 150.0 200.0 250.0 300.0 400.0 500.0		
$\sqrt{0.4}$	0.4		0.4 0.5 0.6 0.8 1.0 1.2 1.5 2.0 2.5 3.0 4.0 5.0 6.0 8.0 10.0 12.0 15.0 20.0 25.0 30.0 40.0 50.0 60.0 80.0 100.0 120.0 150.0 200.0 250.0 300.0 400.0 500.0		
$\sqrt{0.5}$	0.5		0.5 0.6 0.8 1.0 1.2 1.5 2.0 2.5 3.0 4.0 5.0 6.0 8.0 10.0 12.0 15.0 20.0 25.0 30.0 40.0 50.0 60.0 80.0 100.0 120.0 150.0 200.0 250.0 300.0 400.0 500.0		
$\sqrt{0.6}$	0.6		0.6 0.8 1.0 1.2 1.5 2.0 2.5 3.0 4.0 5.0 6.0 8.0 10.0 12.0 15.0 20.0 25.0 30.0 40.0 50.0 60.0 80.0 100.0 120.0 150.0 200.0 250.0 300.0 400.0 500.0		
$\sqrt{0.8}$	0.8		0.8 1.0 1.2 1.5 2.0 2.5 3.0 4.0 5.0 6.0 8.0 10.0 12.0 15.0 20.0 25.0 30.0 40.0 50.0 60.0 80.0 100.0 120.0 150.0 200.0 250.0 300.0 400.0 500.0		
$\sqrt{1.0}$	1.0		1.0 1.2 1.5 2.0 2.5 3.0 4.0 5.0 6.0 8.0 10.0 12.0 15.0 20.0 25.0 30.0 40.0 50.0 60.0 80.0 100.0 120.0 150.0 200.0 250.0 300.0 400.0 500.0		

Design	Date	Name
Check		
Verify		
Heat Treatment	-----	
Coating	-----	
Scale	Sheet No.	Dimension (mm.)
Customer :		

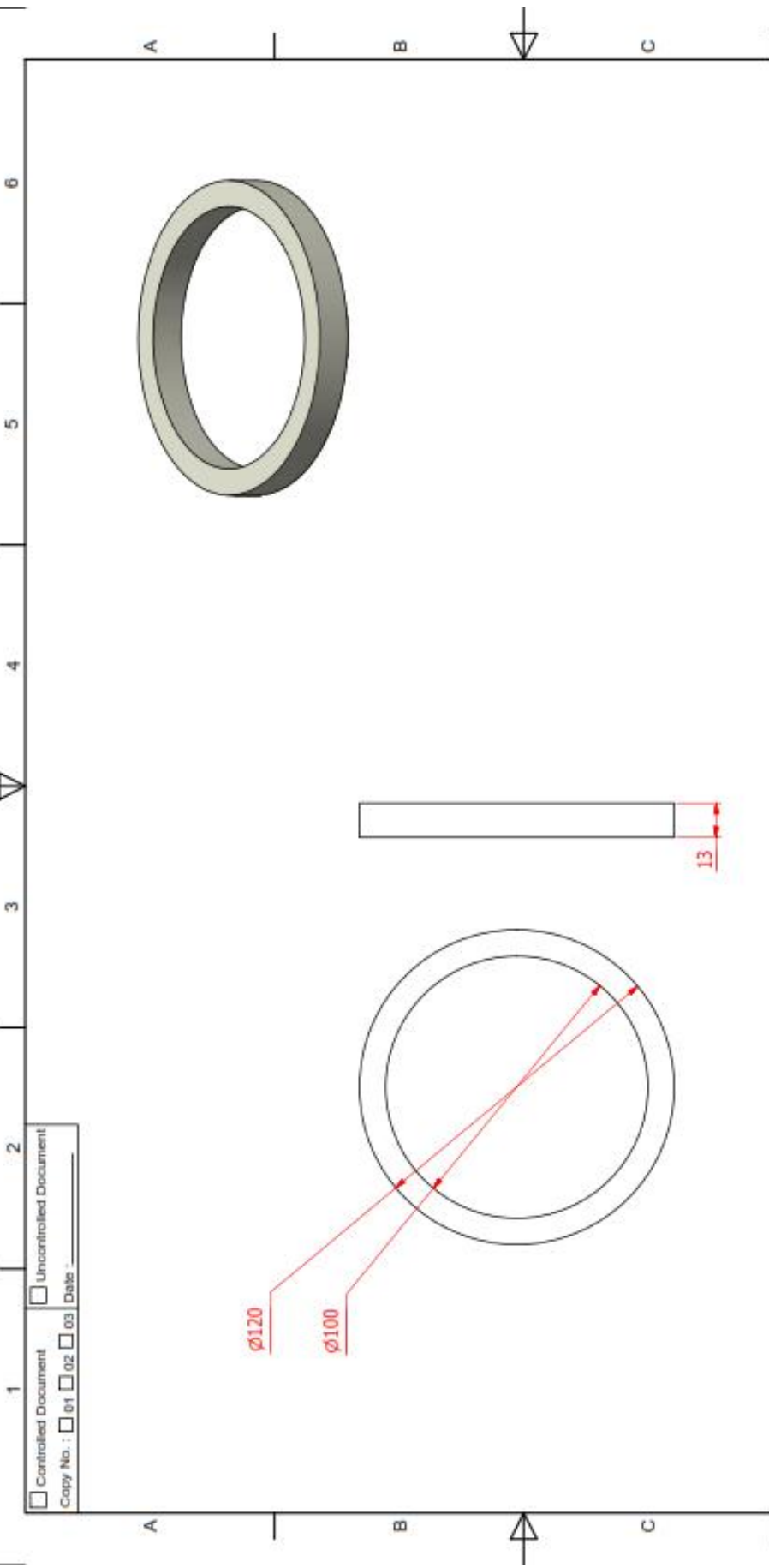
Revise 1 2 3 4 5 6
 Revise Description Cld. Date
 File Name : Hydraulic Cylinder.dwg
 F-ED-013 REV.01 D11126

TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND)
 Phone: +66 2027 933 WWW.TMC.CO.TH
 Model CYLINDER HYDRAULIC OF 100 TON
 Part Name D-95AL.1
 Title
 Weight
 N/A
 Size A4
 Rev.



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03
 Date : _____

Machining Chamfering Welding Angle Tolerance Length Tolerance	Design Check Verify	Date 	Name 		INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 3627 1933 WWW.TMC.CO.TH																																																																																																																																																																																																																																																																																																												
Ref.: JIS B 0405 (Unit: mm.)	Heat Treatment Coating Scale	Model Part Name Title Drawing No.	Mat. / Std. Weight Size Rev	CYLINDER HYDRAULIC OF 100 TON D-364L 2 HPP-07-009-000	N/A A4 HPP-07-009-000																																																																																																																																																																																																																																																																																																												
<table border="1"> <thead> <tr> <th>UP</th> <th>LS</th> <th>3</th> <th>6</th> <th>30</th> <th>120</th> <th>400</th> <th>1000</th> <th>15</th> <th>30</th> <th>120</th> <th>400</th> </tr> </thead> <tbody> <tr> <td>0.05</td> <td>0.1</td> <td>0.15</td> <td>0.2</td> <td>0.3</td> <td>0.5</td> <td>0.8</td> <td>1.2</td> <td>0.1</td> <td>0.15</td> <td>0.2</td> <td>0.3</td> </tr> <tr> <td>0.1</td> <td>0.15</td> <td>0.2</td> <td>0.3</td> <td>0.5</td> <td>0.8</td> <td>1.2</td> <td>0.1</td> <td>0.15</td> <td>0.2</td> <td>0.3</td> <td>0.5</td> </tr> <tr> <td>0.15</td> <td>0.2</td> <td>0.3</td> <td>0.5</td> <td>0.8</td> <td>1.2</td> <td>0.1</td> <td>0.15</td> <td>0.2</td> <td>0.3</td> <td>0.5</td> <td>0.8</td> </tr> <tr> <td>0.2</td> <td>0.3</td> <td>0.5</td> <td>0.8</td> <td>1.2</td> <td>0.1</td> <td>0.15</td> <td>0.2</td> <td>0.3</td> <td>0.5</td> <td>0.8</td> <td>1.2</td> </tr> <tr> <td>0.3</td> <td>0.5</td> <td>0.8</td> <td>1.2</td> <td>0.1</td> <td>0.15</td> <td>0.2</td> <td>0.3</td> <td>0.5</td> <td>0.8</td> <td>1.2</td> <td>0.3</td> </tr> <tr> <td>0.5</td> <td>0.8</td> <td>1.2</td> <td>0.1</td> <td>0.15</td> <td>0.2</td> <td>0.3</td> <td>0.5</td> <td>0.8</td> <td>1.2</td> <td>0.3</td> <td>0.5</td> </tr> <tr> <td>0.8</td> <td>1.2</td> <td>0.1</td> <td>0.15</td> <td>0.2</td> <td>0.3</td> <td>0.5</td> <td>0.8</td> <td>1.2</td> <td>0.3</td> <td>0.5</td> <td>0.8</td> </tr> <tr> <td>1.2</td> <td>0.1</td> <td>0.15</td> <td>0.2</td> <td>0.3</td> <td>0.5</td> <td>0.8</td> <td>1.2</td> <td>0.3</td> <td>0.5</td> <td>0.8</td> <td>1.2</td> </tr> <tr> <td>1.5</td> <td>0.15</td> <td>0.2</td> <td>0.3</td> <td>0.5</td> <td>0.8</td> <td>1.2</td> <td>0.3</td> <td>0.5</td> <td>0.8</td> <td>1.2</td> <td>1.5</td> </tr> <tr> <td>2</td> <td>0.2</td> <td>0.3</td> <td>0.5</td> <td>0.8</td> <td>1.2</td> <td>0.3</td> <td>0.5</td> <td>0.8</td> <td>1.2</td> <td>1.5</td> <td>2</td> </tr> <tr> <td>3</td> <td>0.3</td> <td>0.5</td> <td>0.8</td> <td>1.2</td> <td>0.3</td> <td>0.5</td> <td>0.8</td> <td>1.2</td> <td>1.5</td> <td>2</td> <td>3</td> </tr> <tr> <td>5</td> <td>0.5</td> <td>0.8</td> <td>1.2</td> <td>0.3</td> <td>0.5</td> <td>0.8</td> <td>1.2</td> <td>1.5</td> <td>2</td> <td>3</td> <td>5</td> </tr> <tr> <td>8</td> <td>0.8</td> <td>1.2</td> <td>0.3</td> <td>0.5</td> <td>0.8</td> <td>1.2</td> <td>1.5</td> <td>2</td> <td>3</td> <td>5</td> <td>8</td> </tr> <tr> <td>12</td> <td>1.2</td> <td>0.3</td> <td>0.5</td> <td>0.8</td> <td>1.2</td> <td>1.5</td> <td>2</td> <td>3</td> <td>5</td> <td>8</td> <td>12</td> </tr> <tr> <td>20</td> <td>2</td> <td>0.5</td> <td>0.8</td> <td>1.2</td> <td>1.5</td> <td>2</td> <td>3</td> <td>5</td> <td>8</td> <td>12</td> <td>20</td> </tr> <tr> <td>30</td> <td>3</td> <td>0.8</td> <td>1.2</td> <td>1.5</td> <td>2</td> <td>3</td> <td>5</td> <td>8</td> <td>12</td> <td>20</td> <td>30</td> </tr> <tr> <td>50</td> <td>5</td> <td>1.2</td> <td>1.5</td> <td>2</td> <td>3</td> <td>5</td> <td>8</td> <td>12</td> <td>20</td> <td>30</td> <td>50</td> </tr> <tr> <td>80</td> <td>8</td> <td>1.5</td> <td>2</td> <td>3</td> <td>5</td> <td>8</td> <td>12</td> <td>20</td> <td>30</td> <td>50</td> <td>80</td> </tr> <tr> <td>120</td> <td>12</td> <td>2</td> <td>3</td> <td>5</td> <td>8</td> <td>12</td> <td>20</td> <td>30</td> <td>50</td> <td>80</td> <td>120</td> </tr> <tr> <td>200</td> <td>20</td> <td>3</td> <td>5</td> <td>8</td> <td>12</td> <td>20</td> <td>30</td> <td>50</td> <td>80</td> <td>120</td> <td>200</td> </tr> <tr> <td>300</td> <td>30</td> <td>5</td> <td>8</td> <td>12</td> <td>20</td> <td>30</td> <td>50</td> <td>80</td> <td>120</td> <td>200</td> <td>300</td> </tr> <tr> <td>500</td> <td>50</td> <td>8</td> <td>12</td> <td>20</td> <td>30</td> <td>50</td> <td>80</td> <td>120</td> <td>200</td> <td>300</td> <td>500</td> </tr> <tr> <td>800</td> <td>80</td> <td>12</td> <td>20</td> <td>30</td> <td>50</td> <td>80</td> <td>120</td> <td>200</td> <td>300</td> <td>500</td> <td>800</td> </tr> <tr> <td>1000</td> <td>100</td> <td>20</td> <td>30</td> <td>50</td> <td>80</td> <td>120</td> <td>200</td> <td>300</td> <td>500</td> <td>800</td> <td>1000</td> </tr> </tbody> </table>	UP	LS	3	6	30	120	400	1000	15	30	120	400	0.05	0.1	0.15	0.2	0.3	0.5	0.8	1.2	0.1	0.15	0.2	0.3	0.1	0.15	0.2	0.3	0.5	0.8	1.2	0.1	0.15	0.2	0.3	0.5	0.15	0.2	0.3	0.5	0.8	1.2	0.1	0.15	0.2	0.3	0.5	0.8	0.2	0.3	0.5	0.8	1.2	0.1	0.15	0.2	0.3	0.5	0.8	1.2	0.3	0.5	0.8	1.2	0.1	0.15	0.2	0.3	0.5	0.8	1.2	0.3	0.5	0.8	1.2	0.1	0.15	0.2	0.3	0.5	0.8	1.2	0.3	0.5	0.8	1.2	0.1	0.15	0.2	0.3	0.5	0.8	1.2	0.3	0.5	0.8	1.2	0.1	0.15	0.2	0.3	0.5	0.8	1.2	0.3	0.5	0.8	1.2	1.5	0.15	0.2	0.3	0.5	0.8	1.2	0.3	0.5	0.8	1.2	1.5	2	0.2	0.3	0.5	0.8	1.2	0.3	0.5	0.8	1.2	1.5	2	3	0.3	0.5	0.8	1.2	0.3	0.5	0.8	1.2	1.5	2	3	5	0.5	0.8	1.2	0.3	0.5	0.8	1.2	1.5	2	3	5	8	0.8	1.2	0.3	0.5	0.8	1.2	1.5	2	3	5	8	12	1.2	0.3	0.5	0.8	1.2	1.5	2	3	5	8	12	20	2	0.5	0.8	1.2	1.5	2	3	5	8	12	20	30	3	0.8	1.2	1.5	2	3	5	8	12	20	30	50	5	1.2	1.5	2	3	5	8	12	20	30	50	80	8	1.5	2	3	5	8	12	20	30	50	80	120	12	2	3	5	8	12	20	30	50	80	120	200	20	3	5	8	12	20	30	50	80	120	200	300	30	5	8	12	20	30	50	80	120	200	300	500	50	8	12	20	30	50	80	120	200	300	500	800	80	12	20	30	50	80	120	200	300	500	800	1000	100	20	30	50	80	120	200	300	500	800	1000	Heat Treatment Coating Scale	Heat Treatment Coating Scale	Dimension (mm.) Drawing No.	File Name : Hydraulic Cylinder.dwg	Customer :
UP	LS	3	6	30	120	400	1000	15	30	120	400																																																																																																																																																																																																																																																																																																						
0.05	0.1	0.15	0.2	0.3	0.5	0.8	1.2	0.1	0.15	0.2	0.3																																																																																																																																																																																																																																																																																																						
0.1	0.15	0.2	0.3	0.5	0.8	1.2	0.1	0.15	0.2	0.3	0.5																																																																																																																																																																																																																																																																																																						
0.15	0.2	0.3	0.5	0.8	1.2	0.1	0.15	0.2	0.3	0.5	0.8																																																																																																																																																																																																																																																																																																						
0.2	0.3	0.5	0.8	1.2	0.1	0.15	0.2	0.3	0.5	0.8	1.2																																																																																																																																																																																																																																																																																																						
0.3	0.5	0.8	1.2	0.1	0.15	0.2	0.3	0.5	0.8	1.2	0.3																																																																																																																																																																																																																																																																																																						
0.5	0.8	1.2	0.1	0.15	0.2	0.3	0.5	0.8	1.2	0.3	0.5																																																																																																																																																																																																																																																																																																						
0.8	1.2	0.1	0.15	0.2	0.3	0.5	0.8	1.2	0.3	0.5	0.8																																																																																																																																																																																																																																																																																																						
1.2	0.1	0.15	0.2	0.3	0.5	0.8	1.2	0.3	0.5	0.8	1.2																																																																																																																																																																																																																																																																																																						
1.5	0.15	0.2	0.3	0.5	0.8	1.2	0.3	0.5	0.8	1.2	1.5																																																																																																																																																																																																																																																																																																						
2	0.2	0.3	0.5	0.8	1.2	0.3	0.5	0.8	1.2	1.5	2																																																																																																																																																																																																																																																																																																						
3	0.3	0.5	0.8	1.2	0.3	0.5	0.8	1.2	1.5	2	3																																																																																																																																																																																																																																																																																																						
5	0.5	0.8	1.2	0.3	0.5	0.8	1.2	1.5	2	3	5																																																																																																																																																																																																																																																																																																						
8	0.8	1.2	0.3	0.5	0.8	1.2	1.5	2	3	5	8																																																																																																																																																																																																																																																																																																						
12	1.2	0.3	0.5	0.8	1.2	1.5	2	3	5	8	12																																																																																																																																																																																																																																																																																																						
20	2	0.5	0.8	1.2	1.5	2	3	5	8	12	20																																																																																																																																																																																																																																																																																																						
30	3	0.8	1.2	1.5	2	3	5	8	12	20	30																																																																																																																																																																																																																																																																																																						
50	5	1.2	1.5	2	3	5	8	12	20	30	50																																																																																																																																																																																																																																																																																																						
80	8	1.5	2	3	5	8	12	20	30	50	80																																																																																																																																																																																																																																																																																																						
120	12	2	3	5	8	12	20	30	50	80	120																																																																																																																																																																																																																																																																																																						
200	20	3	5	8	12	20	30	50	80	120	200																																																																																																																																																																																																																																																																																																						
300	30	5	8	12	20	30	50	80	120	200	300																																																																																																																																																																																																																																																																																																						
500	50	8	12	20	30	50	80	120	200	300	500																																																																																																																																																																																																																																																																																																						
800	80	12	20	30	50	80	120	200	300	500	800																																																																																																																																																																																																																																																																																																						
1000	100	20	30	50	80	120	200	300	500	800	1000																																																																																																																																																																																																																																																																																																						
Revise Revise Description Chd. Date	1 	2 	3 	4 	5 	6 																																																																																																																																																																																																																																																																																																											



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____

General Unless Specification do not show on the drawing

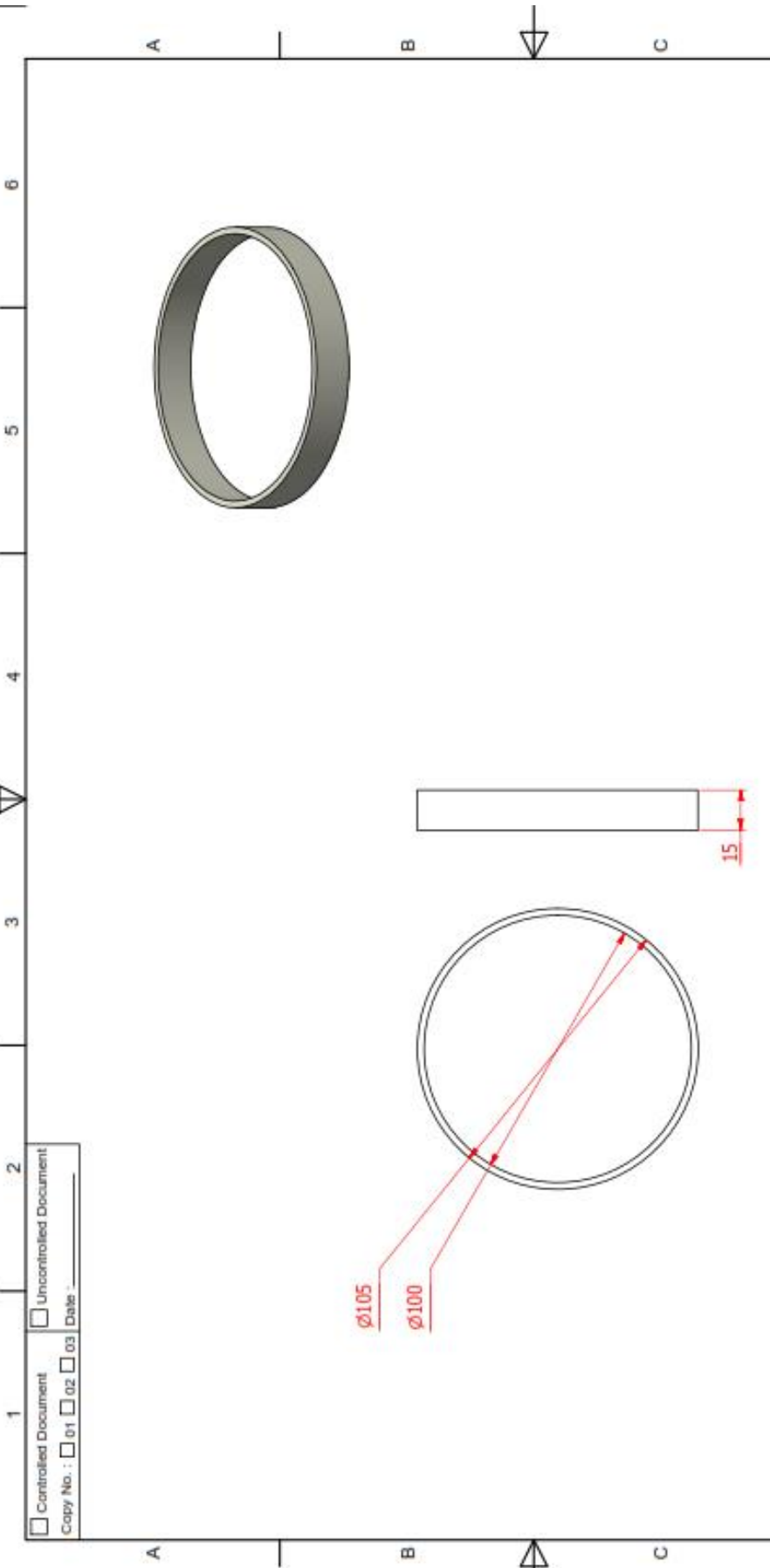
Machining	Welding	Angle Tolerance	Chamfering
JIS B 0405 (Unit:mm.)	Length Tolerance 3 6 30 120 450 1000 3 6 30 120 450 1000	10 30 120 400 30 120 400 400	0.5 1 1.5 2 2.5 3 4 5 6 8 10 12 15 20 25 30 40 50 60 80 100 120 150 200 250 300 400 500
$\sqrt{\text{ }}$ $\sqrt{\text{R}}\text{ }0.2$ $\sqrt{\text{R}}\text{ }0.1$ $\sqrt{\text{R}}\text{ }0.05$ $\sqrt{\text{R}}\text{ }0.02$	$\sqrt{\text{ }}$ $\sqrt{\text{R}}\text{ }0.2$ $\sqrt{\text{R}}\text{ }0.1$ $\sqrt{\text{R}}\text{ }0.05$ $\sqrt{\text{R}}\text{ }0.02$	$\sqrt{\text{ }}$ $\sqrt{\text{R}}\text{ }0.2$ $\sqrt{\text{R}}\text{ }0.1$ $\sqrt{\text{R}}\text{ }0.05$ $\sqrt{\text{R}}\text{ }0.02$	$\sqrt{\text{ }}$ $\sqrt{\text{R}}\text{ }0.2$ $\sqrt{\text{R}}\text{ }0.1$ $\sqrt{\text{R}}\text{ }0.05$ $\sqrt{\text{R}}\text{ }0.02$

Design	Date	Name
Check		
Verify		
Heat Treatment	-----	
Coating	-----	
Scale	Sheet No.	Dimension (mm.)
Customer :		

		INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 2027 9333 WWW.TMC.CO.TH
Model	Cylinder hydraulic of 100 TON	
Part Name	C-SDAL 3	
Title	N/A	
Weight	N/A	
Mat. / Std.	A4	
Drawing No.	HPP-07-0010-000	
File Name	Hydraulic Cylinder.dwg	

Revise	Revise Description	Chd.	Date	1	2	3	4	5	6

Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03
 Date : _____



General Unless Specification do not show on the drawing

Mechanism	Welding	Chamfering	Angle	Length Tolerance	Angle Tolerance
UP	E5	3	0	30	1.20
	3	8	30	1.20	400
	5	15	30	1.20	400
	6	20	30	1.20	400
	8	30	40	1.50	2000
	10	40	50	2.00	1000
	15	50	60	2.50	600
	20	60	75	3.00	400
	25	75	90	3.50	300
	30	90	105	4.00	250
	35	105	120	4.50	200
	40	120	135	5.00	150
	45	135	150	5.50	100
	50	150	165	6.00	75
	55	165	180	6.50	60
	60	180		7.00	50

Name: _____
 Date: _____
 Design: _____
 Check: _____
 Verify: _____
 Heat Treatment: _____
 Coating: _____
 Scale: _____
 Sheet No.: _____
 Dimension (mm.): _____

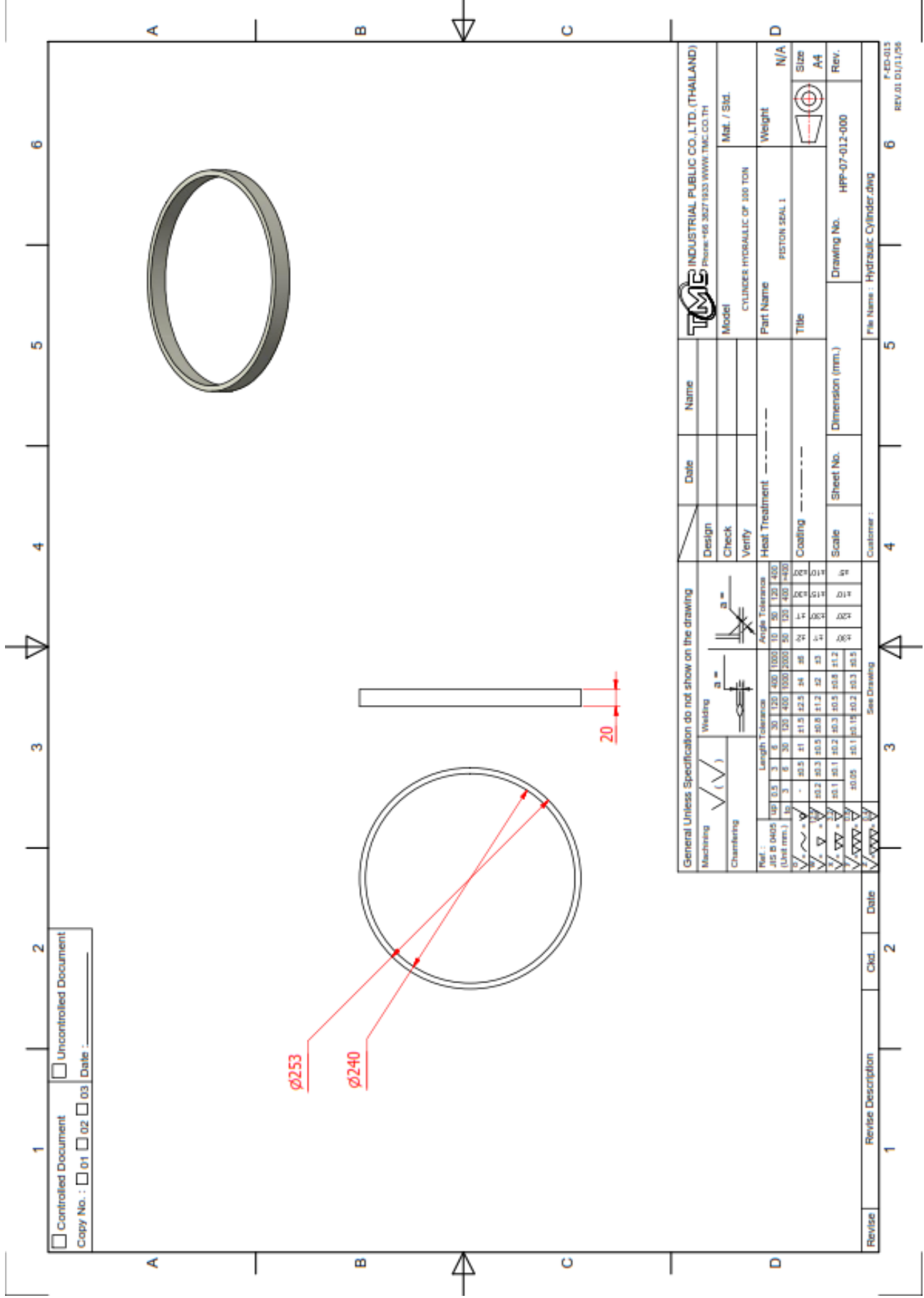
Customer: _____
 File Name: Hydraulic Cylinder.dwg

TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND)
 Phone: +66 3827 9333 WWW.TMC.CO.TH

Model: CYLINDER HYDRAULIC OF 105 TON
 Part Name: D-22AL 4
 Title: _____
 Weight: _____
 Mat. / Std.: _____

Size: N/A
 Drawing No.: HPP-07-011-000
 Rev: A4

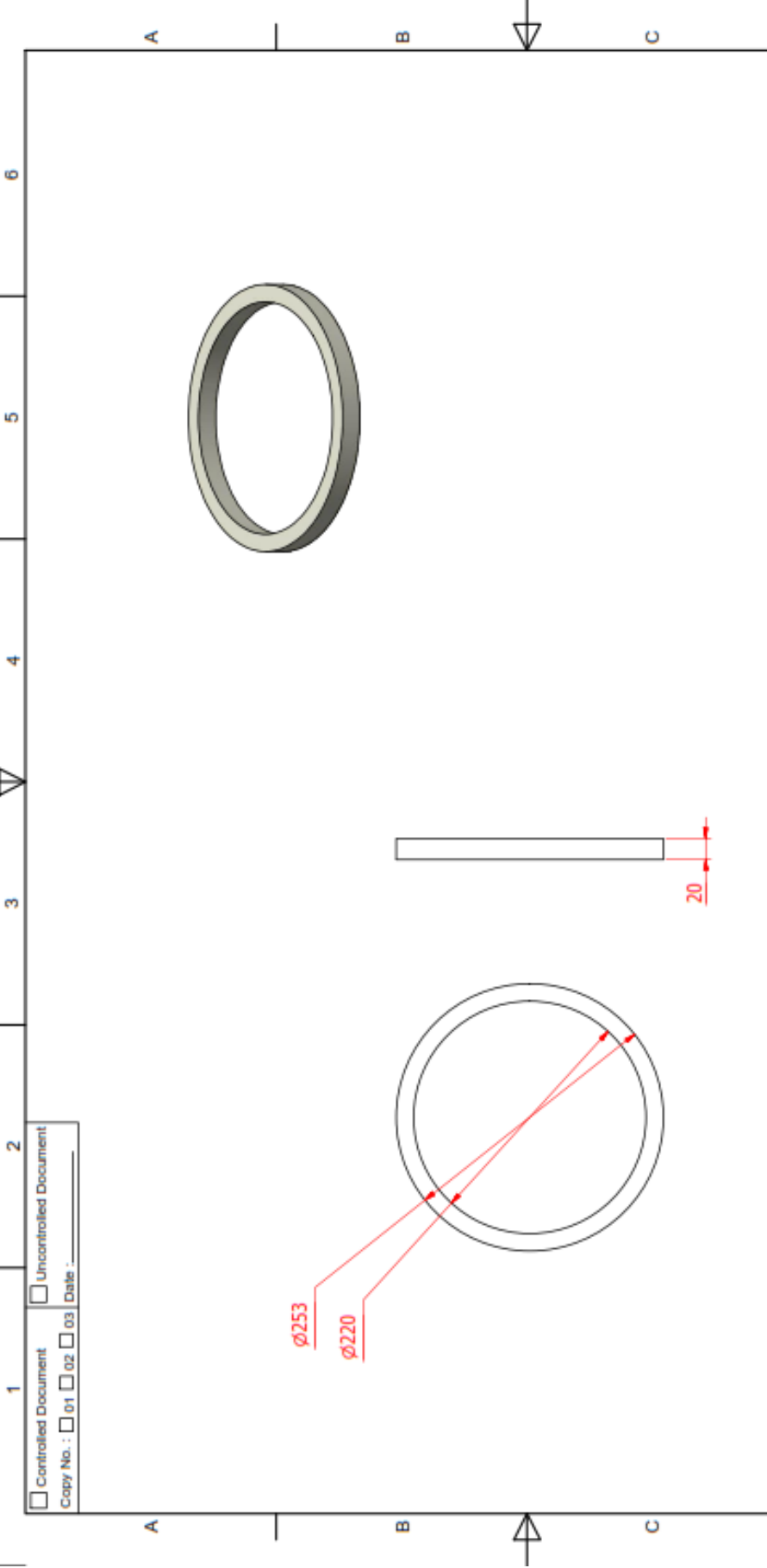
Revise: _____
 Revise Description: _____
 Chd. Date: _____
 1 2 3 4 5 6
 F-ED-013
 REV.01 DU.1.05



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 | Date : _____

<input type="checkbox"/> Controlled Document <input type="checkbox"/> Uncontrolled Document Copy No. : <input type="checkbox"/> 01 <input type="checkbox"/> 02 <input type="checkbox"/> 03 Date : _____		1 2 3 4 5 6	
General Unless Specification do not show on the drawing Machining <input checked="" type="checkbox"/> (✓)		Design Check Verify	
Chamfering <input checked="" type="checkbox"/> (✓)		Date Name	
Welding <input checked="" type="checkbox"/> (✓)		Model Part Name Title	
Heat Treatment <input type="checkbox"/> ()		Material / Std. Weight	
Coating <input type="checkbox"/> ()		Drawing No. HPP-07-012-000 Rev.	
Scale <input type="checkbox"/> ()		Sheet No. Dimension (mm.)	
Customer :		File Name : Hydraulic Cylinder.dwg	
1 2 3 4 5 6		1 2 3 4 5 6	

F4D-013
REV.01 01/1/206



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03
 Date : _____

General Unless Specification do not show on the drawing

Machining	(√)	Welding	(√)
Chamfering	(√)		
Ref. :	JIS B 0405	Length Tolerance	1000 15 30 120 400 1000 15 30 120 400
(Unit mm.)	10 3 6 30 120 450 1000 2000 50 120 400 1000	Angle Tolerance	15 30 120 400 1000
Surface	0.4 0.8 1.6 3.2 6.3 12.5 25 50 100 200 400 800	Surface	0.4 0.8 1.6 3.2 6.3 12.5 25 50 100 200 400 800
Form	0.1 0.2 0.3 0.5 0.8 1.2 1.8 2.5 3.6 5 7 10 15 20 30 40 50 60 70 80 90 100 120 150 200 250 300 400 500 600 700 800 900 1000	Form	0.1 0.2 0.3 0.5 0.8 1.2 1.8 2.5 3.6 5 7 10 15 20 30 40 50 60 70 80 90 100 120 150 200 250 300 400 500 600 700 800 900 1000
Texture	0.1 0.2 0.3 0.5 0.8 1.2 1.8 2.5 3.6 5 7 10 15 20 30 40 50 60 70 80 90 100 120 150 200 250 300 400 500 600 700 800 900 1000	Texture	0.1 0.2 0.3 0.5 0.8 1.2 1.8 2.5 3.6 5 7 10 15 20 30 40 50 60 70 80 90 100 120 150 200 250 300 400 500 600 700 800 900 1000
Position	0.1 0.2 0.3 0.5 0.8 1.2 1.8 2.5 3.6 5 7 10 15 20 30 40 50 60 70 80 90 100 120 150 200 250 300 400 500 600 700 800 900 1000	Position	0.1 0.2 0.3 0.5 0.8 1.2 1.8 2.5 3.6 5 7 10 15 20 30 40 50 60 70 80 90 100 120 150 200 250 300 400 500 600 700 800 900 1000
Step	0.1 0.2 0.3 0.5 0.8 1.2 1.8 2.5 3.6 5 7 10 15 20 30 40 50 60 70 80 90 100 120 150 200 250 300 400 500 600 700 800 900 1000	Step	0.1 0.2 0.3 0.5 0.8 1.2 1.8 2.5 3.6 5 7 10 15 20 30 40 50 60 70 80 90 100 120 150 200 250 300 400 500 600 700 800 900 1000
Step	0.1 0.2 0.3 0.5 0.8 1.2 1.8 2.5 3.6 5 7 10 15 20 30 40 50 60 70 80 90 100 120 150 200 250 300 400 500 600 700 800 900 1000	Step	0.1 0.2 0.3 0.5 0.8 1.2 1.8 2.5 3.6 5 7 10 15 20 30 40 50 60 70 80 90 100 120 150 200 250 300 400 500 600 700 800 900 1000

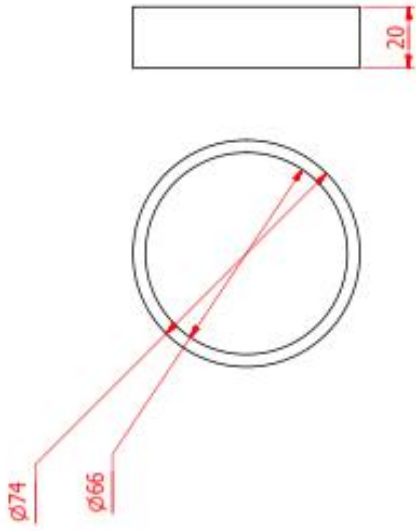
Design	Date	Name
Check		
Verify		
Heat Treatment	-----	
Coating	-----	
Scale	Sheet No.	Dimension (mm.)
Customer : _____		

Revise	Revise Description	Chd.	Date
1			
2			
3			
4			
5			
6			

		TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone : 66 2627 833 WWW.TMC.CO.TH	
Model	CYLINDER HYDRAULIC OF 100 TON	Mat. / Std.	
Part Name	PISTON SEAL 2	Weight	N/A
Title		Size	A4
Scale		Rev.	
Drawing No.	HPP-07-013-000	File Name : Hydraulic Cylinder.dwg	

Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03
 Date : _____

1 2 3 4 5 6



A B C D

General Unless Specification do not show on the drawing

Machining		Welding		Angle Tolerance							
Chamfering											
Ref.	UP	ES	3	E	30	1.20	400	10	35	120	400
	(Unit mm.)	SA	3	E	30	1.20	400	10	35	120	400
			0.2	0.3	0.5	0.8	1.2	0.4	0.3	0.1	0.1
			0.1	0.1	0.2	0.3	0.3	0.3	0.3	0.2	0.1
			0.05	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1

Design	Date	Name
Check		
Verify		
Heat Treatment	-----	
Coating	-----	
Scale	Sheet No.	Dimension (mm.)

Customer :
 File Name : Hydraulic Cylinder.dwg
 Drawing No. : HPP-07-014-000
 Weight : N/A
 Size : A4
 Rev. :

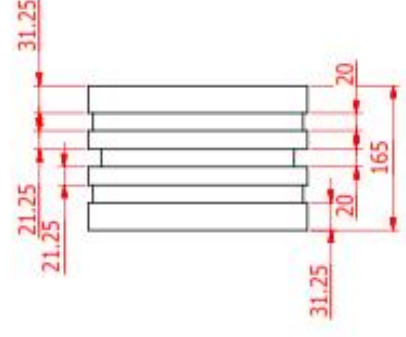
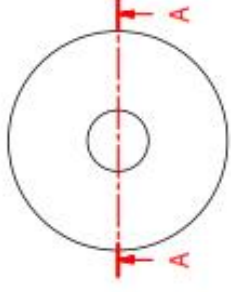
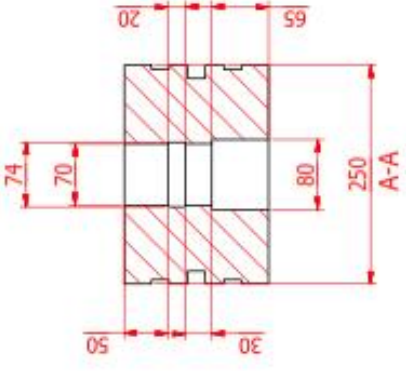
INDUSTRIAL PUBLIC CO., LTD. (THAILAND)
 Phone : 66 2627 9333 WWW.TMC.CO.TH

Model : CYLINDER HYDRAULIC 100 TON
 Part Name : PISTON SEAL 3
 Title :
 Mat. / Std. :
 Weight :

Revise	Revise Description	Chd.	Date
1			
2			

1 2 3 4 5 6

Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____



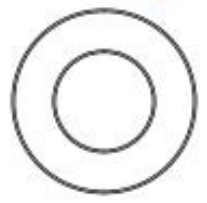
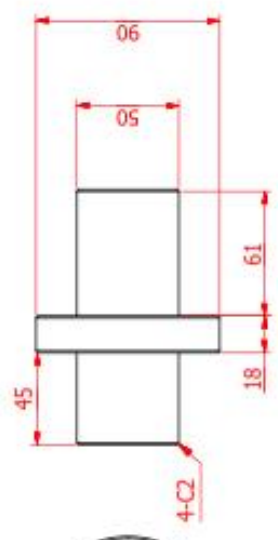
General Unless Specification do not show on the drawing

Machining	Welding	Chamfering	Angle Tolerance	Heat Treatment	Coating	Scale	Sheet No.	Dimension (mm.)	Drawing No.
<input type="checkbox"/> (V) <input type="checkbox"/> (W) <input type="checkbox"/> (X) <input type="checkbox"/> (Y) <input type="checkbox"/> (Z)	<input type="checkbox"/> (A) <input type="checkbox"/> (B) <input type="checkbox"/> (C) <input type="checkbox"/> (D)	<input type="checkbox"/> (E) <input type="checkbox"/> (F) <input type="checkbox"/> (G) <input type="checkbox"/> (H)	10° ±0.1 15° ±0.1 30° ±0.1 45° ±0.1 60° ±0.1 75° ±0.1 90° ±0.1	---	---	1:1	01	250	HPP-07-0013-000

JIS B 0405 (Unit:mm.) 3 8 30 120 400 1000 15 30 120 400 3 8 30 120 400 1000 2000 30 120 400 4000	Length Tolerance 10 ±0.1 15 ±0.1 30 ±0.1 45 ±0.1 60 ±0.1 75 ±0.1 90 ±0.1	Weight N/A
TME INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 30271933 WWW.TME.CO.TH	Model CYLINDER HYDRAULIC OF 100 TON	Mat. / Std.
Part Name HYDRO POSITION	Title	Size A4
Heat Treatment	Coating	Rev

File Name : Hydraulic Cylinder.dwg
 Customer :

Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____



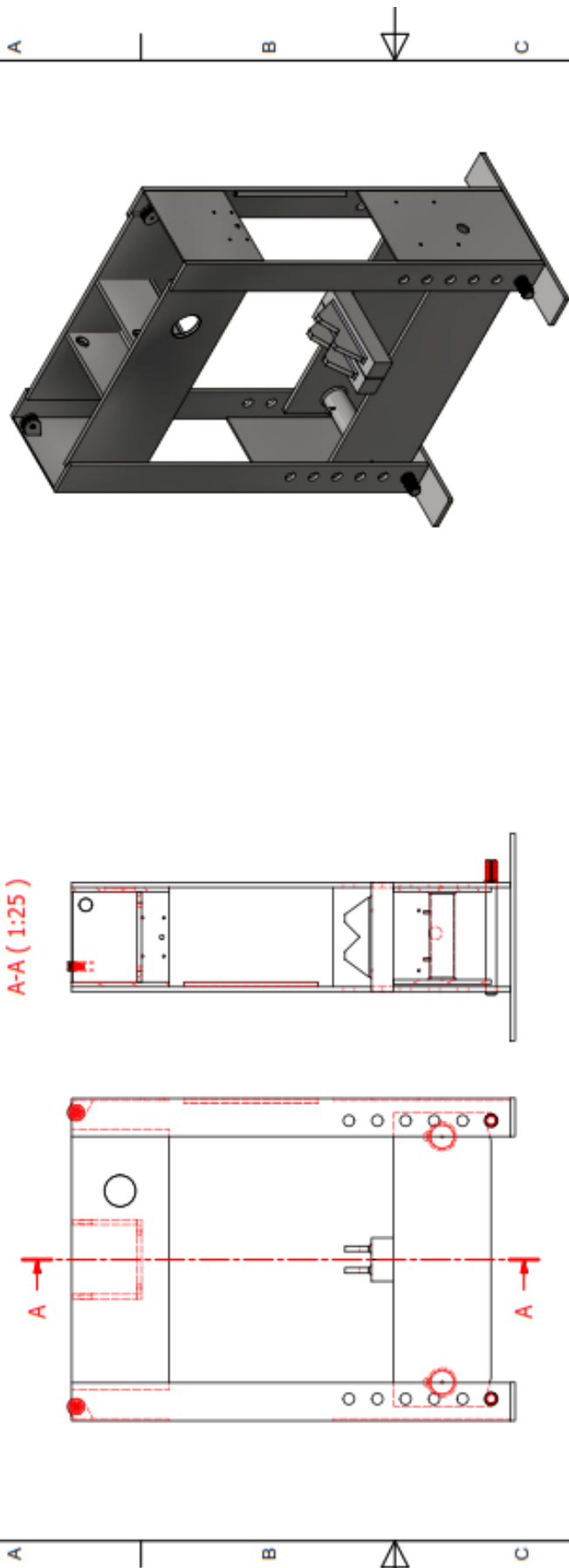
Machining		Welding		General Unless Specification do not show on the drawing		Design	Date	Name	TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 3627 1933 WWW.TMC.CO.TH	
Chamfering		See Drawing		Angle Tolerance		Check			Model	Mat. / Std.
				Length Tolerance		Verify	Heat Treatment	Part Name	CYLINDER HYDRAULIC OF 100 TON	Weight
				Surface Tolerance		Coating		Title	puich	N/A
				Form Tolerance		Scale		Sheet No.	Dimension (mm.)	Size
				Position Tolerance		Customer		Drawing No.	HPP-07-0016-000	Rev
				Circular Runout		File Name		Hydraulic Cylinder.dwg		

Revise	1	Revise Description	2	Chd.	3	Date	4	5	6
F-03-013 REV.01 DU.1296									

ATTACHMENT 2

Design of Hydraulic Press Structures

Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____



General Unless Specification do not show on the drawing

Machining	Chamfering	Welding	Angle Tolerance
$\sqrt{\text{V}}$ $\sqrt{\text{X}}$	$\sqrt{\text{V}}$		

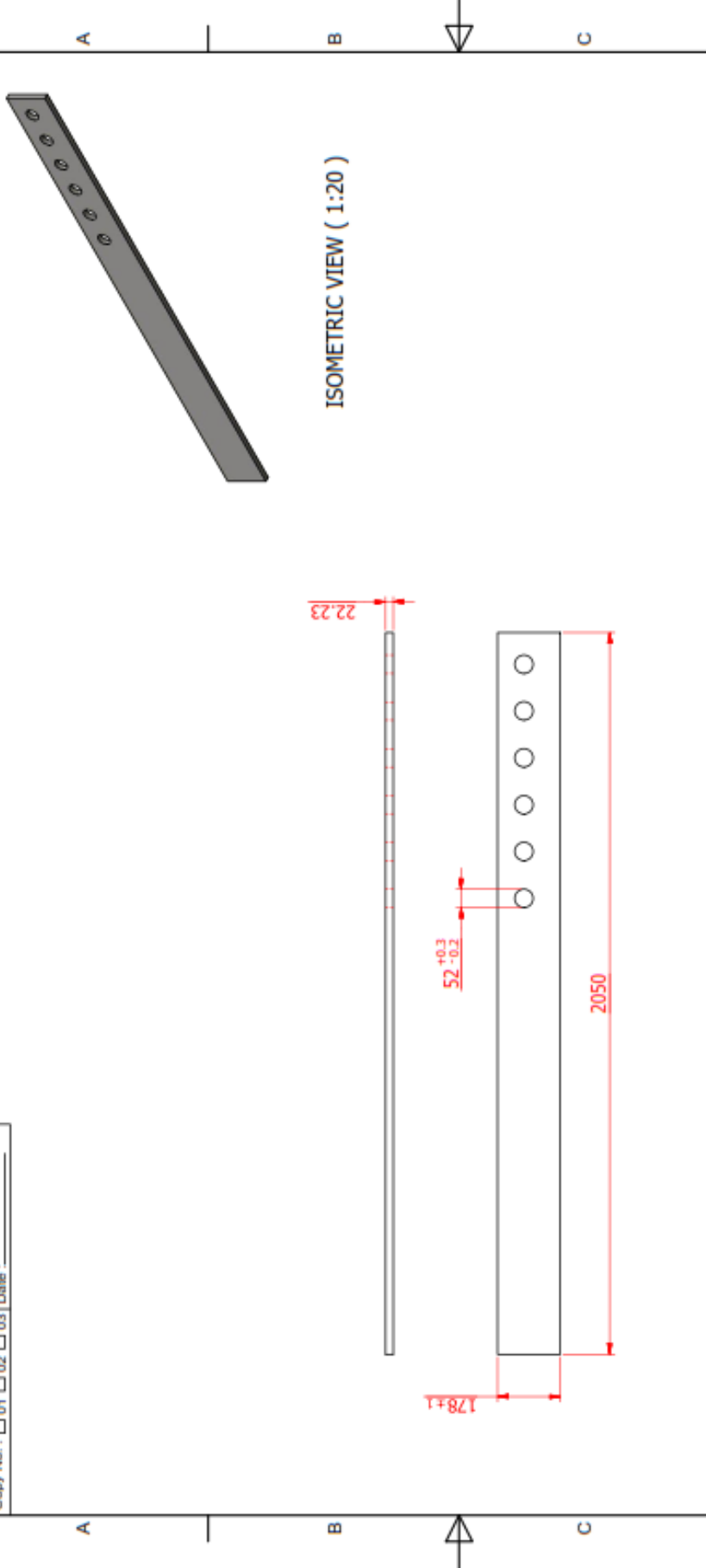
Ref.	Length Tolerance	Angle Tolerance
JIS B 0405	10 3 6 30 120 400 1000 15 30 120 400	10 30 45 60 75 90 105 120 135 150
(Unit mm.)	10 3 6 30 120 400 1000 2000 30 120 400 +0.03	120 400 +0.03
$\sqrt{\text{V}}$	- 0.05 ±1 ±1.5 ±2.5 ±4 ±6 ±10 ±15 ±20 ±25 ±30 ±40 ±50 ±60 ±70 ±80 ±90 ±100 ±120 ±150 ±200 ±250 ±300 ±400 ±500 ±600 ±700 ±800 ±900 ±1000 ±1200 ±1500 ±2000 ±2500 ±3000 ±4000 ±5000 ±6000 ±7000 ±8000 ±9000 ±10000	1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0 10.5 11.0 11.5 12.0 12.5 13.0 13.5 14.0 14.5 15.0 15.5 16.0 16.5 17.0 17.5 18.0 18.5 19.0 19.5 20.0 20.5 21.0 21.5 22.0 22.5 23.0 23.5 24.0 24.5 25.0 25.5 26.0 26.5 27.0 27.5 28.0 28.5 29.0 29.5 30.0 30.5 31.0 31.5 32.0 32.5 33.0 33.5 34.0 34.5 35.0 35.5 36.0 36.5 37.0 37.5 38.0 38.5 39.0 39.5 40.0 40.5 41.0 41.5 42.0 42.5 43.0 43.5 44.0 44.5 45.0 45.5 46.0 46.5 47.0 47.5 48.0 48.5 49.0 49.5 50.0 50.5 51.0 51.5 52.0 52.5 53.0 53.5 54.0 54.5 55.0 55.5 56.0 56.5 57.0 57.5 58.0 58.5 59.0 59.5 60.0 60.5 61.0 61.5 62.0 62.5 63.0 63.5 64.0 64.5 65.0 65.5 66.0 66.5 67.0 67.5 68.0 68.5 69.0 69.5 70.0 70.5 71.0 71.5 72.0 72.5 73.0 73.5 74.0 74.5 75.0 75.5 76.0 76.5 77.0 77.5 78.0 78.5 79.0 79.5 80.0 80.5 81.0 81.5 82.0 82.5 83.0 83.5 84.0 84.5 85.0 85.5 86.0 86.5 87.0 87.5 88.0 88.5 89.0 89.5 90.0 90.5 91.0 91.5 92.0 92.5 93.0 93.5 94.0 94.5 95.0 95.5 96.0 96.5 97.0 97.5 98.0 98.5 99.0 99.5 100.0

Design	Date	Name	TMC INDUSTRIAL PUBLIC CO.,LTD. (THAILAND) Phone : 66 2627 833 WWW.TMC.CO.TH
Check			Model HYDRAULIC PRESS 100 TON
Verify			Part Name FRAME
Heat Treatment			Weight N/A
Coating			Size A4
Scale			Rev. Rev.
Sheet No.		Dimension (mm.)	Drawing No. HPP-02-000-000
Customer : _____			

Revise	Revise Description	Chd.	Date
00	First Issue		

1 2 3 4 5 6

Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03
 Date : _____



Revise	Revise Description	Chd.	Date
00	First Issue		

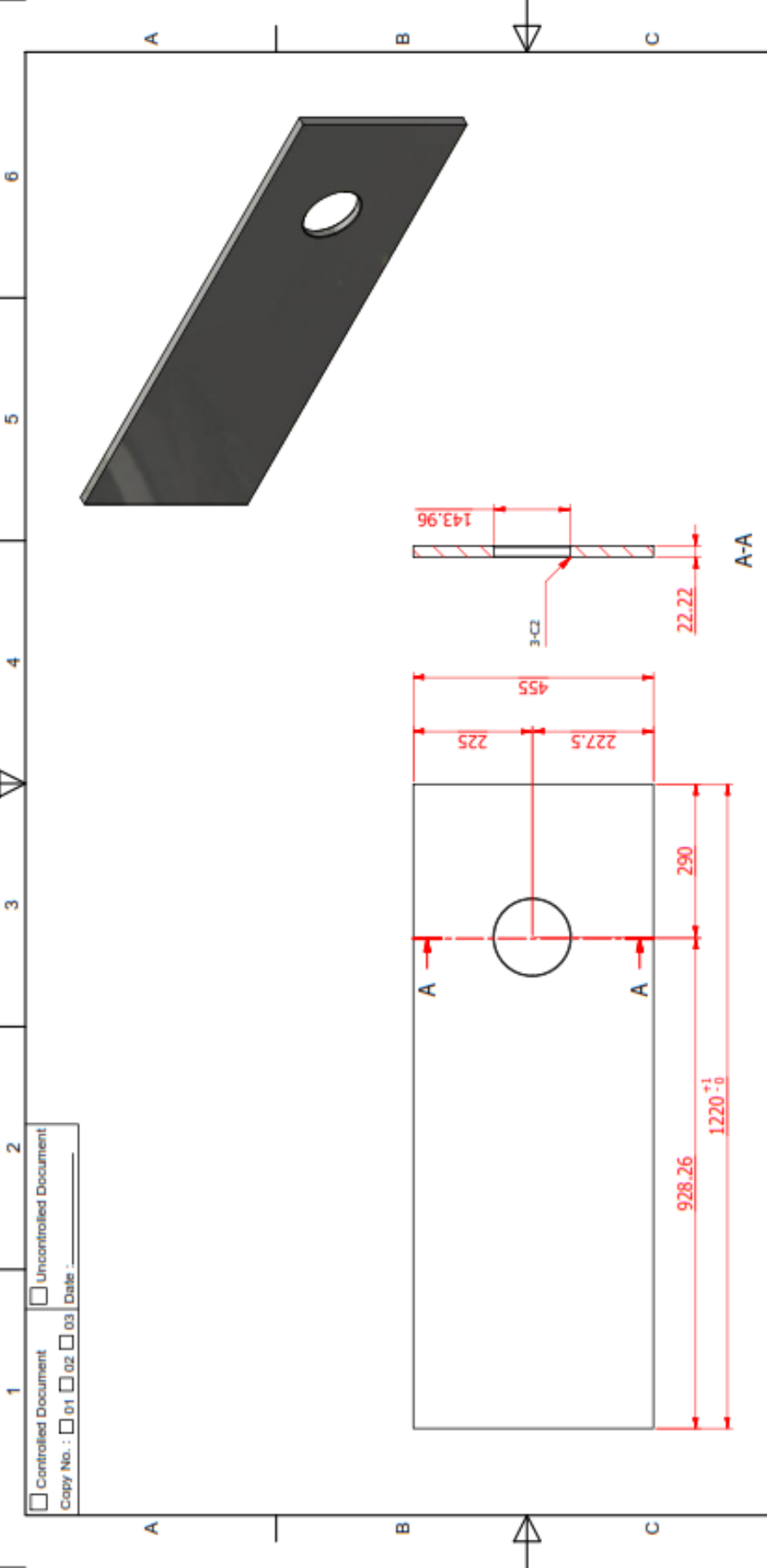
Revise	Revise Description	Chd.	Date
1			
2			
3			
4			
5			
6			

General Unless Specification do not show on the drawing		Date	Name
Machining	(V)	Design	
Chamfering	(/)	Check	
		Verify	
		Heat Treatment	-----
		Coating	-----
		Scale	Dimension (mm.)
		Sheet No.	Drawing No.
		Customer :	File Name : Hydraulic Press Frame.dwg

Part No.	JIS B 0405	Length Tolerance	1000 10 30 120 405 1000 15 30 120 400	Angle Tolerance	15 30 120 400
Unit (mm.)	15 3 6 30 120 400 1000 2000 50 125 400 +0.30				
Surface	0.4 1.6 3.2 6.3 12.5 25 50 100 200 400 800 1.6 3.2 6.3 12.5 25 50 100 200 400				
Form	0.2 0.3 0.5 0.8 1.2 1.5 2.0 2.5 3.0 4.0 5.0 6.0 8.0 10.0 12.5 15.0 20.0 25.0 30.0 40.0 50.0 60.0 80.0 100.0 125.0 150.0 200.0 250.0 300.0 400.0 500.0				
Welding	(V)	See Drawing			
Chamfering	(/)				
Heat Treatment	-----				
Coating	-----				
Scale	-----				
Sheet No.	-----				
Drawing No.	-----				
Customer	-----				

Model	HYDRAULIC PRESS 100 TON	Mat. / Std.	
Part Name	FRAME	Weight	
Title		Size	N/A
Drawing No.	HPP-02-001-000	Rev.	A4

Company Logo	TMC	Company Name	INDUSTRIAL PUBLIC CO., LTD. (THAILAND)
Contact Info	Phone: +66 2027 9333 WWW: TMC.CO.TH		



General Unless Specification do not show on the drawing

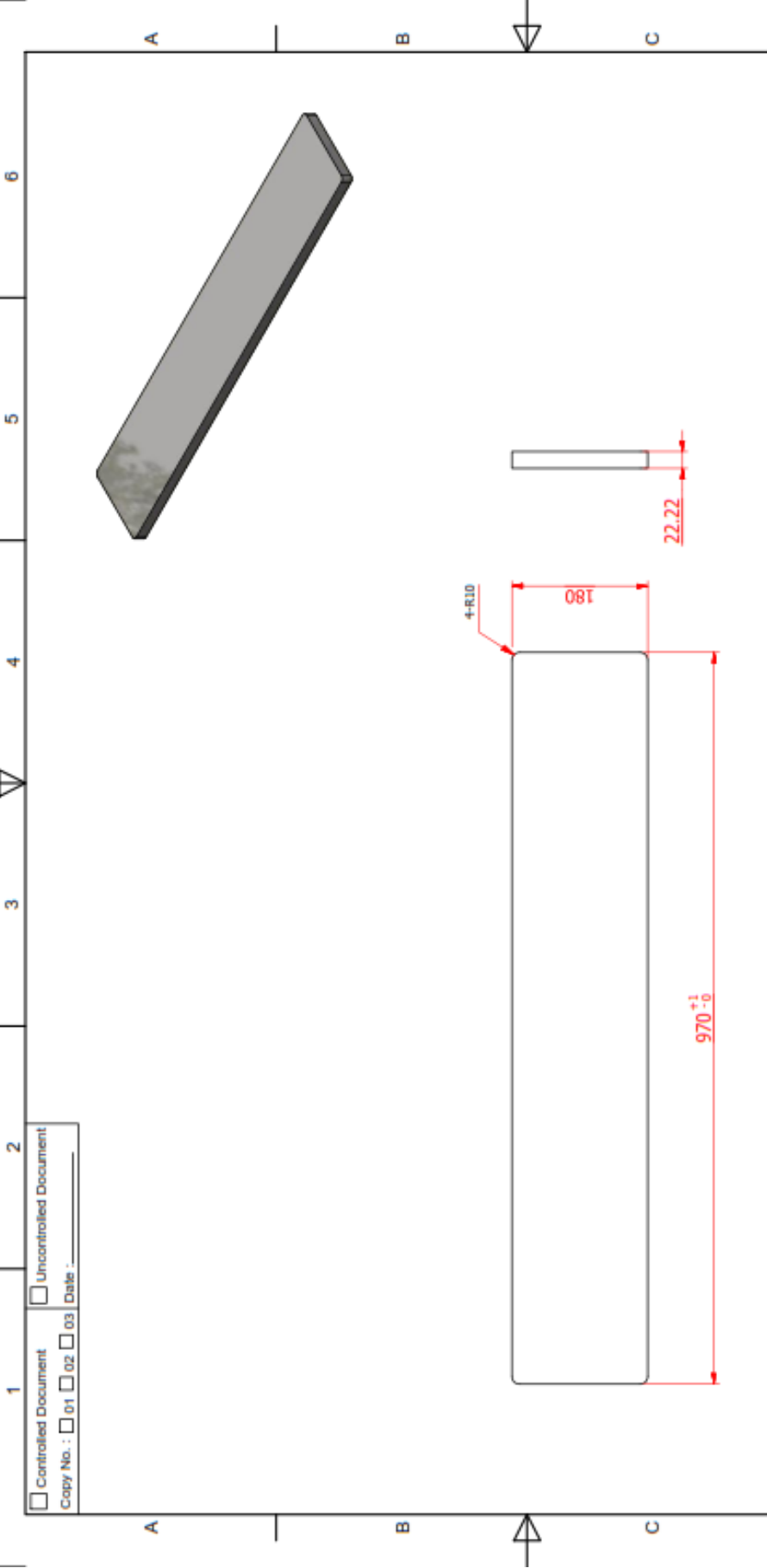
Machining	✓ (✓)	Welding	a =	Angle Tolerance	10 30 120 400 15 30 120 400
Chamfering	✓ (✓)			Length Tolerance	10 30 120 400 1000 2000 50 125 400 +0.30
Ref.:	JIS B 0405	UP 0.5 3 6 30 120 400			
	(Unit mm.)	10 30 60 120 400 1000 2000			
Surface Finish	✓ (✓)	- 0.5 1 1.5 2.5 4 8 12.5 20 30 40 50 63 80 100 125 160 200 250 315 400 500 630 800 1000			
Welding	✓ (✓)	0.2 0.3 0.5 0.8 1.2 1.6 2 2.5 3 4 5 6 8 10 12 16 20 25 30 40 50 60 80 100 125 160 200 250 300 400 500 600 800 1000			
Chamfering	✓ (✓)	0.1 0.2 0.3 0.5 0.8 1.2 1.6 2 2.5 3 4 5 6 8 10 12 16 20 25 30 40 50 60 80 100 125 160 200 250 300 400 500 600 800 1000			
Welding	✓ (✓)	0.1 0.2 0.3 0.5 0.8 1.2 1.6 2 2.5 3 4 5 6 8 10 12 16 20 25 30 40 50 60 80 100 125 160 200 250 300 400 500 600 800 1000			
Chamfering	✓ (✓)	0.1 0.2 0.3 0.5 0.8 1.2 1.6 2 2.5 3 4 5 6 8 10 12 16 20 25 30 40 50 60 80 100 125 160 200 250 300 400 500 600 800 1000			

Design	Name	Date
Check		
Verify		
Heat Treatment	-----	
Coating	-----	
Scale	Sheet No.	Dimension (mm.)
Customer:	File Name : Hydraulic Press Frame.dwg	

Revise	Revise Description	Chd.	Date
1		2	

TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 3027 1933 WWW.TMC.CO.TH	Model	Mat. / Std.
HYDRAULIC PRESS 100 TON		
Part Name	Weight	
FRAME	93.97 kg	
Title		Size
		A4
Drawing No.		Rev.
HFP-02-002-000		

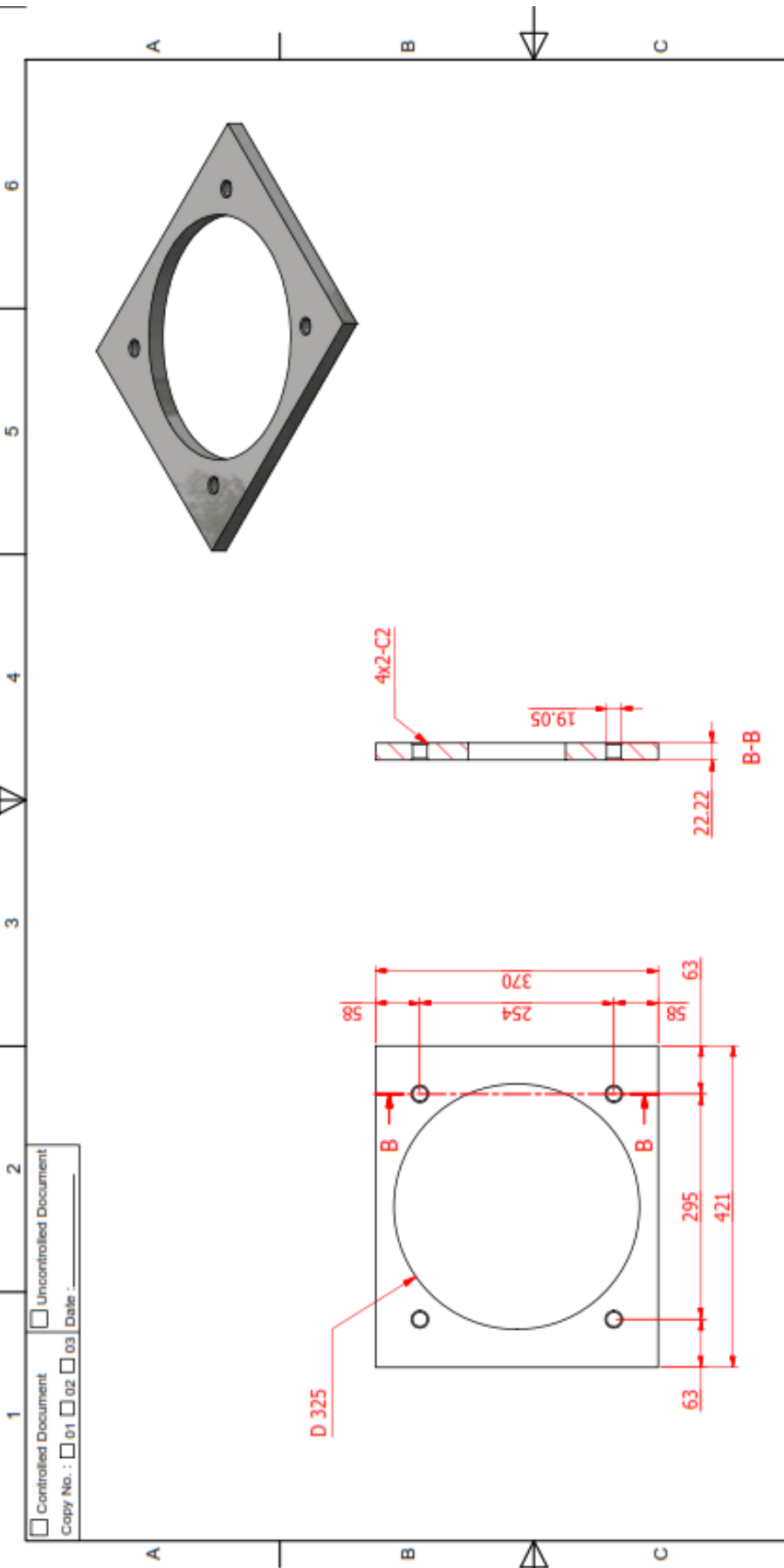
Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03
 Date : _____



Machining		Welding		Chamfering		General Unless Specification do not show on the drawing		Design	Date	Name
Ref.:								Check		
JIS B 0405	UP	2.5	3	6	30	120	400	Verify		
(Unit mm.)		10	3	6	30	120	400	Heat Treatment		
								Coating		
								Scale		
								Sheet No.		
								Dimension (mm.)		
								Drawing No.		
								File Name		
								Customer		

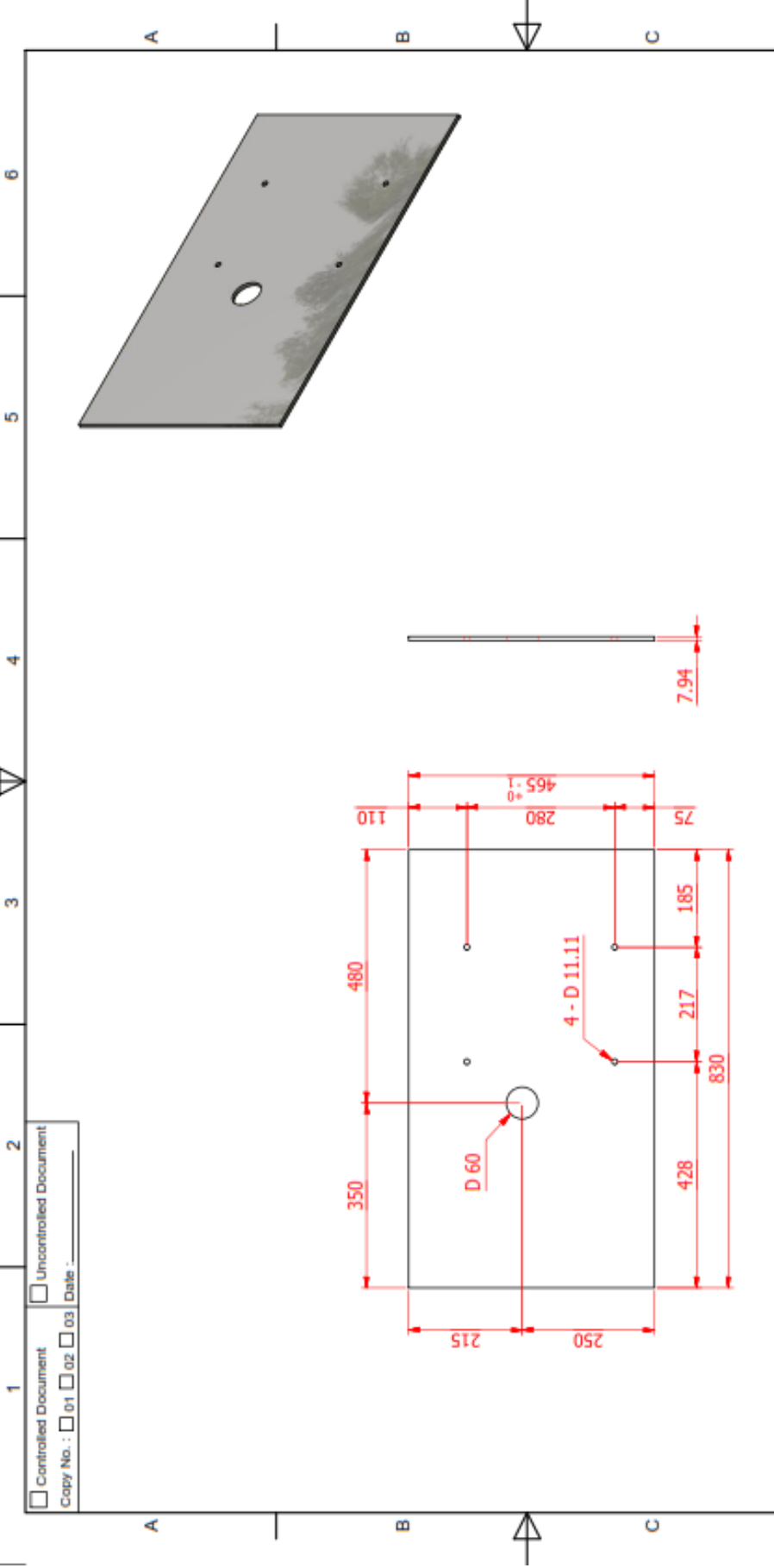
Part Name	Model	Mat. / Std.	Weight
HYDRAULIC PRESS 100 TON			
FRAME			
Title			
Size			
A4			
Rev.			

Revise	Revise Description	Chd.	Date
1			
2			
3			
4			
5			
6			



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____

Revise	1	Revise Description	2	Chd.	Date	3	4	5	6																
Customer : _____																									
Scale : _____ Dimension (mm.) : _____ Drawing No. : HPP-02-004-000 Rev. : _____																									
File Name : Hydraulic Press Frame.dwg																									
General Unless Specification do not show on the drawing Machining $\sqrt{}$ Welding $\sqrt{}$ Chamfering $\sqrt{}$																									
<table border="1"> <thead> <tr> <th>Ref. :</th> <th>Length Tolerance</th> <th>Angle Tolerance</th> </tr> </thead> <tbody> <tr> <td>JIS B 0405</td> <td>0.5 3 6 30 120 400 1000 15 30 120 400</td> <td>10 30 120 400</td> </tr> <tr> <td>(Unit mm.)</td> <td>10 3 6 30 120 400 1000 2000 50 120 400 +0.05</td> <td>5 10 30 120 400</td> </tr> <tr> <td>$\sqrt{}$</td> <td>- 0.05 ±1 ±1.5 ±2.5 ±4 ±6 ±10 ±15 ±25 ±45 ±60 ±100 ±150 ±200 ±300 ±400 ±500 ±600 ±800 ±1000 ±1500 ±2000 ±3000 ±4000 ±5000</td> <td>1° 1.5° 2° 3° 4° 5° 6° 8° 10° 12° 15° 18° 20° 25° 30° 35° 40° 45° 50° 60° 70° 80° 90° 100° 120° 150° 180°</td> </tr> <tr> <td>$\sqrt{}$</td> <td>±0.2 ±0.3 ±0.5 ±0.8 ±1.2 ±2 ±3 ±4 ±5 ±6 ±8 ±10 ±15 ±20 ±25 ±30 ±40 ±50 ±60 ±80 ±100 ±150 ±200 ±300 ±400 ±500 ±600 ±800 ±1000 ±1500 ±2000 ±3000 ±4000 ±5000</td> <td>±0.05 ±0.1 ±0.15 ±0.2 ±0.3 ±0.5 ±0.8 ±1.2 ±2 ±3 ±4 ±5 ±6 ±8 ±10 ±15 ±20 ±25 ±30 ±40 ±50 ±60 ±80 ±100 ±150 ±200 ±300 ±400 ±500 ±600 ±800 ±1000 ±1500 ±2000 ±3000 ±4000 ±5000</td> </tr> </tbody> </table>										Ref. :	Length Tolerance	Angle Tolerance	JIS B 0405	0.5 3 6 30 120 400 1000 15 30 120 400	10 30 120 400	(Unit mm.)	10 3 6 30 120 400 1000 2000 50 120 400 +0.05	5 10 30 120 400	$\sqrt{}$	- 0.05 ±1 ±1.5 ±2.5 ±4 ±6 ±10 ±15 ±25 ±45 ±60 ±100 ±150 ±200 ±300 ±400 ±500 ±600 ±800 ±1000 ±1500 ±2000 ±3000 ±4000 ±5000	1° 1.5° 2° 3° 4° 5° 6° 8° 10° 12° 15° 18° 20° 25° 30° 35° 40° 45° 50° 60° 70° 80° 90° 100° 120° 150° 180°	$\sqrt{}$	±0.2 ±0.3 ±0.5 ±0.8 ±1.2 ±2 ±3 ±4 ±5 ±6 ±8 ±10 ±15 ±20 ±25 ±30 ±40 ±50 ±60 ±80 ±100 ±150 ±200 ±300 ±400 ±500 ±600 ±800 ±1000 ±1500 ±2000 ±3000 ±4000 ±5000	±0.05 ±0.1 ±0.15 ±0.2 ±0.3 ±0.5 ±0.8 ±1.2 ±2 ±3 ±4 ±5 ±6 ±8 ±10 ±15 ±20 ±25 ±30 ±40 ±50 ±60 ±80 ±100 ±150 ±200 ±300 ±400 ±500 ±600 ±800 ±1000 ±1500 ±2000 ±3000 ±4000 ±5000	
Ref. :	Length Tolerance	Angle Tolerance																							
JIS B 0405	0.5 3 6 30 120 400 1000 15 30 120 400	10 30 120 400																							
(Unit mm.)	10 3 6 30 120 400 1000 2000 50 120 400 +0.05	5 10 30 120 400																							
$\sqrt{}$	- 0.05 ±1 ±1.5 ±2.5 ±4 ±6 ±10 ±15 ±25 ±45 ±60 ±100 ±150 ±200 ±300 ±400 ±500 ±600 ±800 ±1000 ±1500 ±2000 ±3000 ±4000 ±5000	1° 1.5° 2° 3° 4° 5° 6° 8° 10° 12° 15° 18° 20° 25° 30° 35° 40° 45° 50° 60° 70° 80° 90° 100° 120° 150° 180°																							
$\sqrt{}$	±0.2 ±0.3 ±0.5 ±0.8 ±1.2 ±2 ±3 ±4 ±5 ±6 ±8 ±10 ±15 ±20 ±25 ±30 ±40 ±50 ±60 ±80 ±100 ±150 ±200 ±300 ±400 ±500 ±600 ±800 ±1000 ±1500 ±2000 ±3000 ±4000 ±5000	±0.05 ±0.1 ±0.15 ±0.2 ±0.3 ±0.5 ±0.8 ±1.2 ±2 ±3 ±4 ±5 ±6 ±8 ±10 ±15 ±20 ±25 ±30 ±40 ±50 ±60 ±80 ±100 ±150 ±200 ±300 ±400 ±500 ±600 ±800 ±1000 ±1500 ±2000 ±3000 ±4000 ±5000																							
<table border="1"> <thead> <tr> <th>Design</th> <th>Name</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>Check</td> <td></td> <td></td> </tr> <tr> <td>Verify</td> <td></td> <td></td> </tr> <tr> <td>Heat Treatment</td> <td>-----</td> <td></td> </tr> <tr> <td>Coating</td> <td>-----</td> <td></td> </tr> </tbody> </table>										Design	Name	Date	Check			Verify			Heat Treatment	-----		Coating	-----		
Design	Name	Date																							
Check																									
Verify																									
Heat Treatment	-----																								
Coating	-----																								
<table border="1"> <thead> <tr> <th>Model</th> <th>Part Name</th> <th>Weight</th> <th>Mat. / Std.</th> </tr> </thead> <tbody> <tr> <td></td> <td>HYDRAULIC PRESS 100 TON</td> <td></td> <td></td> </tr> <tr> <td></td> <td>FRAME</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Title</td> <td></td> <td></td> </tr> </tbody> </table>										Model	Part Name	Weight	Mat. / Std.		HYDRAULIC PRESS 100 TON				FRAME				Title		
Model	Part Name	Weight	Mat. / Std.																						
	HYDRAULIC PRESS 100 TON																								
	FRAME																								
	Title																								
<table border="1"> <thead> <tr> <th>Size</th> <th>Rev.</th> </tr> </thead> <tbody> <tr> <td>A4</td> <td></td> </tr> </tbody> </table>										Size	Rev.	A4													
Size	Rev.																								
A4																									
<table border="1"> <thead> <tr> <th>Logo</th> <th>Company Name</th> <th>Address</th> <th>Phone</th> </tr> </thead> <tbody> <tr> <td></td> <td>INDUSTRIAL PUBLIC CO., LTD. (THAILAND)</td> <td>166/167/168/169/170/171/172/173/174/175/176/177/178/179/180/181/182/183/184/185/186/187/188/189/190/191/192/193/194/195/196/197/198/199/200/201/202/203/204/205/206/207/208/209/210/211/212/213/214/215/216/217/218/219/220/221/222/223/224/225/226/227/228/229/230/231/232/233/234/235/236/237/238/239/240/241/242/243/244/245/246/247/248/249/250/251/252/253/254/255/256/257/258/259/260/261/262/263/264/265/266/267/268/269/270/271/272/273/274/275/276/277/278/279/280/281/282/283/284/285/286/287/288/289/290/291/292/293/294/295/296/297/298/299/300/301/302/303/304/305/306/307/308/309/310/311/312/313/314/315/316/317/318/319/320/321/322/323/324/325/326/327/328/329/330/331/332/333/334/335/336/337/338/339/340/341/342/343/344/345/346/347/348/349/350/351/352/353/354/355/356/357/358/359/360/361/362/363/364/365/366/367/368/369/370/371/372/373/374/375/376/377/378/379/380/381/382/383/384/385/386/387/388/389/390/391/392/393/394/395/396/397/398/399/400/401/402/403/404/405/406/407/408/409/410/411/412/413/414/415/416/417/418/419/420/421/422/423/424/425/426/427/428/429/430/431/432/433/434/435/436/437/438/439/440/441/442/443/444/445/446/447/448/449/450/451/452/453/454/455/456/457/458/459/460/461/462/463/464/465/466/467/468/469/470/471/472/473/474/475/476/477/478/479/480/481/482/483/484/485/486/487/488/489/490/491/492/493/494/495/496/497/498/499/500</td> <td>166 2627 9333 WWW.TMC.CO.TH</td> </tr> </tbody> </table>										Logo	Company Name	Address	Phone		INDUSTRIAL PUBLIC CO., LTD. (THAILAND)	166/167/168/169/170/171/172/173/174/175/176/177/178/179/180/181/182/183/184/185/186/187/188/189/190/191/192/193/194/195/196/197/198/199/200/201/202/203/204/205/206/207/208/209/210/211/212/213/214/215/216/217/218/219/220/221/222/223/224/225/226/227/228/229/230/231/232/233/234/235/236/237/238/239/240/241/242/243/244/245/246/247/248/249/250/251/252/253/254/255/256/257/258/259/260/261/262/263/264/265/266/267/268/269/270/271/272/273/274/275/276/277/278/279/280/281/282/283/284/285/286/287/288/289/290/291/292/293/294/295/296/297/298/299/300/301/302/303/304/305/306/307/308/309/310/311/312/313/314/315/316/317/318/319/320/321/322/323/324/325/326/327/328/329/330/331/332/333/334/335/336/337/338/339/340/341/342/343/344/345/346/347/348/349/350/351/352/353/354/355/356/357/358/359/360/361/362/363/364/365/366/367/368/369/370/371/372/373/374/375/376/377/378/379/380/381/382/383/384/385/386/387/388/389/390/391/392/393/394/395/396/397/398/399/400/401/402/403/404/405/406/407/408/409/410/411/412/413/414/415/416/417/418/419/420/421/422/423/424/425/426/427/428/429/430/431/432/433/434/435/436/437/438/439/440/441/442/443/444/445/446/447/448/449/450/451/452/453/454/455/456/457/458/459/460/461/462/463/464/465/466/467/468/469/470/471/472/473/474/475/476/477/478/479/480/481/482/483/484/485/486/487/488/489/490/491/492/493/494/495/496/497/498/499/500	166 2627 9333 WWW.TMC.CO.TH								
Logo	Company Name	Address	Phone																						
	INDUSTRIAL PUBLIC CO., LTD. (THAILAND)	166/167/168/169/170/171/172/173/174/175/176/177/178/179/180/181/182/183/184/185/186/187/188/189/190/191/192/193/194/195/196/197/198/199/200/201/202/203/204/205/206/207/208/209/210/211/212/213/214/215/216/217/218/219/220/221/222/223/224/225/226/227/228/229/230/231/232/233/234/235/236/237/238/239/240/241/242/243/244/245/246/247/248/249/250/251/252/253/254/255/256/257/258/259/260/261/262/263/264/265/266/267/268/269/270/271/272/273/274/275/276/277/278/279/280/281/282/283/284/285/286/287/288/289/290/291/292/293/294/295/296/297/298/299/300/301/302/303/304/305/306/307/308/309/310/311/312/313/314/315/316/317/318/319/320/321/322/323/324/325/326/327/328/329/330/331/332/333/334/335/336/337/338/339/340/341/342/343/344/345/346/347/348/349/350/351/352/353/354/355/356/357/358/359/360/361/362/363/364/365/366/367/368/369/370/371/372/373/374/375/376/377/378/379/380/381/382/383/384/385/386/387/388/389/390/391/392/393/394/395/396/397/398/399/400/401/402/403/404/405/406/407/408/409/410/411/412/413/414/415/416/417/418/419/420/421/422/423/424/425/426/427/428/429/430/431/432/433/434/435/436/437/438/439/440/441/442/443/444/445/446/447/448/449/450/451/452/453/454/455/456/457/458/459/460/461/462/463/464/465/466/467/468/469/470/471/472/473/474/475/476/477/478/479/480/481/482/483/484/485/486/487/488/489/490/491/492/493/494/495/496/497/498/499/500	166 2627 9333 WWW.TMC.CO.TH																						



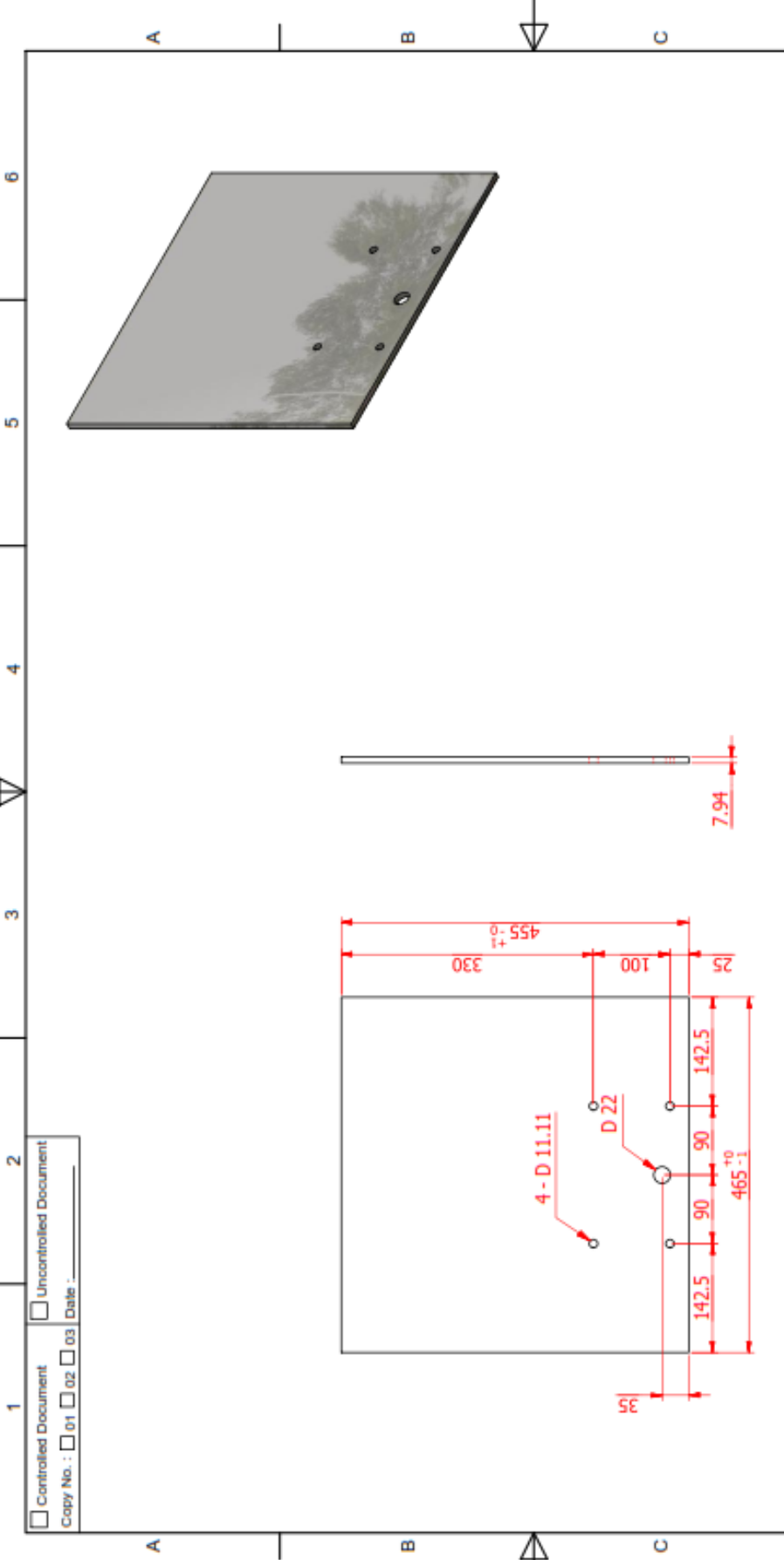
Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03
 Date : _____

Machining $\sqrt{(\quad)}$		Welding $\begin{matrix} a \\ a \end{matrix}$		Chamfering $\begin{matrix} a \\ a \end{matrix}$		Angle Tolerance	
Ref. : JIS B 0405		Length Tolerance		Angle Tolerance		Ref. : JIS B 0405	
UP 0.5 3 6 30 120 400 1000 15 30 120 400		10 30 100 200 50 120 400 +0.05		15 30 45 60 75 90 105 120 135 150 165 180 195 210 225 240 255 270 285 300 315 330 345 360 375 390 405 420 435 450 465 480 495 510 525 540 555 570 585 600 615 630 645 660 675 690 705 720 735 750 765 780 795 810 825 840 855 870 885 900 915 930 945 960 975 990 1000		15 30 45 60 75 90 105 120 135 150 165 180 195 210 225 240 255 270 285 300 315 330 345 360 375 390 405 420 435 450 465 480 495 510 525 540 555 570 585 600 615 630 645 660 675 690 705 720 735 750 765 780 795 810 825 840 855 870 885 900 915 930 945 960 975 990 1000	
0.1 0.2 0.3 0.5 0.8 1.2 1.6 2 2.5 3 4 5 6 8 10 12 15 20 25 30 40 50 60 80 100 120 150 200 250 300 400 500 600 800 1000		0.1 0.2 0.3 0.5 0.8 1.2 1.6 2 2.5 3 4 5 6 8 10 12 15 20 25 30 40 50 60 80 100 120 150 200 250 300 400 500 600 800 1000		15 30 45 60 75 90 105 120 135 150 165 180 195 210 225 240 255 270 285 300 315 330 345 360 375 390 405 420 435 450 465 480 495 510 525 540 555 570 585 600 615 630 645 660 675 690 705 720 735 750 765 780 795 810 825 840 855 870 885 900 915 930 945 960 975 990 1000		15 30 45 60 75 90 105 120 135 150 165 180 195 210 225 240 255 270 285 300 315 330 345 360 375 390 405 420 435 450 465 480 495 510 525 540 555 570 585 600 615 630 645 660 675 690 705 720 735 750 765 780 795 810 825 840 855 870 885 900 915 930 945 960 975 990 1000	
0.1 0.2 0.3 0.5 0.8 1.2 1.6 2 2.5 3 4 5 6 8 10 12 15 20 25 30 40 50 60 80 100 120 150 200 250 300 400 500 600 800 1000		0.1 0.2 0.3 0.5 0.8 1.2 1.6 2 2.5 3 4 5 6 8 10 12 15 20 25 30 40 50 60 80 100 120 150 200 250 300 400 500 600 800 1000		15 30 45 60 75 90 105 120 135 150 165 180 195 210 225 240 255 270 285 300 315 330 345 360 375 390 405 420 435 450 465 480 495 510 525 540 555 570 585 600 615 630 645 660 675 690 705 720 735 750 765 780 795 810 825 840 855 870 885 900 915 930 945 960 975 990 1000		15 30 45 60 75 90 105 120 135 150 165 180 195 210 225 240 255 270 285 300 315 330 345 360 375 390 405 420 435 450 465 480 495 510 525 540 555 570 585 600 615 630 645 660 675 690 705 720 735 750 765 780 795 810 825 840 855 870 885 900 915 930 945 960 975 990 1000	

General Unless Specification do not show on the drawing	Design	Date	Name
Machining $\sqrt{(\quad)}$	Check		
Chamfering $\begin{matrix} a \\ a \end{matrix}$	Verify		
Ref. : JIS B 0405	Heat Treatment		
UP 0.5 3 6 30 120 400 1000 15 30 120 400 +0.05	Coating		
0.1 0.2 0.3 0.5 0.8 1.2 1.6 2 2.5 3 4 5 6 8 10 12 15 20 25 30 40 50 60 80 100 120 150 200 250 300 400 500 600 800 1000	Scale	Sheet No.	Dimension (mm.)
0.1 0.2 0.3 0.5 0.8 1.2 1.6 2 2.5 3 4 5 6 8 10 12 15 20 25 30 40 50 60 80 100 120 150 200 250 300 400 500 600 800 1000	Customer :		

TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone : 66 2027 833 WWW.TMC.CO.TH		Mat. / Std.
Model	HYDRAULIC PRESS 100 TON	Weight
Part Name	FRAME	23,84 kg
Title		Size
		A4
Scale	Sheet No.	Rev.
Customer :	Drawing No.	
	HPP-02-005-000	
	File Name : Hydraulic Press Frame.dwg	

Revise	1	Revise Description	2	Chd.	3	Date	4	Customer :	5	6



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03
 Date : _____

General Unless Specification do not show on the drawing

Machining	Welding	Chamfering	Angle Tolerance
$\sqrt{\text{M}}$ $\sqrt{\text{M}}$ $\sqrt{\text{M}}$	$\sqrt{\text{W}}$ $\sqrt{\text{W}}$ $\sqrt{\text{W}}$	$\sqrt{\text{C}}$ $\sqrt{\text{C}}$ $\sqrt{\text{C}}$	$\sqrt{\text{A}}$ $\sqrt{\text{A}}$ $\sqrt{\text{A}}$
Ref.: JIS B 0405 (Unit mm.)	Length Tolerance 0.5 3 6 30 120 400 1000 15 30 120 400 15 3 6 30 120 400 1000 2000 35 120 400 +0.05	Angle Tolerance 15 30 45 60 75 90 105 120 135 150 165 180	Angle Tolerance 15 30 45 60 75 90 105 120 135 150 165 180

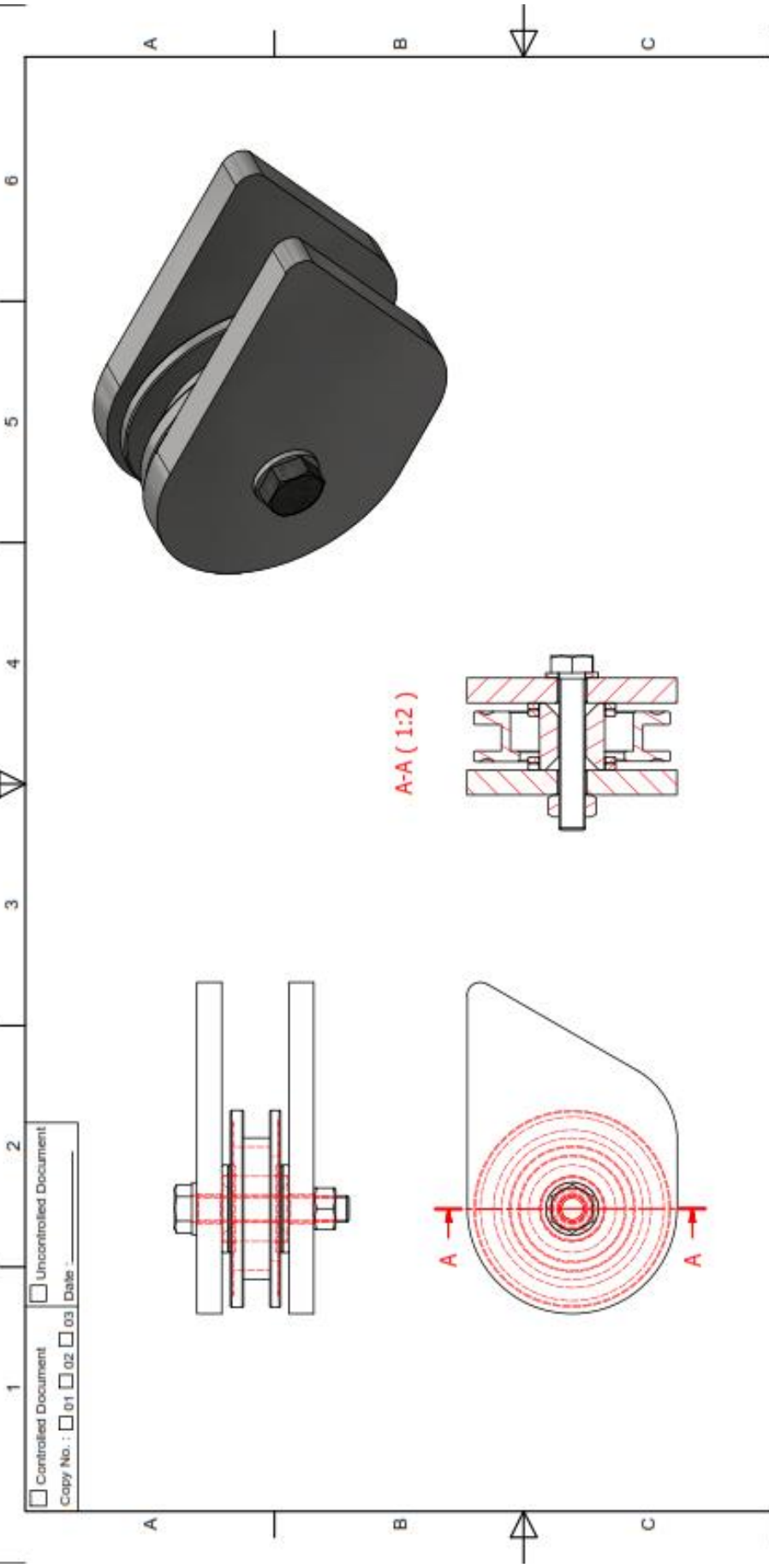
Design	Date	Name
Check		
Verify		
Heat Treatment	-----	
Coating	-----	
Scale	Sheet No.	Dimension (mm.)
Customer :		

		TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 2027 1933 WWW.TMC.CO.TH	
Model	HYDRAULIC PRESS 100 TON	Mat. / Std.	
Part Name	FRAME	Weight	N/A
Title		Size	A4
Drawing No.	HPP-02-006-000	Rev.	
File Name : Hydraulic Press Frame.dwg			

Revise	Revise Description	Chd.	Date	1	2	3	4	5	6

F-ED-013
REV.01 D11/1/26

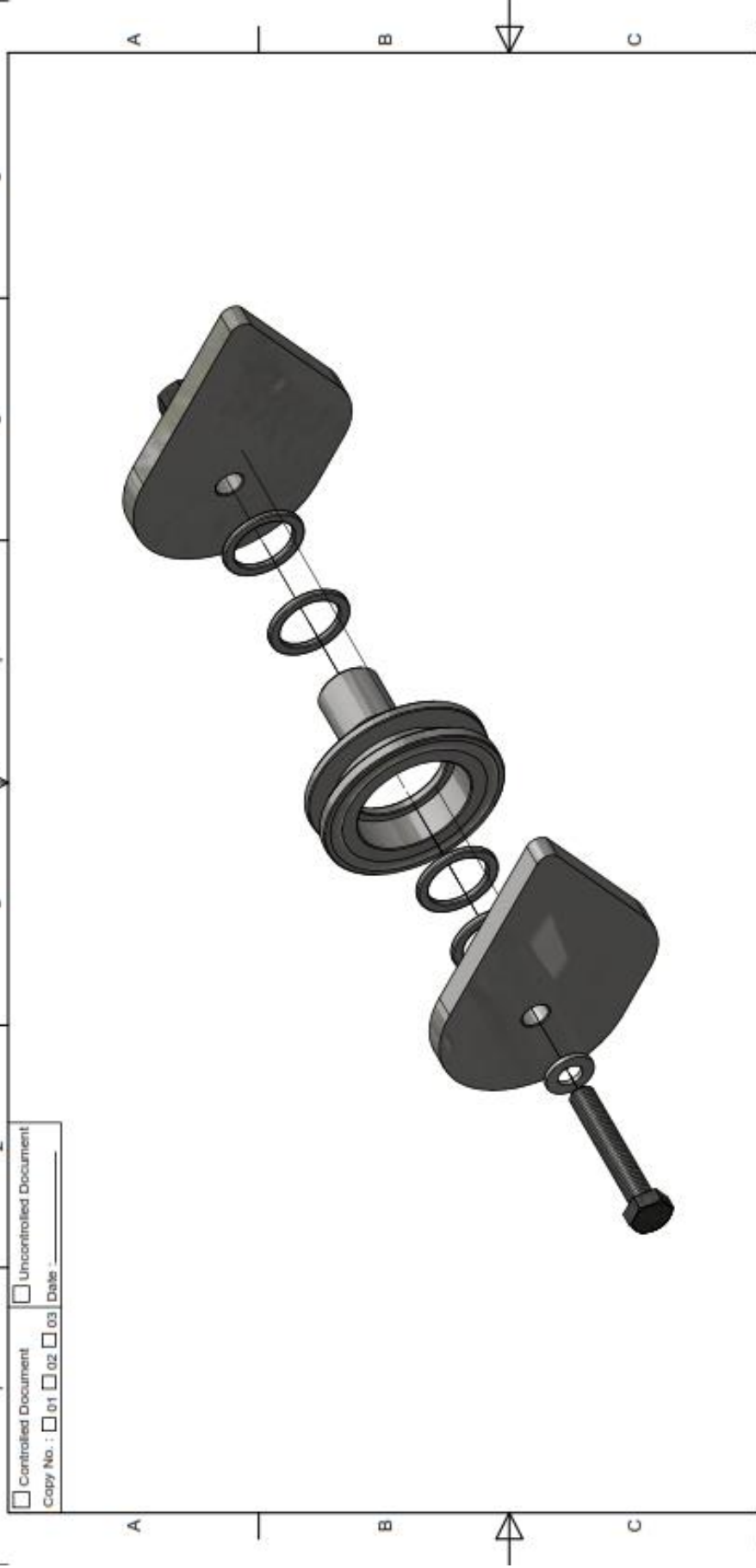
Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____



A-A (1:2)

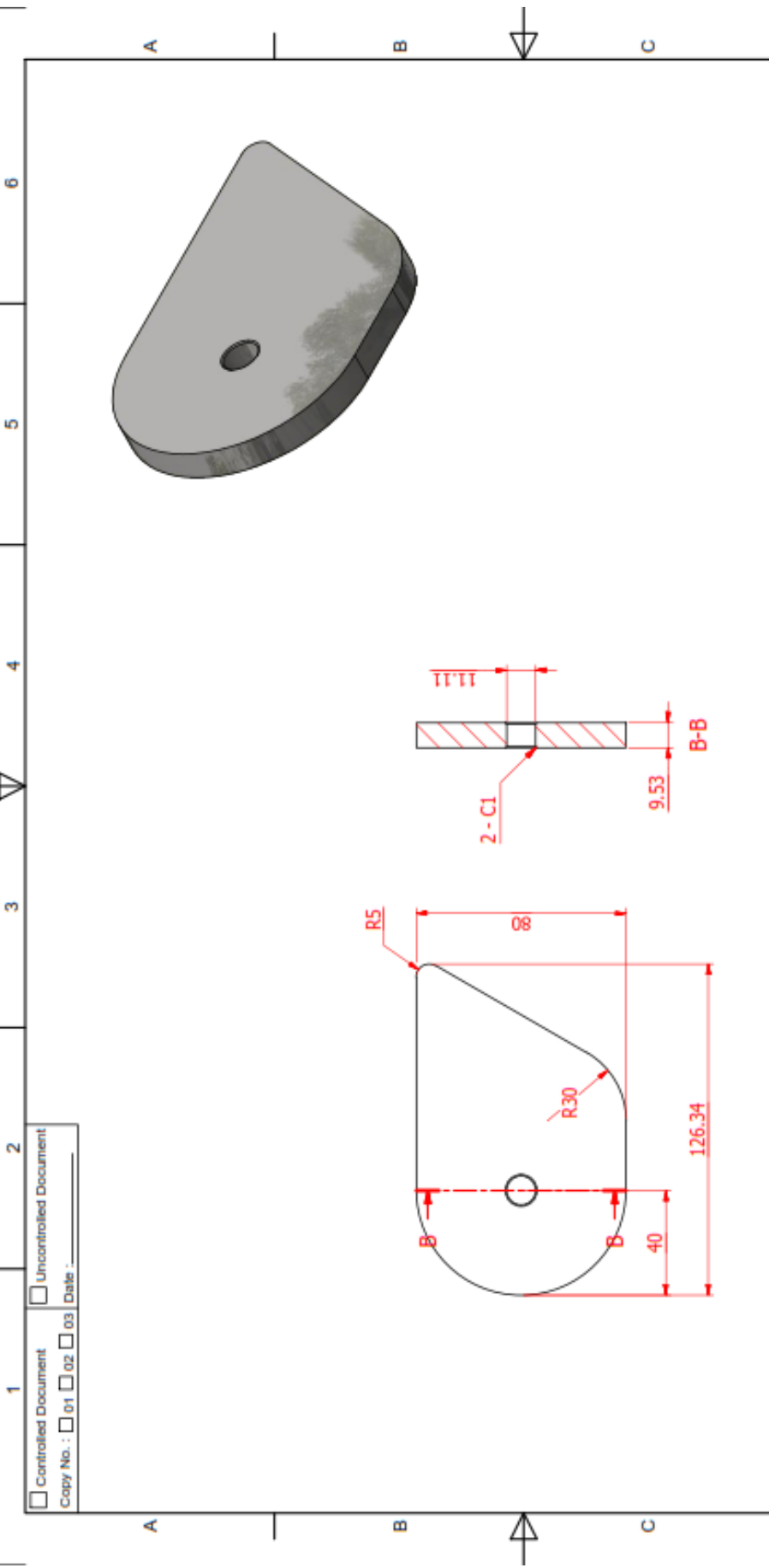
Machining Chamfering Welding Angle Tolerance		Design Check Verify		Date Name		INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 3627 1933 WWW.TMC.CO.TH		
Length Tolerance (Unit:mm.) 0 - 30 ±0.05 30 - 40 ±0.06 40 - 50 ±0.07 50 - 60 ±0.08 60 - 80 ±0.10 80 - 100 ±0.12 100 - 150 ±0.15 150 - 200 ±0.20 200 - 300 ±0.25 300 - 400 ±0.30		Angle Tolerance 10° ±0.1° 15° ±0.15° 20° ±0.2° 25° ±0.25° 30° ±0.3° 45° ±0.45° 60° ±0.6° 90° ±0.9° 120° ±1.2° 150° ±1.5° 180° ±1.8°		Heat Treatment ----- Coating -----		Model HYDRAULIC PRESS 100 TON Part Name FRAME Title		Mat. / Std. N/A Weight
Ref.: JIS B 0405 100 ±0.1 150 ±0.15 200 ±0.2 300 ±0.25 400 ±0.3 500 ±0.35 600 ±0.4 800 ±0.5 1000 ±0.6		10° ±0.1° 15° ±0.15° 20° ±0.2° 25° ±0.25° 30° ±0.3° 45° ±0.45° 60° ±0.6° 90° ±0.9° 120° ±1.2° 150° ±1.5° 180° ±1.8°		Scale Sheet No. Dimension (mm.) HPP-02-007-000		Drawing No. HPP-02-007-000 File Name: assembly HPP-02-07-000.dwg		
00 - First Issue		1		4		6		
Revise		Revise Description		Customer :		REV.01 DU.1298		

Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____



General Unless Specification do not show on the drawing Machining <input checked="" type="checkbox"/> Chamfering <input checked="" type="checkbox"/> Welding <input checked="" type="checkbox"/>		 	Design Check Verify	Date Name	 TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 2027 9333 WWW.TMC.CO.TH
Ref. : JIS B 0405 (Unit:mm.) 05 \pm 0.1 10 \pm 0.2 15 \pm 0.3 20 \pm 0.4 30 \pm 0.5 40 \pm 0.6 50 \pm 0.8 60 \pm 1.0 80 \pm 1.2 100 \pm 1.5 125 \pm 2.0 160 \pm 2.5 200 \pm 3.0	Length Tolerance 0.30 0.45 0.60 0.75 1.00 1.25 1.50 2.00 2.50 3.00 4.00 5.00 6.00 8.00 10.00 12.50 16.00 20.00 25.00 30.00 40.00 50.00 63.00 80.00 100.00 125.00 160.00 200.00 250.00 300.00 400.00 500.00	Angle Tolerance 10' 15' 30' 45' 60' 90' 	Heat Treatment Coating	Model HYDRAULIC PRESS 300 TON Part Name FRAME KATROL Title	Mat. / Std. Weight N/A Size A4 Rev.
00 - First Issue	01 02 03	04 05 06	07 08 09 10	Scale Sheet No. Drawing No. HPP-02-007-000-EXP	Dimension (mm.) File Name - Frame katrol.dwg
Revise 1 2	3 4 5 6	7 8 9 10	11 12 13 14	15 16 17 18	19 20 21 22

Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____



General Unless Specification do not show on the drawing

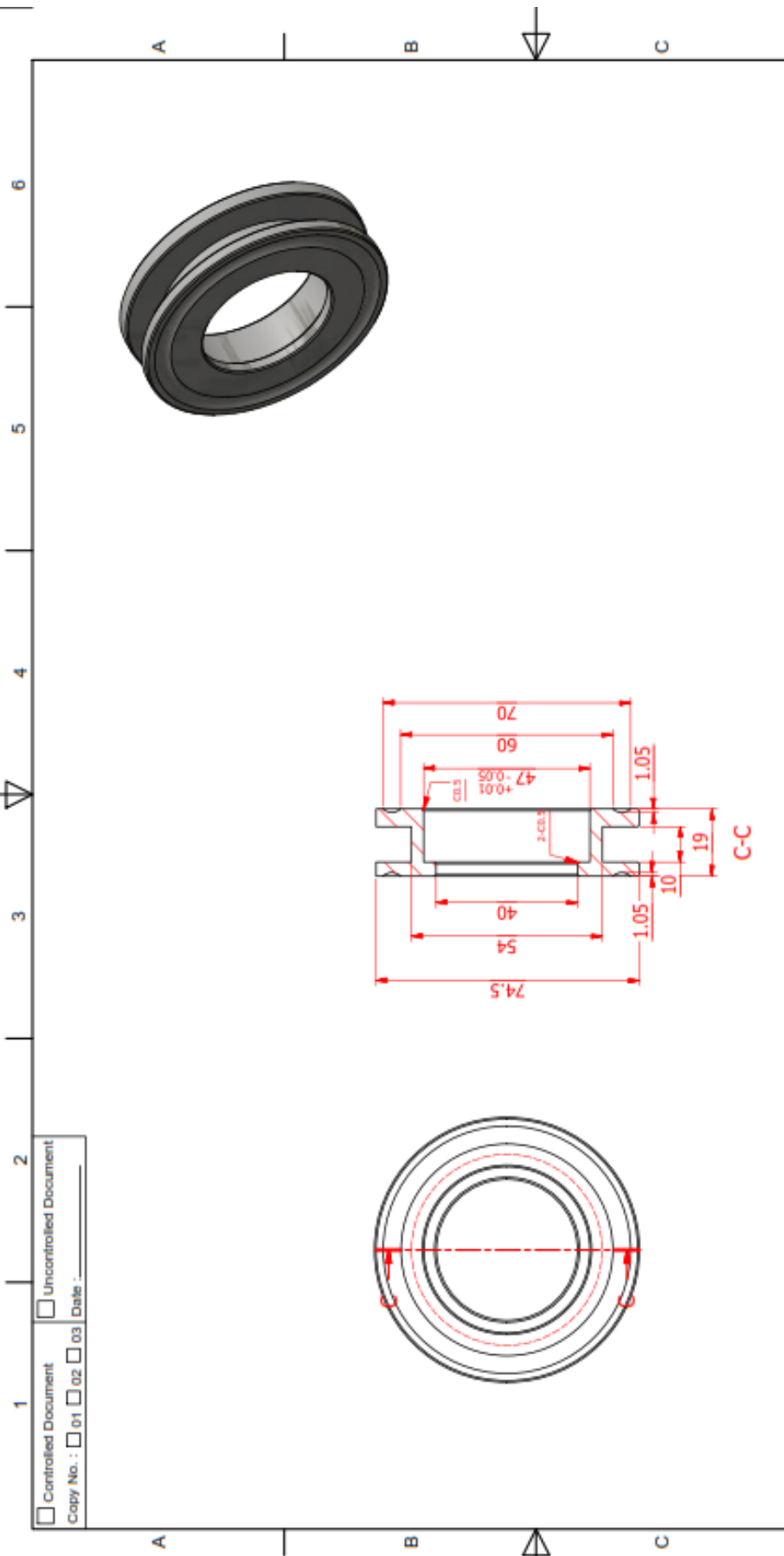
Machining	Welding	Chamfering	Angle Tolerance
<input type="checkbox"/> (V) <input type="checkbox"/> (W)	<input type="checkbox"/> a= <input type="checkbox"/> b=	<input type="checkbox"/> a= <input type="checkbox"/> b=	<input type="checkbox"/> 15° <input type="checkbox"/> 30° <input type="checkbox"/> 45° <input type="checkbox"/> 60° <input type="checkbox"/> 75° <input type="checkbox"/> 90°
Ref.: JIS B 0405 (Unit mm.)	Length Tolerance 0 - +0.1 0.1 - +0.2 0.2 - +0.3 0.3 - +0.4 0.4 - +0.5 0.5 - +0.6 0.6 - +0.8 0.8 - +1.0 1.0 - +1.5 1.5 - +2.0 2.0 - +3.0 3.0 - +4.0 4.0 - +5.0 5.0 - +7.0 7.0 - +10.0	Angle Tolerance 15° 30° 45° 60° 75° 90°	Surface Finish Ra 0.4 Ra 0.8 Ra 1.6 Ra 3.2 Ra 6.3 Ra 12.5 Ra 25 Ra 50 Ra 100 Ra 200 Ra 400 Ra 800

Design	Date	Name	
Check			
Verify			
Heat Treatment	-----		
Coating	-----		
Scale	Sheet No.	Dimension (mm.)	Drawing No.
			HPP-02-007-001
Customer :			File Name : HPP-02-007-000.dwg

 TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 2627 8333 WWW.TMC.CO.TH	Model HYDRAULIC PRESS 100 TON Part Name FRAME Title Weight N/A	Mat. / Std. Size A4 Rev.
---	--	-----------------------------------

Revise	1	Revise Description	2	Chd.	3	Date	4	Customer :	5	6
								See Drawing		

Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03
 Date : _____



General Unless Specification do not show on the drawing

Machining	Welding	Chamfering	Angle Tolerance
$\sqrt{\quad}$ $\sqrt{\quad}$ $\sqrt{\quad}$	$\sqrt{\quad}$	$\sqrt{\quad}$	$\sqrt{\quad}$
Ref.: JIS B 0405 (UP) (Unit: mm.)	Length Tolerance 30 40 50 60 70 80 90 100 120 150 200 300 400 500 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50 0.60 0.70 0.80 1.00 1.20 1.50 2.00	Angle Tolerance 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150	10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150

Machining: $\sqrt{\quad}$
 Welding: $\sqrt{\quad}$
 Chamfering: $\sqrt{\quad}$
 Angle Tolerance: $\sqrt{\quad}$

Design	Name	Date
Check		
Verify		
Heat Treatment	-----	
Coating	-----	
Scale	Dimension (mm.)	Sheet No.
4:30		
4:10		4
4:15		5
4:20		6

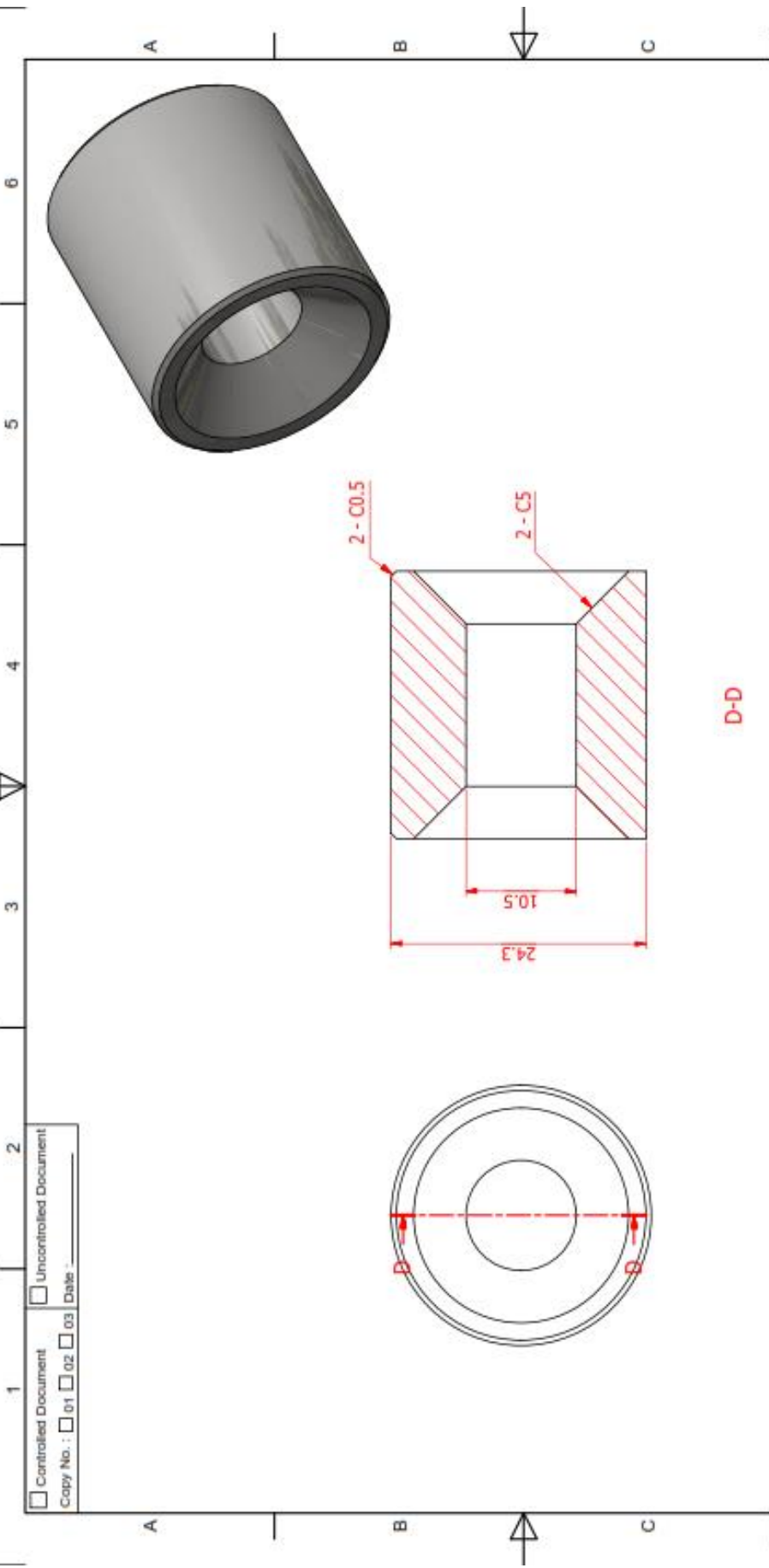
Customer: _____
 File Name: HPP-02-007-000.dwg

Revise	Revise Description	Chd.	Date
00	First Issue		

Drawing No. HPP-02-007-002
 Part Name FRAME
 Model HYDRAULIC PRESS 100 TON
 Title
 Weight N/A
 Size A4
 Rev.

TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND)
 Phone: +66 2027 1933 WWW.TMC.CO.TH

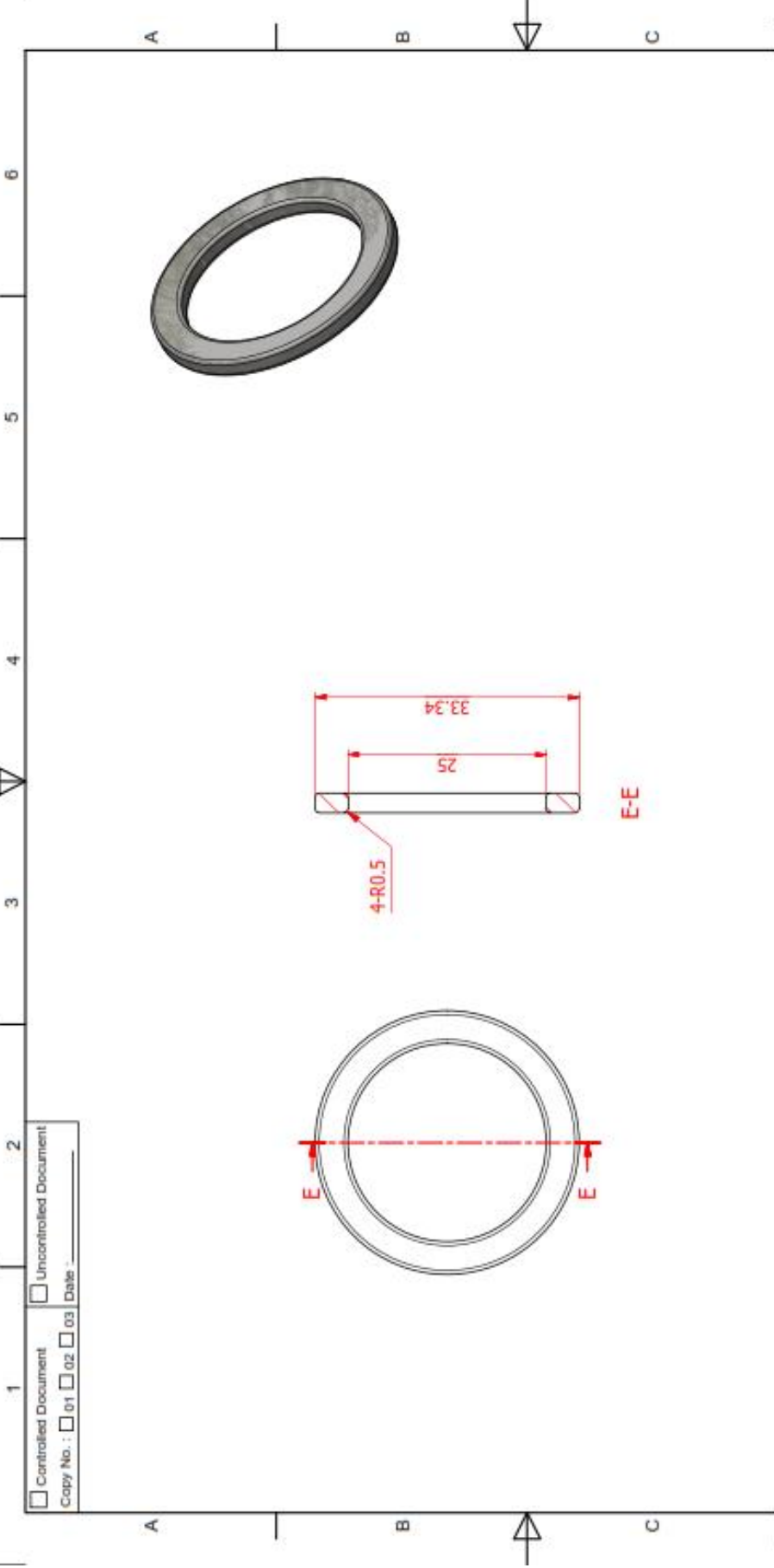
Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____



D-D

Machining		Welding		Angle Tolerance		Design <input type="checkbox"/> Design <input type="checkbox"/> Check <input type="checkbox"/> Verify		Date Name		TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 2027 9333 WWW.TMC.CO.TH	
Chamfering		Length Tolerance		Parallelism		Heat Treatment -----		Model HYDRAULIC PRESS 100 TON		Mat. / Ssl. Weight	
Part : JIS B 0405 (Unit:mm.)		0.5 3 6 30 1.20 400 1000 10 30 120 400 0.5 3 6 30 1.20 400 1000 20 30 120 400 +0.05		0.05 0.1 0.2 0.5 1 1.5 2.5 4 6 10 15 20 30 40 50 60 80 100 120 150 200 300 400 500		Coating -----		Part Name FRAME		Title N/A	
						Scale 1:1		Sheet No. Dimension (mm.)		Drawing No. HPP-02-007-003	
						Rev. 1		File Name HPP-02-007-000.dwg		REV.01.DWG	

Revise	1	Revise Description	2	Chd.	3	Date	4	Customer	5	6
--------	---	--------------------	---	------	---	------	---	----------	---	---



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____

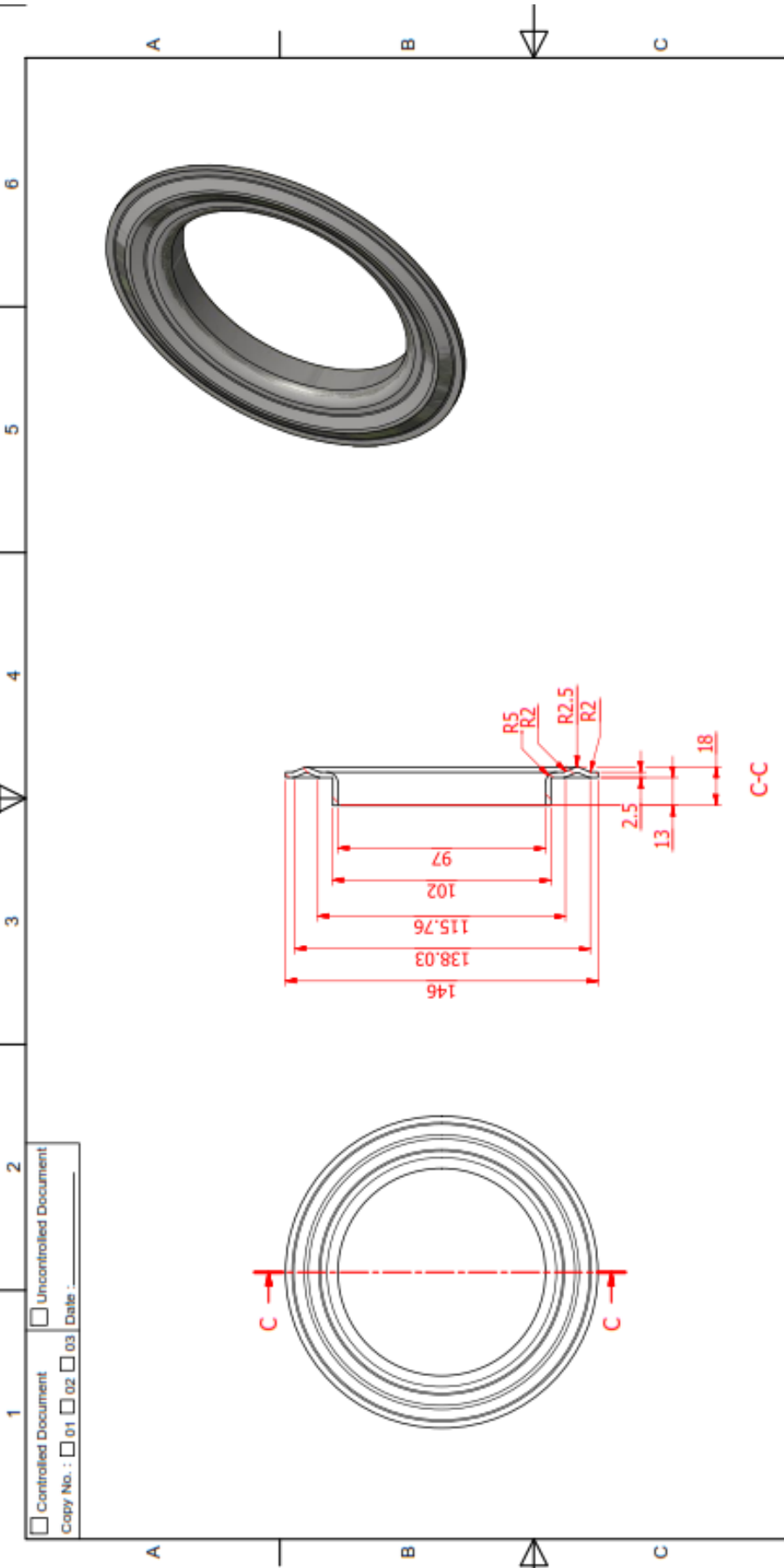
General Unless Specification do not show on the drawing

Machining	Welding	Angle Tolerance
Chamfering		
Ref. : JIS B 0405	Length Tolerance	Angle Tolerance
(Unit:mm.)	3 6 30 120 450 1000	10 30 120 450
	3 6 30 120 450 1000 2000	30 120 450 1000
	- 0.5 0.1 0.15 0.25 0.4 0.6	0.1 0.2 0.3 0.5 0.8 1.2 1.8 2.5 4 6
	0.2 0.3 0.5 0.8 1.2 1.8 2.5 4 6	0.1 0.2 0.3 0.5 0.8 1.2 1.8 2.5 4 6
	0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1	0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1
	0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05	0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05

Design	Date	Name
Check		
Verify		
Heat Treatment	-----	
Coating	-----	
Scale	Sheet No.	Dimension (mm.)
	HPP-02-007-004	
Customer :	File Name :	HPP-02-007-000.dwg

TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND)
 Phone : 66 2027 9333 WWW.TMC.CO.TH
 Model : HYDRAULIC PRESS 100 TON
 Part Name : FRAME
 Title :
 Mat. / Std. :
 Weight :
 N/A
 Size : A4
 Rev. :

Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____

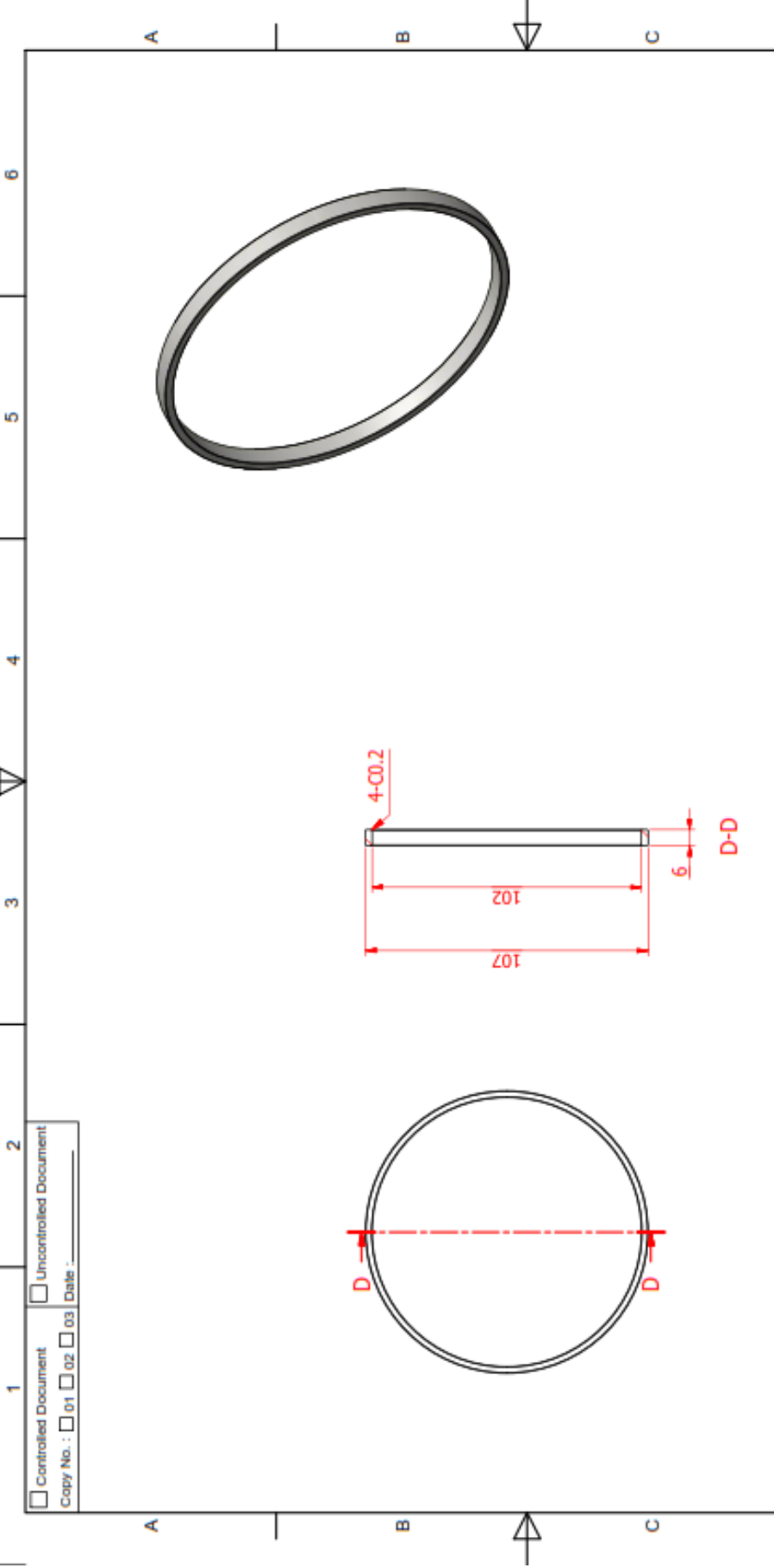


General Unless Specification do not show on the drawing

Machining	✓ (✓)	Welding	See Drawing
Chamfering	✓	Angle Tolerance	110° ±0.2°
		Length Tolerance	115° ±0.2°
			120° ±0.2°
			125° ±0.2°
			130° ±0.2°
			135° ±0.2°
			140° ±0.2°
			145° ±0.2°
			150° ±0.2°
			155° ±0.2°
			160° ±0.2°
			165° ±0.2°
			170° ±0.2°
			175° ±0.2°
			180° ±0.2°

Design	Date	Name	TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 3627 1933 WWW.TMC.CO.TH
Check			
Verify			
Heat Treatment	----	Model	HYDRAULIC PRESS 100 TON
Coating	----	Part Name	FRAME
Scale	----	Title	
Sheet No.	----	Drawing No.	HPP-02-010-000
Dimension (mm.)	----	Mat. / Std.	
Customer	----	Weight	
		Size	N/A
		Rev	A4

Revise: _____
 Chk. _____
 Date _____
 Revise Description: _____
 Customer: Hydraulic Press Frame.dwg
 File Name: Hydraulic Press Frame.dwg
 F-45-013
 rev.01 01/1/26



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03
 Date : _____

General Unless Specification do not show on the drawing

Machining	(√)	Welding	(√)
Chamfering	(√)		

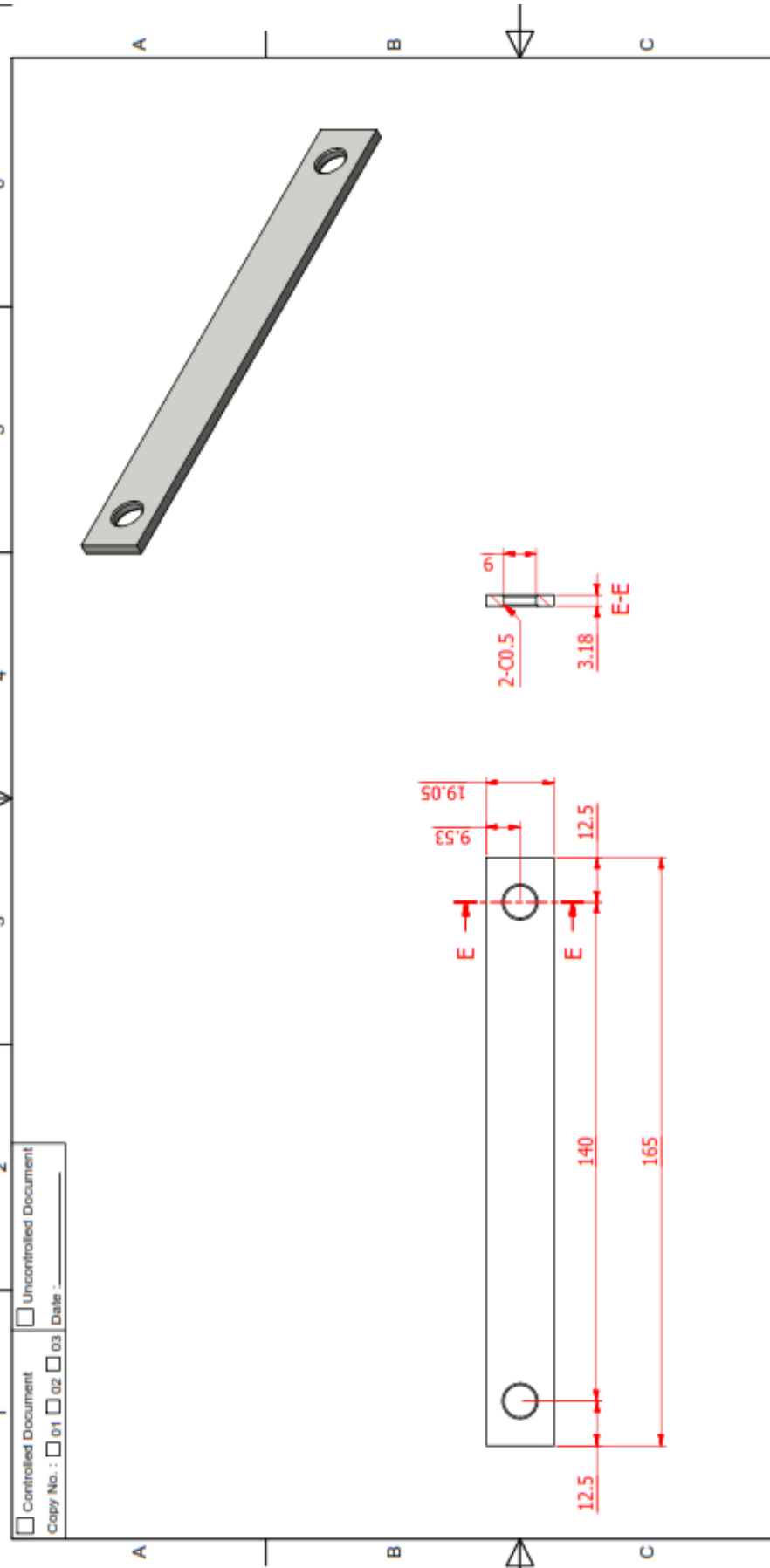
Ref. :	Length	Tolerance	Angle	Tolerance
JIS B 0405	UP	0.5 3 6 30 120 400	10 30 120 400	10 30 120 400
(Unit mm.)	0.3 3 6 30 120 400	0.030 0.050 0.100	0.5 1 2 5	0.5 1 2 5

Part Name	FRAME	Weight	N/A
Model	HYDRAULIC PRESS 100 TON	Mat. / Std.	
Customer		Scale	1:1
Sheet No.		Dimension (mm.)	420
Drawing No.	HFP-02-011-000	Rev.	A4
File Name	Hydraulic Press Frame.dwg		

Revise	Revise Description	Chd.	Date
1			
2			
3			
4			
5			
6			

F-ED-013
REV.01 D1/1/26

Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____

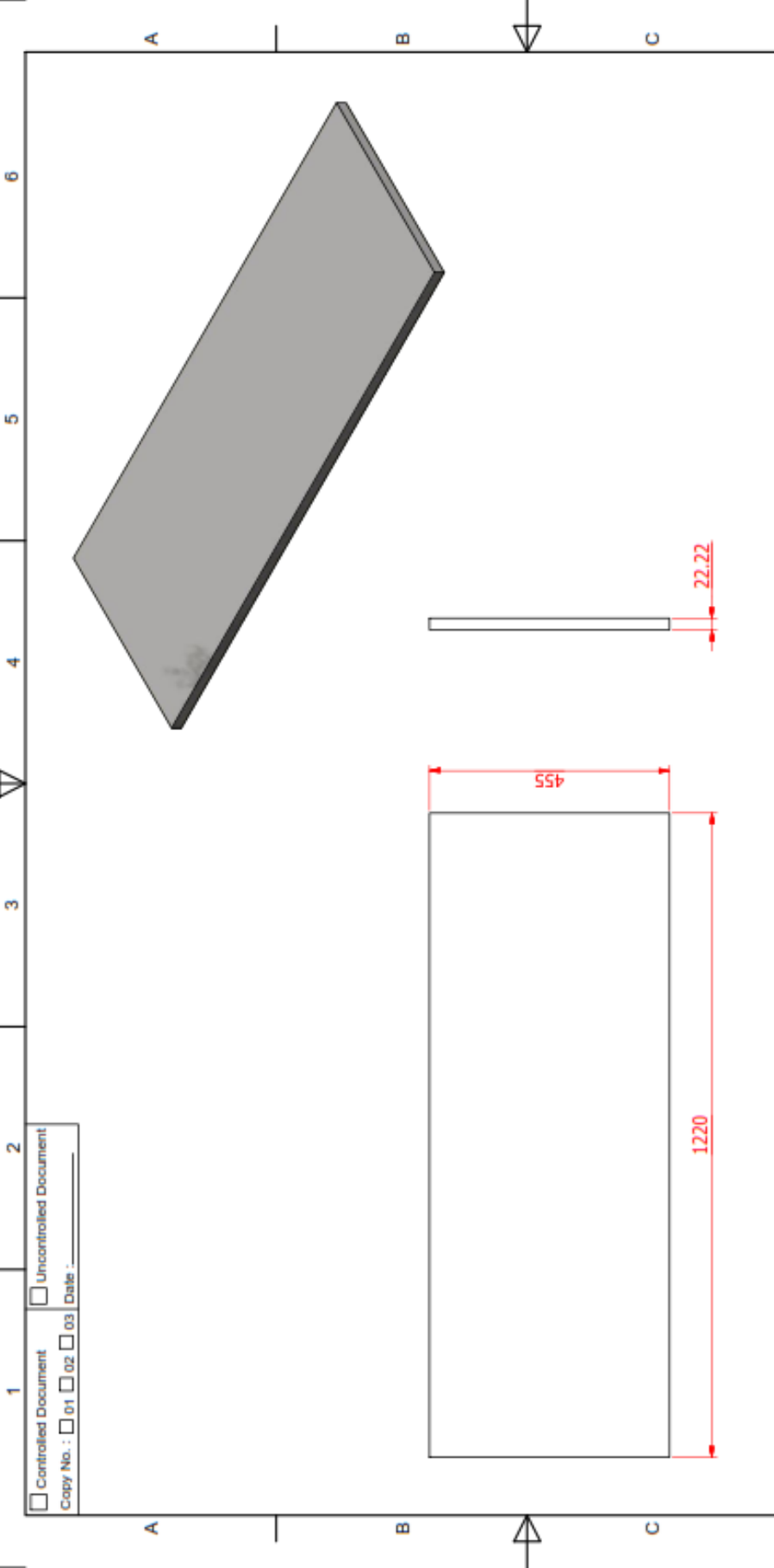


General Unless Specification do not show on the drawing

Machining	Welding	Chamfering	Angle	Length Tolerance
√ ()	√ ()	√ ()	15°	UP 0.5 3 6 30 120 400 1000 15 50 120 400
√ ()	√ ()	√ ()	30°	LS 3 6 30 120 400 1000 2000 50 120 400 1000
√ ()	√ ()	√ ()	45°	0.02
√ ()	√ ()	√ ()	60°	0.02
√ ()	√ ()	√ ()	75°	0.02
√ ()	√ ()	√ ()	90°	0.02
√ ()	√ ()	√ ()	105°	0.02
√ ()	√ ()	√ ()	120°	0.02
√ ()	√ ()	√ ()	135°	0.02
√ ()	√ ()	√ ()	150°	0.02
√ ()	√ ()	√ ()	165°	0.02
√ ()	√ ()	√ ()	180°	0.02

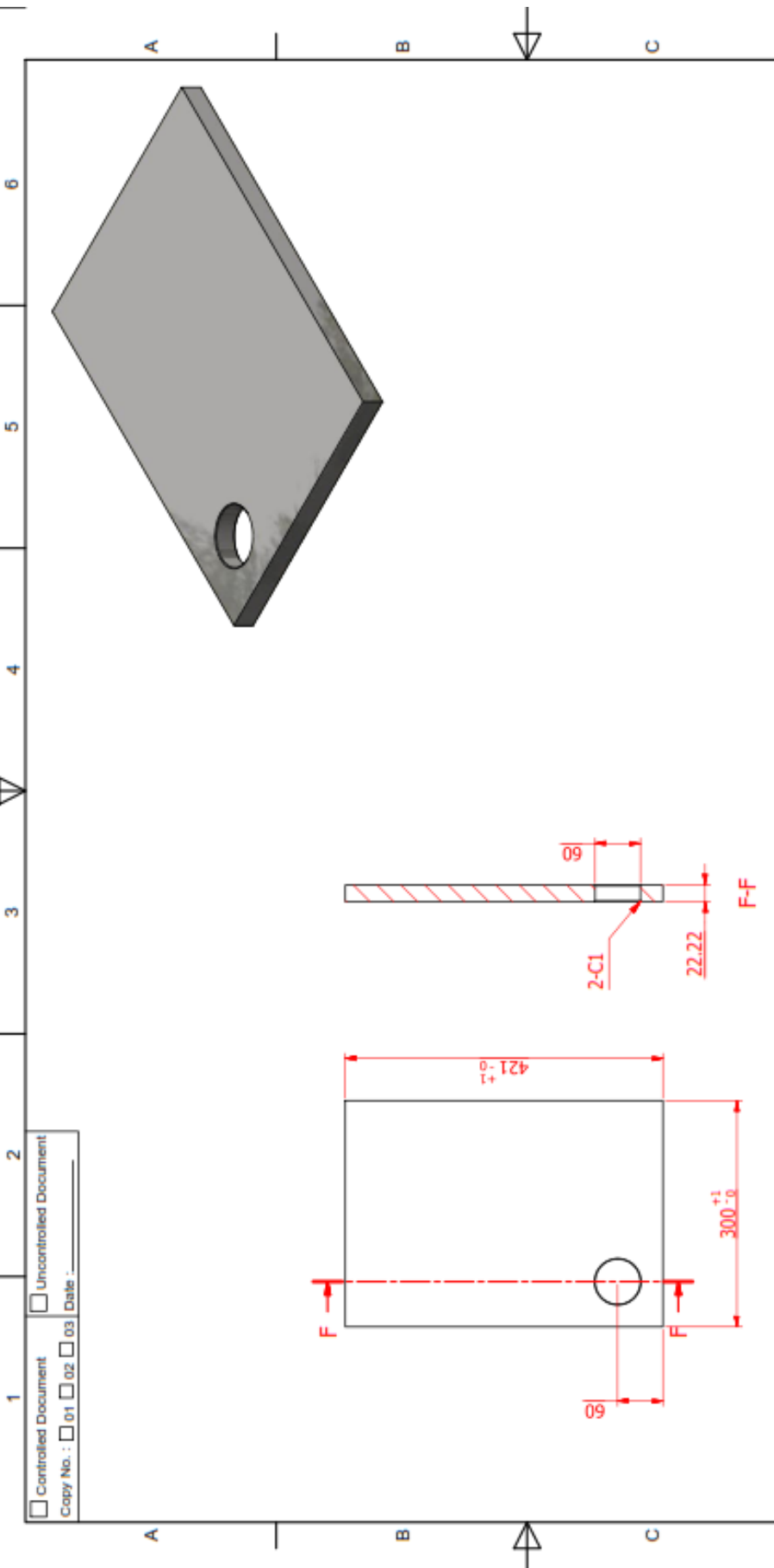
Design	Date	Name
Check		
Verify		
Heat Treatment	-----	
Coating	-----	
Scale	Sheet No.	Dimension (mm.)
Customer : _____		

		INDUSTRIAL PUBLIC CO., LTD. (THAILAND)
Model HYDRAULIC PRESS 100 TON		Mat. / Std.
Part Name FRAME		Weight
Title N/A		Size A4
Drawing No. HPP-02-012-000		Rev. 6
File Name : Hydraulic Press Frame.dwg		



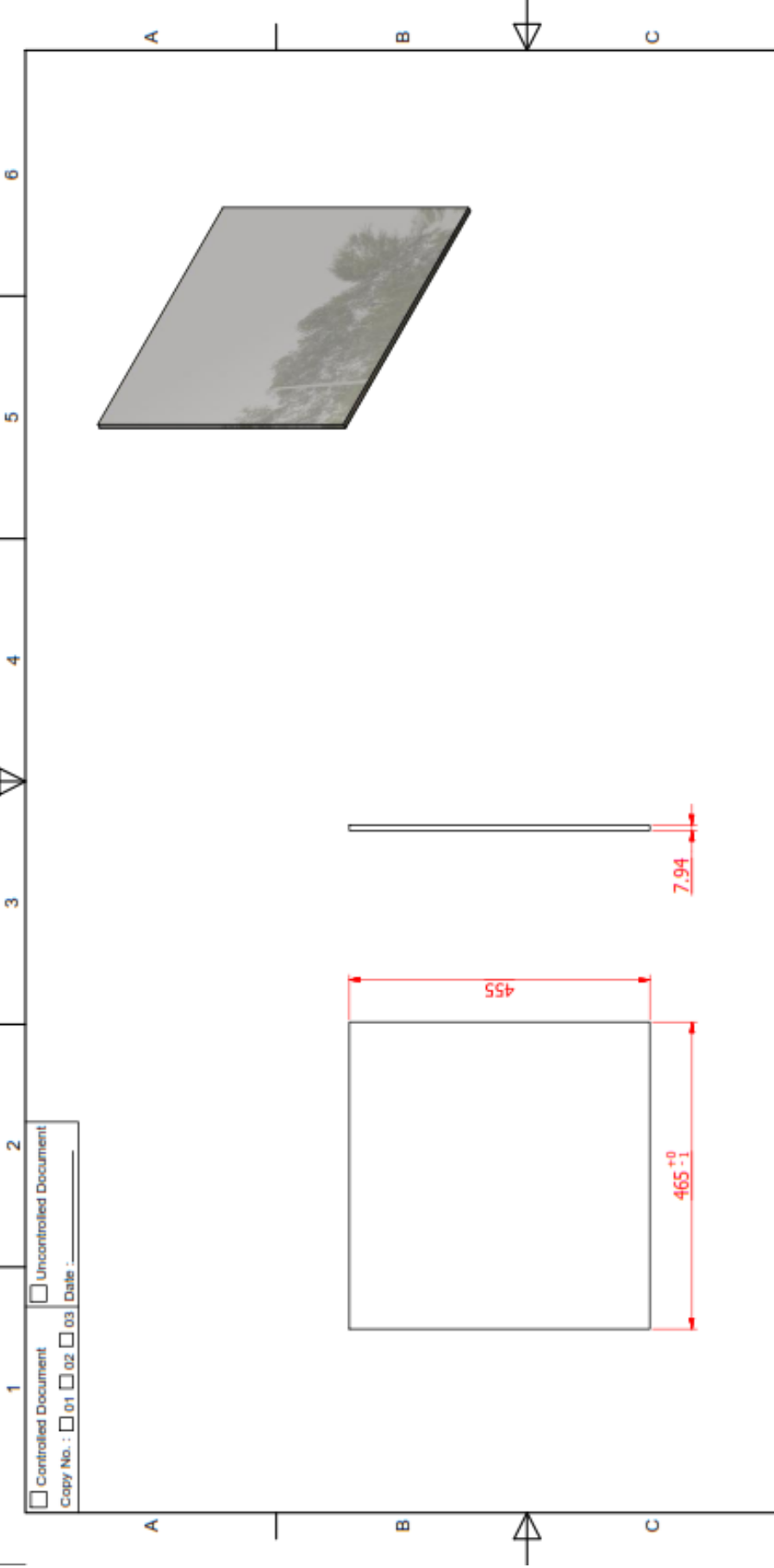
Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____

<input type="checkbox"/> Machining <input type="checkbox"/> Chamfering <input type="checkbox"/> Welding <input type="checkbox"/> See Drawing		General Unless Specification do not show on the drawing <input type="checkbox"/> Length Tolerance <input type="checkbox"/> Angle Tolerance		Design Check Verify	Date Heat Treatment Coating Scale	Name Model Part Name Title Dimension (mm.) Drawing No.	TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 3827 1933 WWW: TMC.CO.TH HYDRAULIC PRESS 100 TON FRAME HPP-02-013-000	Mat. / Std. Weight N/A Size A4 Rev.
Ref.: JIS B 0405 (Unit mm.)	0.5 1 3 6 10 15 30 60 100 150 300 600 1000	0.3 0.5 1 1.5 2 3 4 5 6 8 10 12 15 20 25 30 40 50 60 80 100 120 150 200 250 300 400 500 600 800 1000 1200 1500 2000 2500 3000 4000 5000	10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300	Design Check Verify	Date Heat Treatment Coating Scale	Name Model Part Name Title Dimension (mm.) Drawing No.	TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 3827 1933 WWW: TMC.CO.TH HYDRAULIC PRESS 100 TON FRAME HPP-02-013-000	Mat. / Std. Weight N/A Size A4 Rev.
Revise	Revise Description	Chd.	Date	4	Customer:	5	6	6



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____

Machining		Welding		General Unless Specification do not show on the drawing		Design		Date		Name		TMC INDUSTRIAL PUBLIC CO.,LTD.(THAILAND) Phone: +66 2027 833 WWW.TMC.CO.TH	
Chamfering		a =		Angle Tolerance		Check				Model		Mat. / Std.	
		a =		Length Tolerance		Verify				Part Name		Weight	
		a =		Ref. : JIS B 9405		Heat Treatment		-----		Title		N/A	
		a =		(Unit mm.)		Coating		-----		Drawing No.		Size	
		a =		10 3 6 30 120 400 1000 15 30 120 400		Scale		-----		HPP-02-014-000		A4	
		a =		15 3 6 30 120 400 1000 20 30 120 400		Dimension (mm.)		-----		Rev.			
		a =		20 3 6 30 120 400 1000 25 30 120 400		Customer :		-----		File Name : Hydraulic Press Framing.dwg			
		a =		25 3 6 30 120 400 1000 30 30 120 400		Customer :		-----		HPP-02-014-000			
		a =		30 3 6 30 120 400 1000 35 30 120 400		Customer :		-----		HPP-02-014-000			
		a =		35 3 6 30 120 400 1000 40 30 120 400		Customer :		-----		HPP-02-014-000			
		a =		40 3 6 30 120 400 1000 45 30 120 400		Customer :		-----		HPP-02-014-000			
		a =		45 3 6 30 120 400 1000 50 30 120 400		Customer :		-----		HPP-02-014-000			
		a =		50 3 6 30 120 400 1000 55 30 120 400		Customer :		-----		HPP-02-014-000			
		a =		55 3 6 30 120 400 1000 60 30 120 400		Customer :		-----		HPP-02-014-000			
		a =		60 3 6 30 120 400 1000 65 30 120 400		Customer :		-----		HPP-02-014-000			
		a =		65 3 6 30 120 400 1000 70 30 120 400		Customer :		-----		HPP-02-014-000			
		a =		70 3 6 30 120 400 1000 75 30 120 400		Customer :		-----		HPP-02-014-000			
		a =		75 3 6 30 120 400 1000 80 30 120 400		Customer :		-----		HPP-02-014-000			
		a =		80 3 6 30 120 400 1000 85 30 120 400		Customer :		-----		HPP-02-014-000			
		a =		85 3 6 30 120 400 1000 90 30 120 400		Customer :		-----		HPP-02-014-000			
		a =		90 3 6 30 120 400 1000 95 30 120 400		Customer :		-----		HPP-02-014-000			
		a =		95 3 6 30 120 400 1000 100 30 120 400		Customer :		-----		HPP-02-014-000			



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____

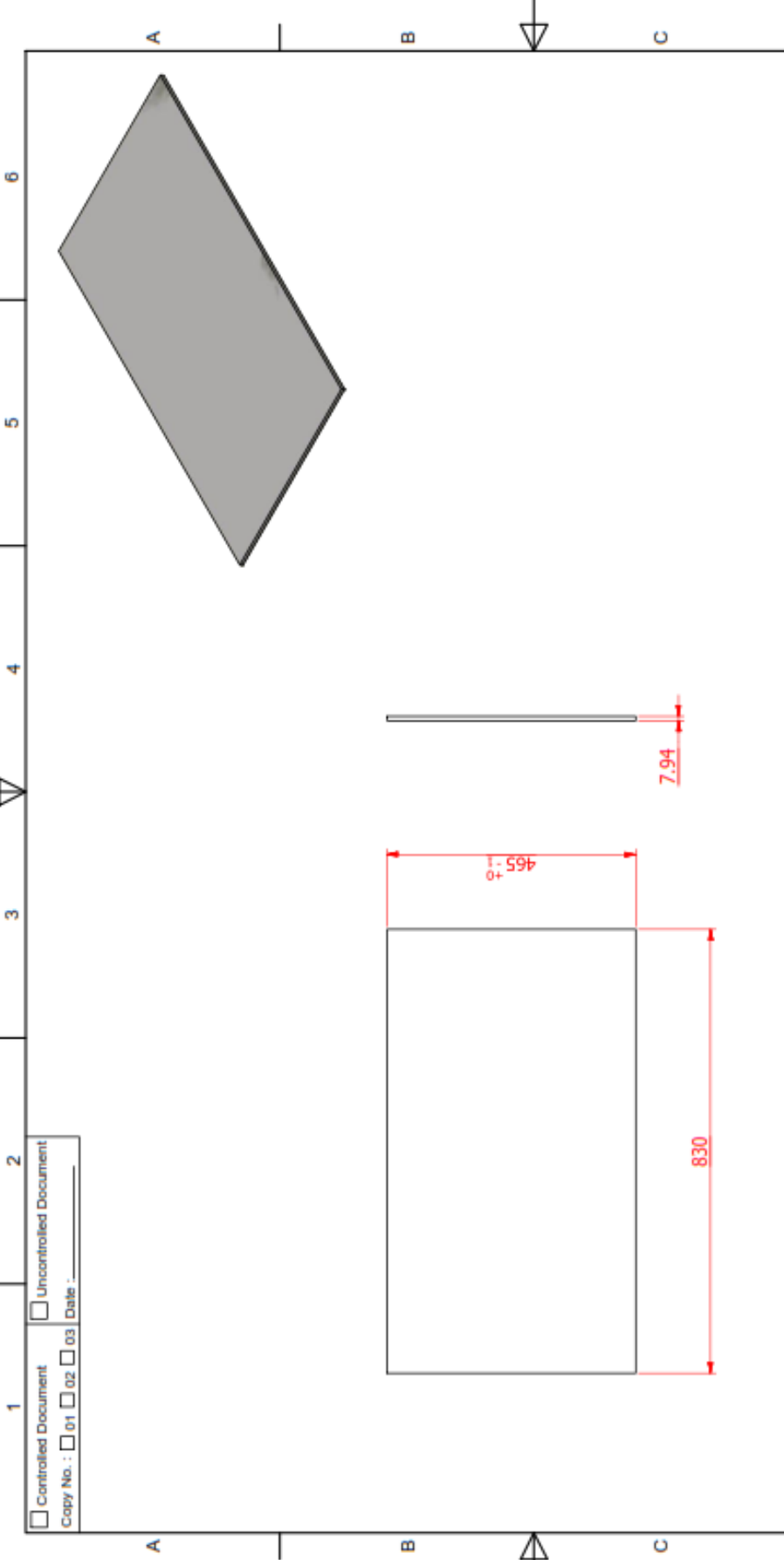
General Unless Specification do not show on the drawing

Machining	Welding	Chamfering	Angle Tolerance
$\sqrt{\text{V}}$ $\sqrt{\text{X}}$ $\sqrt{\text{Y}}$ $\sqrt{\text{Z}}$ $\sqrt{\text{AA}}$ $\sqrt{\text{BB}}$ $\sqrt{\text{CC}}$ $\sqrt{\text{DD}}$ $\sqrt{\text{EE}}$ $\sqrt{\text{FF}}$ $\sqrt{\text{GG}}$ $\sqrt{\text{HH}}$ $\sqrt{\text{II}}$ $\sqrt{\text{JJ}}$ $\sqrt{\text{KK}}$ $\sqrt{\text{LL}}$ $\sqrt{\text{MM}}$ $\sqrt{\text{NN}}$ $\sqrt{\text{OO}}$ $\sqrt{\text{PP}}$ $\sqrt{\text{QQ}}$ $\sqrt{\text{RR}}$ $\sqrt{\text{SS}}$ $\sqrt{\text{TT}}$ $\sqrt{\text{UU}}$ $\sqrt{\text{VV}}$ $\sqrt{\text{WW}}$ $\sqrt{\text{XX}}$ $\sqrt{\text{YY}}$ $\sqrt{\text{ZZ}}$	$\sqrt{\text{V}}$ $\sqrt{\text{X}}$ $\sqrt{\text{Y}}$ $\sqrt{\text{Z}}$ $\sqrt{\text{AA}}$ $\sqrt{\text{BB}}$ $\sqrt{\text{CC}}$ $\sqrt{\text{DD}}$ $\sqrt{\text{EE}}$ $\sqrt{\text{FF}}$ $\sqrt{\text{GG}}$ $\sqrt{\text{HH}}$ $\sqrt{\text{II}}$ $\sqrt{\text{JJ}}$ $\sqrt{\text{KK}}$ $\sqrt{\text{LL}}$ $\sqrt{\text{MM}}$ $\sqrt{\text{NN}}$ $\sqrt{\text{OO}}$ $\sqrt{\text{PP}}$ $\sqrt{\text{QQ}}$ $\sqrt{\text{RR}}$ $\sqrt{\text{SS}}$ $\sqrt{\text{TT}}$ $\sqrt{\text{UU}}$ $\sqrt{\text{VV}}$ $\sqrt{\text{WW}}$ $\sqrt{\text{XX}}$ $\sqrt{\text{YY}}$ $\sqrt{\text{ZZ}}$	$\sqrt{\text{V}}$ $\sqrt{\text{X}}$ $\sqrt{\text{Y}}$ $\sqrt{\text{Z}}$ $\sqrt{\text{AA}}$ $\sqrt{\text{BB}}$ $\sqrt{\text{CC}}$ $\sqrt{\text{DD}}$ $\sqrt{\text{EE}}$ $\sqrt{\text{FF}}$ $\sqrt{\text{GG}}$ $\sqrt{\text{HH}}$ $\sqrt{\text{II}}$ $\sqrt{\text{JJ}}$ $\sqrt{\text{KK}}$ $\sqrt{\text{LL}}$ $\sqrt{\text{MM}}$ $\sqrt{\text{NN}}$ $\sqrt{\text{OO}}$ $\sqrt{\text{PP}}$ $\sqrt{\text{QQ}}$ $\sqrt{\text{RR}}$ $\sqrt{\text{SS}}$ $\sqrt{\text{TT}}$ $\sqrt{\text{UU}}$ $\sqrt{\text{VV}}$ $\sqrt{\text{WW}}$ $\sqrt{\text{XX}}$ $\sqrt{\text{YY}}$ $\sqrt{\text{ZZ}}$	Length Tolerance JIS B 0405 (Unit mm.) 0.1 0.2 0.3 0.4 0.5 0.6 0.8 1.0 1.5 2.0 3.0 4.0 5.0 6.0 8.0 10.0 15.0 20.0 30.0 40.0 50.0 70.0 100.0 150.0 200.0 300.0 400.0 500.0

Design	Date	Name
Check		
Verify		
Heat Treatment	-----	
Coating	-----	
Scale	Sheet No.	Dimension (mm.)
Customer :		

Revise	Revise Description	Chd.	Date
1		2	

		TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 2627 8333 WWW.TMC.CO.TH	
Model	HYDRAULIC PRESS 100 TON	Mat. / Std.	
Part Name	FRAME	Weight	N/A
Title		Size	A4
Drawing No.	HPP-02-015-000	Rev.	
File Name : Hydraulic Press Frame.dwg			



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____

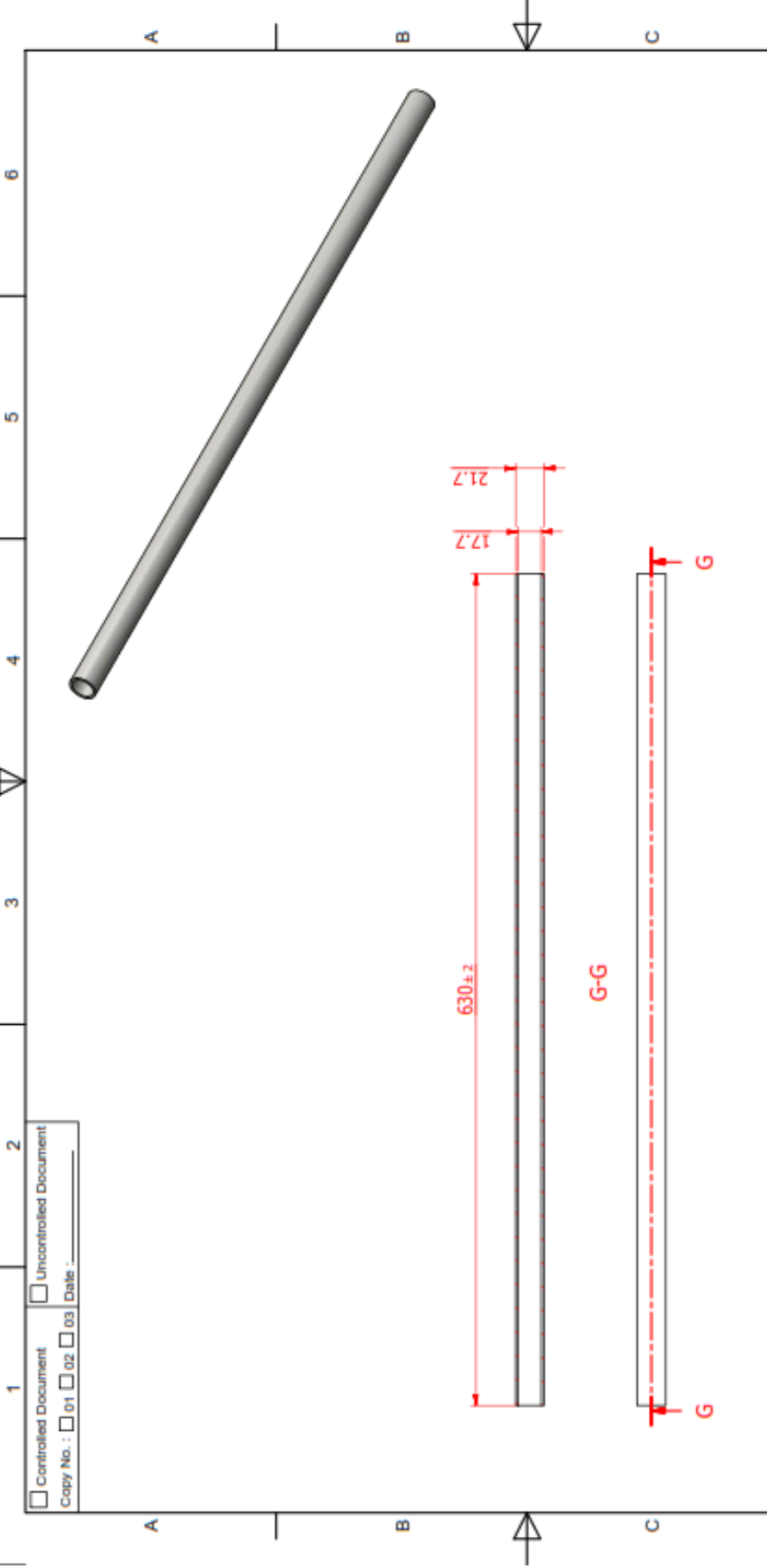
General Unless Specification do not show on the drawing

Machining	Welding	Chamfering	Angle Tolerance
Ref. : JIS B 0405 (UP)	Ref. : JIS B 0405 (UP)	Ref. : JIS B 0405 (UP)	Ref. : JIS B 0405 (UP)
0.01	0.05	0.05	0.05
0.02	0.10	0.10	0.10
0.03	0.15	0.15	0.15
0.04	0.20	0.20	0.20
0.05	0.25	0.25	0.25
0.06	0.30	0.30	0.30
0.07	0.35	0.35	0.35
0.08	0.40	0.40	0.40
0.09	0.45	0.45	0.45
0.10	0.50	0.50	0.50
0.11	0.55	0.55	0.55
0.12	0.60	0.60	0.60
0.13	0.65	0.65	0.65
0.14	0.70	0.70	0.70
0.15	0.75	0.75	0.75
0.16	0.80	0.80	0.80
0.17	0.85	0.85	0.85
0.18	0.90	0.90	0.90
0.19	0.95	0.95	0.95
0.20	1.00	1.00	1.00

Design	Date	Name
Check		
Verify		
Heat Treatment	-----	
Coating	-----	
Scale	Sheet No.	Dimension (mm.)
Customer :		
1	2	3
4	5	6

Revise	Revise Description	Chd.	Date
1			
2			
3			
4			
5			
6			

		INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 2627 1933 WWW.TMC.CO.TH
Model	HYDRAULIC PRESS 100 TON	Mat. / Std.
Part Name	FRAME	Weight
Title		N/A
Size		A4
Rev.		
Drawing No.	HPP-02-010-000	
File Name	Hydraulic Press Frame.dwg	



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____

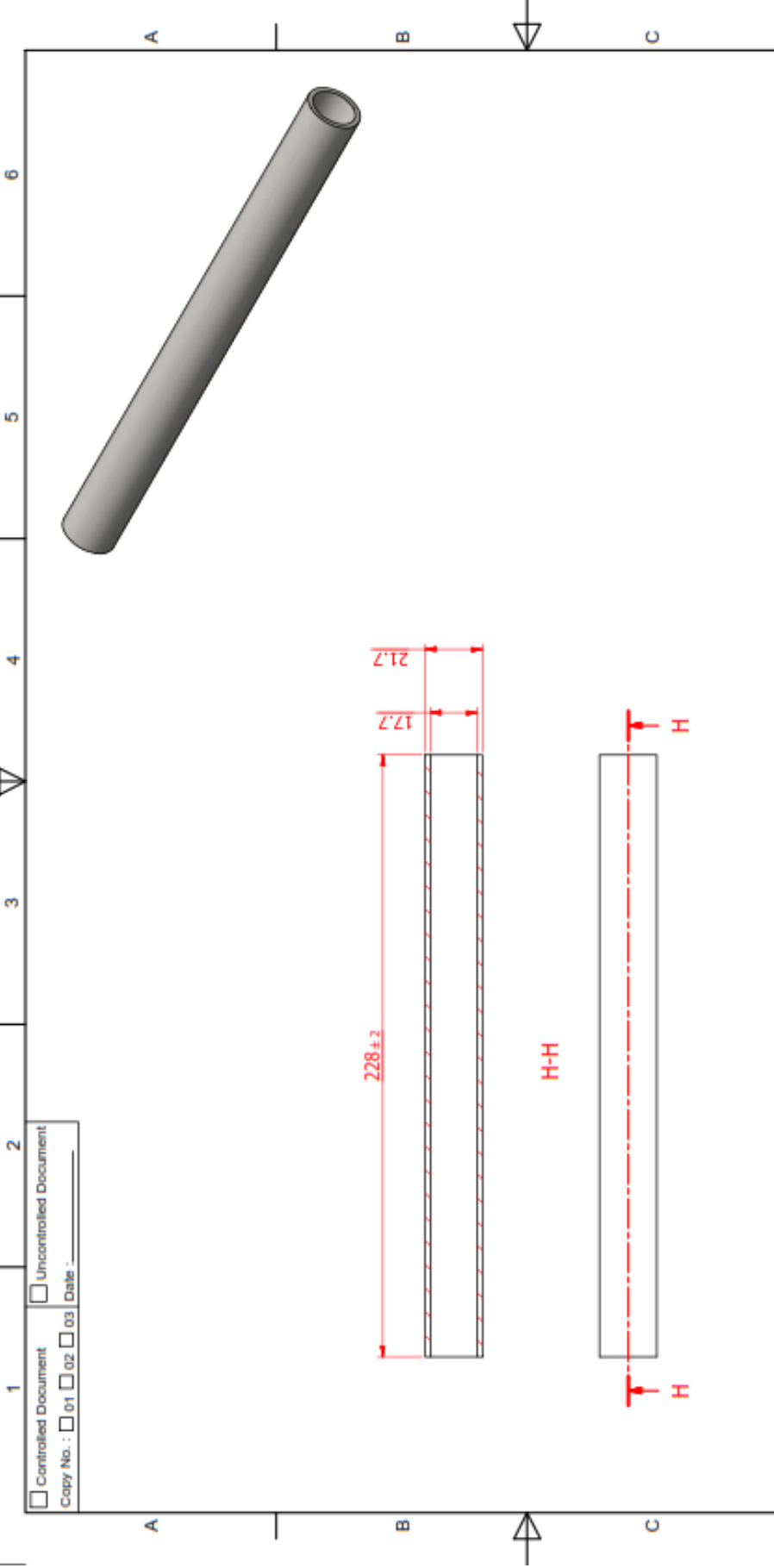
General Unless Specification do not show on the drawing

Machining	Welding	Chamfering	Angle Tolerance
$\sqrt{\text{V}}$ $\sqrt{\text{R}}$	$\text{a} =$ 	$\text{a} =$ 	15 30 45 60 75 90 105 120 135 150 165 180 195 210 225 240 255 270 285 300 315 330 345 360 375 390 405 420 435 450 465 480 495
Ref. : JIS B 0405 (Unit mm.)	Length Tolerance 3 6 30 120 450 1000 3 6 30 120 450 1000 2000	15 30 45 60 75 90 105 120 135 150 165 180 195 210 225 240 255 270 285 300 315 330 345 360 375 390 405 420 435 450 465 480 495	15 30 45 60 75 90 105 120 135 150 165 180 195 210 225 240 255 270 285 300 315 330 345 360 375 390 405 420 435 450 465 480 495
$\sqrt{\text{V}}$ $\sqrt{\text{R}}$	± 0.2 ± 0.3 ± 0.5 ± 0.8 ± 1.2 ± 2 ± 3	± 0.5 ± 1 ± 1.5 ± 2.5 ± 4 ± 6 ± 10	± 0.2 ± 0.3 ± 0.5 ± 0.8 ± 1.2 ± 2 ± 3
$\sqrt{\text{V}}$ $\sqrt{\text{R}}$	± 0.1 ± 0.15 ± 0.2 ± 0.3 ± 0.5 ± 0.8 ± 1.2	± 0.2 ± 0.3 ± 0.5 ± 0.8 ± 1.2 ± 2 ± 3	± 0.1 ± 0.15 ± 0.2 ± 0.3 ± 0.5 ± 0.8 ± 1.2
$\sqrt{\text{V}}$ $\sqrt{\text{R}}$	± 0.05 ± 0.1 ± 0.15 ± 0.2 ± 0.3 ± 0.5	± 0.1 ± 0.15 ± 0.2 ± 0.3 ± 0.5	± 0.05 ± 0.1 ± 0.15 ± 0.2 ± 0.3 ± 0.5

INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 2627 8333 WWW.TMC.CO.TH	Name	Date	Design	Check	Verify	Heat Treatment	Coating	Scale	Sheet No.	Dimension (mm.)	Drawing No.	Weight	Mat. / Std.	Size	Rev.
Model HYDRAULIC PRESS 100 TON											HPP-02-017-000			N/A	A4
Part Name	FRAME														
Title															
File Name : Hydraulic Press Frame.dwg															

Revise	1	Revise Description	2	Chd.	3	Date	4	Customer :	5	6

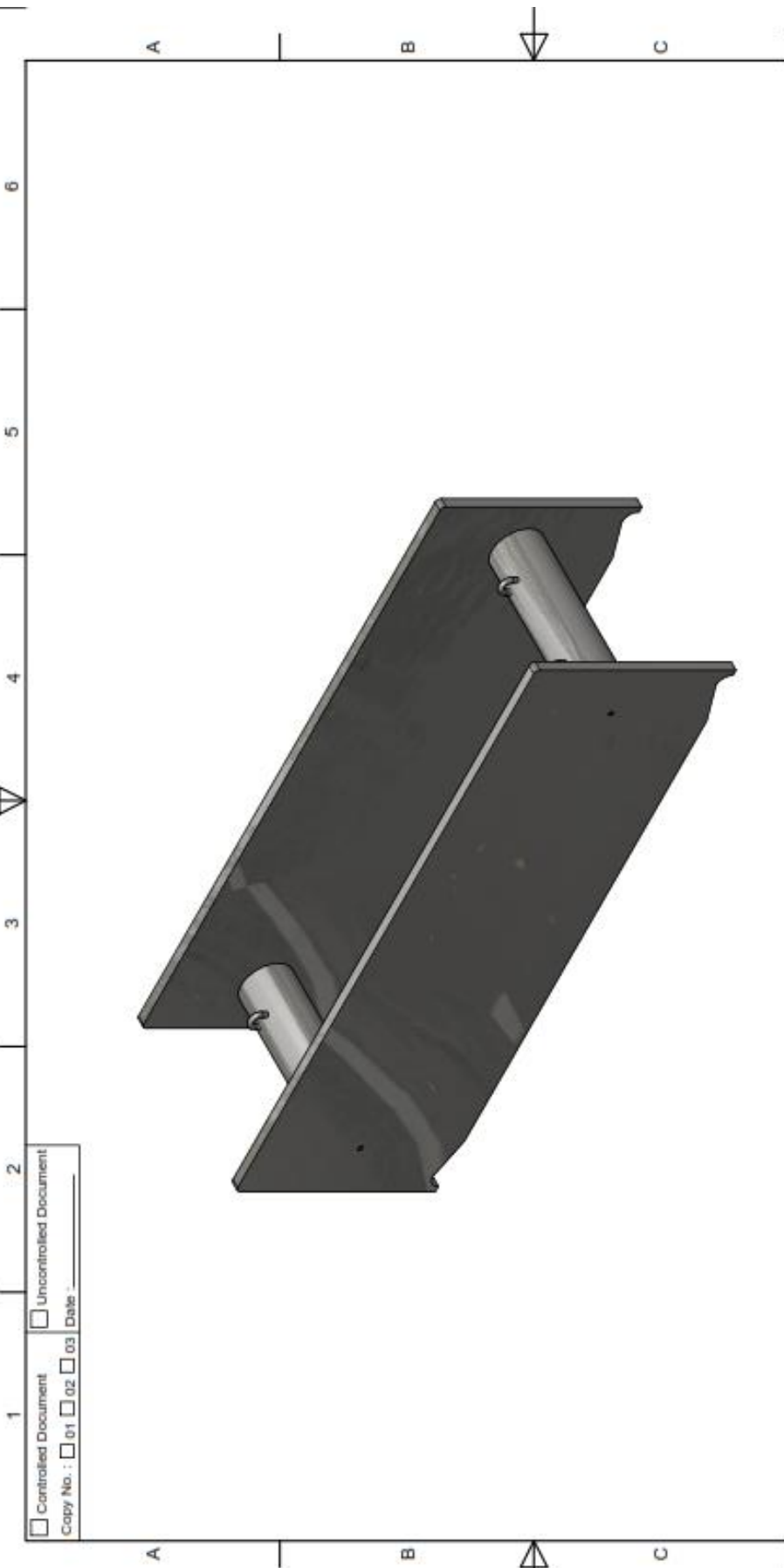
F-ED-013
REV.01 D1/1/26



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____

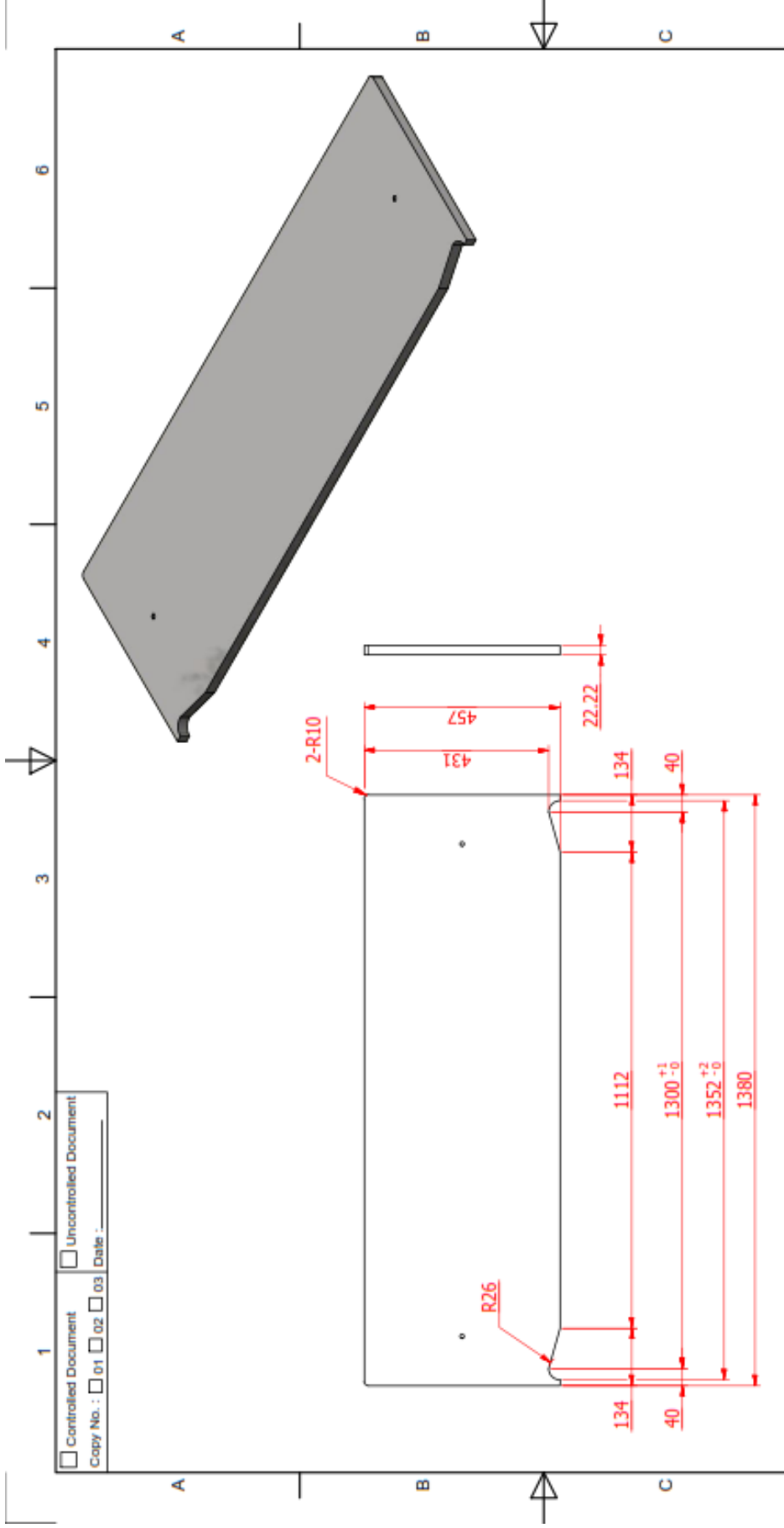
Machining $\sqrt{(\quad)}$		Welding $\begin{matrix} a \\ \text{---} \\ a \end{matrix}$		General Unless Specification do not show on the drawing		Design	Date	Name	TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 2627 1933 WWW.TMC.CO.TH	
Chamfering $\sqrt{(\quad)}$		$\begin{matrix} a \\ \text{---} \\ a \end{matrix}$		Angle Tolerance		Check			Model	Mat. / Std.
				Length Tolerance		Verify	Heat Treatment	-----	HYDRAULIC PRESS 100 TON	Weight
				JIS B 0405					Part Name	
				(Unit mm.)					FRAME	N/A
				10 3 6 30 120 400 1000 15 30 120 400					Title	Size
				15 3 6 30 120 400 1000 2000 30 120 400					Coating	A4
				20 3 6 30 120 400 1000 25 15 30 120 400					Scale	Rev.
				25 3 6 30 120 400 1000 30 15 30 120 400					Sheet No.	
				30 3 6 30 120 400 1000 35 15 30 120 400					Dimension (mm.)	
				35 3 6 30 120 400 1000 40 15 30 120 400					Drawing No.	HPP-02-01B-000
				40 3 6 30 120 400 1000 45 15 30 120 400					Customer :	
				45 3 6 30 120 400 1000 50 15 30 120 400					File Name :	Hydraulic Press Frame.dwg
				50 3 6 30 120 400 1000 55 15 30 120 400						

Revise	1	Revise Description	2	Chd.	3	Date	4	Customer :	5	6



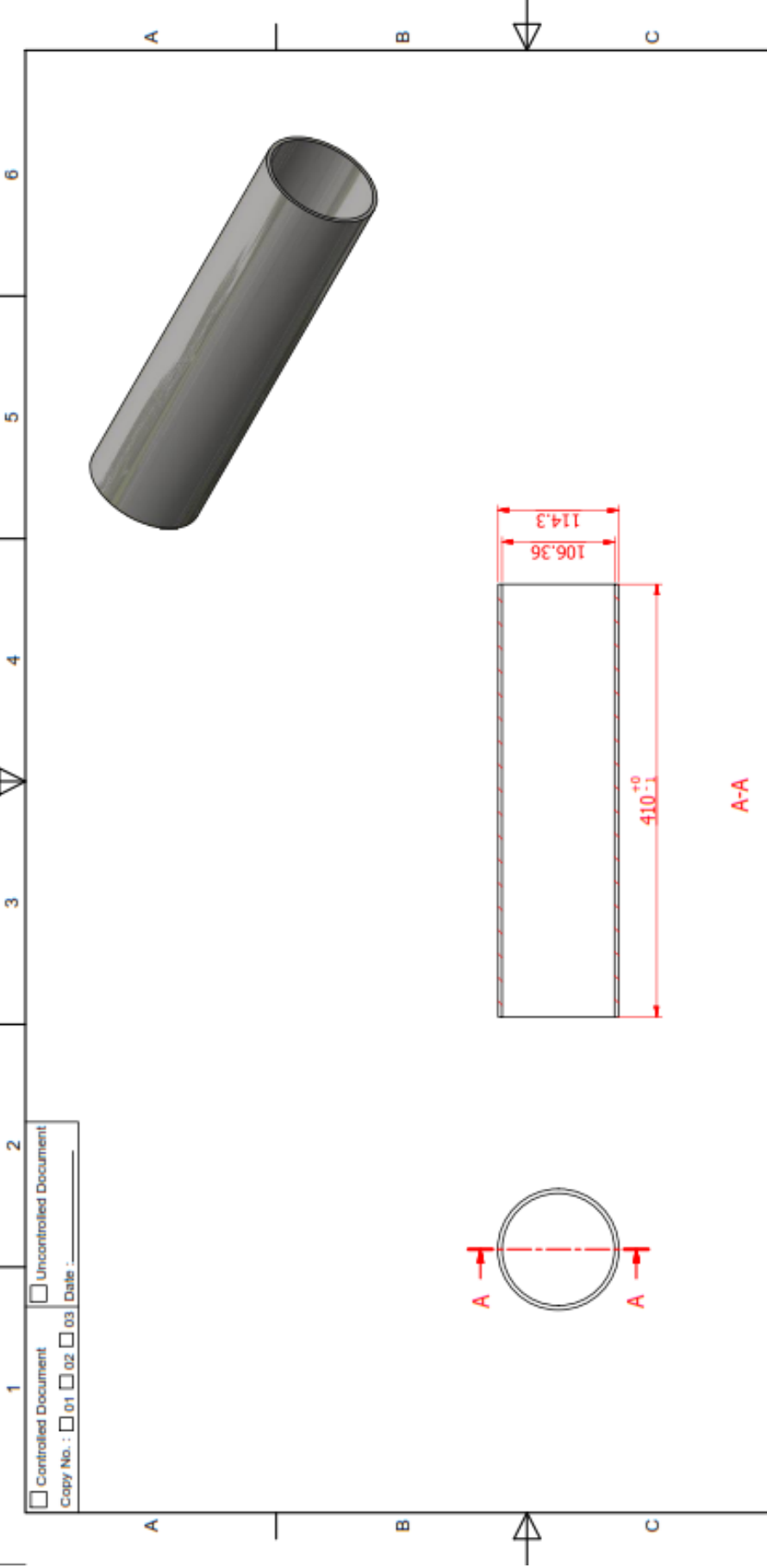
Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 | Date : _____

Machining		Welding		Chamfering		General Unless Specification do not show on the drawing		Design <input type="checkbox"/>	Date	Name	 TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone : 66 2827 8333 WWW.TMC.CO.TH
Ref. : JIS B 0405 (Unit mm.)		Length Tolerance 3 6 30 120 450 1000 15 35 125 400 630 3 6 30 120 450 1000 20 35 125 400 630		Angle Tolerance 15 30 45 60 75 90 105 120 135 150 165 180 15 30 45 60 75 90 105 120 135 150 165 180		Check <input type="checkbox"/>	Verify <input type="checkbox"/>	Heat Treatment : -----	Model HYDRAULIC PRESS 300 TON	Mat. / S3L	
<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		Coating : -----	Part Name LOW BEAM	Weight N/A	
<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		Scale Dimension (mm.)	Drawing No. HPP-03-000-000	Size A4	
<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		Sheet No.	Rev.	00 - First Issue	
<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		Customer :	File Name : standard.dwg	00	



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____

General Unless Specification do not show on the drawing																																																																																																																																																																																																																																																																																																																																																																	
Machining	Chamfering	Welding	Heat Treatment	Coating	Scale	Sheet No.	Dimension (mm.)	Drawing No.	HPP-03-001-000	Weight	Mat. / Std.																																																																																																																																																																																																																																																																																																																																																						
<p style="font-size: small;">Ref. : JIS B 0405 (Unit mm.)</p> <table border="1"> <tr> <td>UP</td> <td>0.5</td> <td>3</td> <td>6</td> <td>30</td> <td>120</td> <td>400</td> <td>1000</td> <td>15</td> <td>50</td> <td>120</td> <td>400</td> </tr> <tr> <td>Ls</td> <td>3</td> <td>6</td> <td>30</td> <td>120</td> <td>400</td> <td>1000</td> <td>2000</td> <td>50</td> <td>120</td> <td>400</td> <td>4000</td> </tr> <tr> <td>V</td> <td>0.1</td> <td>0.2</td> <td>0.5</td> <td>1</td> <td>2.5</td> <td>5</td> <td>10</td> <td>0.1</td> <td>0.2</td> <td>0.5</td> <td>1</td> </tr> <tr> <td>W</td> <td>0.1</td> <td>0.3</td> <td>0.5</td> <td>1</td> <td>2.5</td> <td>5</td> <td>10</td> <td>0.1</td> <td>0.2</td> <td>0.5</td> <td>1</td> </tr> <tr> <td>X</td> <td>0.1</td> <td>0.3</td> <td>0.5</td> <td>1</td> <td>2.5</td> <td>5</td> <td>10</td> <td>0.1</td> <td>0.2</td> <td>0.5</td> <td>1</td> </tr> <tr> <td>Y</td> <td>0.1</td> <td>0.3</td> <td>0.5</td> <td>1</td> <td>2.5</td> <td>5</td> <td>10</td> <td>0.1</td> <td>0.2</td> <td>0.5</td> <td>1</td> </tr> <tr> <td>Z</td> <td>0.1</td> <td>0.3</td> <td>0.5</td> <td>1</td> <td>2.5</td> <td>5</td> <td>10</td> <td>0.1</td> <td>0.2</td> <td>0.5</td> <td>1</td> </tr> <tr> <td>AA</td> <td>0.1</td> <td>0.3</td> <td>0.5</td> <td>1</td> <td>2.5</td> <td>5</td> <td>10</td> <td>0.1</td> <td>0.2</td> <td>0.5</td> <td>1</td> </tr> <tr> <td>BB</td> <td>0.1</td> <td>0.3</td> <td>0.5</td> <td>1</td> <td>2.5</td> <td>5</td> <td>10</td> <td>0.1</td> <td>0.2</td> <td>0.5</td> <td>1</td> </tr> <tr> <td>CC</td> <td>0.1</td> <td>0.3</td> <td>0.5</td> <td>1</td> <td>2.5</td> <td>5</td> <td>10</td> <td>0.1</td> <td>0.2</td> <td>0.5</td> <td>1</td> </tr> <tr> <td>DD</td> <td>0.1</td> <td>0.3</td> <td>0.5</td> <td>1</td> <td>2.5</td> <td>5</td> <td>10</td> <td>0.1</td> <td>0.2</td> <td>0.5</td> <td>1</td> </tr> </table>		UP	0.5	3	6	30	120	400	1000	15	50	120	400	Ls	3	6	30	120	400	1000	2000	50	120	400	4000	V	0.1	0.2	0.5	1	2.5	5	10	0.1	0.2	0.5	1	W	0.1	0.3	0.5	1	2.5	5	10	0.1	0.2	0.5	1	X	0.1	0.3	0.5	1	2.5	5	10	0.1	0.2	0.5	1	Y	0.1	0.3	0.5	1	2.5	5	10	0.1	0.2	0.5	1	Z	0.1	0.3	0.5	1	2.5	5	10	0.1	0.2	0.5	1	AA	0.1	0.3	0.5	1	2.5	5	10	0.1	0.2	0.5	1	BB	0.1	0.3	0.5	1	2.5	5	10	0.1	0.2	0.5	1	CC	0.1	0.3	0.5	1	2.5	5	10	0.1	0.2	0.5	1	DD	0.1	0.3	0.5	1	2.5	5	10	0.1	0.2	0.5	1	<p style="font-size: small;">Angle Tolerance</p> <table border="1"> <tr> <td>15°</td> <td>30°</td> <td>45°</td> <td>60°</td> <td>75°</td> <td>90°</td> <td>105°</td> <td>120°</td> <td>135°</td> <td>150°</td> </tr> <tr> <td>15'</td> <td>30'</td> <td>45'</td> <td>60'</td> <td>75'</td> <td>90'</td> <td>105'</td> <td>120'</td> <td>135'</td> <td>150'</td> </tr> </table>		15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	15'	30'	45'	60'	75'	90'	105'	120'	135'	150'	<p style="font-size: small;">Tolerance</p> <table border="1"> <tr> <td>15°</td> <td>30°</td> <td>45°</td> <td>60°</td> <td>75°</td> <td>90°</td> <td>105°</td> <td>120°</td> <td>135°</td> <td>150°</td> </tr> <tr> <td>15'</td> <td>30'</td> <td>45'</td> <td>60'</td> <td>75'</td> <td>90'</td> <td>105'</td> <td>120'</td> <td>135'</td> <td>150'</td> </tr> </table>		15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	15'	30'	45'	60'	75'	90'	105'	120'	135'	150'	<p style="font-size: small;">Heat Treatment</p> <table border="1"> <tr> <td>15°</td> <td>30°</td> <td>45°</td> <td>60°</td> <td>75°</td> <td>90°</td> <td>105°</td> <td>120°</td> <td>135°</td> <td>150°</td> </tr> <tr> <td>15'</td> <td>30'</td> <td>45'</td> <td>60'</td> <td>75'</td> <td>90'</td> <td>105'</td> <td>120'</td> <td>135'</td> <td>150'</td> </tr> </table>		15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	15'	30'	45'	60'	75'	90'	105'	120'	135'	150'	<p style="font-size: small;">Coating</p> <table border="1"> <tr> <td>15°</td> <td>30°</td> <td>45°</td> <td>60°</td> <td>75°</td> <td>90°</td> <td>105°</td> <td>120°</td> <td>135°</td> <td>150°</td> </tr> <tr> <td>15'</td> <td>30'</td> <td>45'</td> <td>60'</td> <td>75'</td> <td>90'</td> <td>105'</td> <td>120'</td> <td>135'</td> <td>150'</td> </tr> </table>		15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	15'	30'	45'	60'	75'	90'	105'	120'	135'	150'	<p style="font-size: small;">Scale</p> <table border="1"> <tr> <td>15°</td> <td>30°</td> <td>45°</td> <td>60°</td> <td>75°</td> <td>90°</td> <td>105°</td> <td>120°</td> <td>135°</td> <td>150°</td> </tr> <tr> <td>15'</td> <td>30'</td> <td>45'</td> <td>60'</td> <td>75'</td> <td>90'</td> <td>105'</td> <td>120'</td> <td>135'</td> <td>150'</td> </tr> </table>		15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	15'	30'	45'	60'	75'	90'	105'	120'	135'	150'	<p style="font-size: small;">Sheet No.</p> <table border="1"> <tr> <td>15°</td> <td>30°</td> <td>45°</td> <td>60°</td> <td>75°</td> <td>90°</td> <td>105°</td> <td>120°</td> <td>135°</td> <td>150°</td> </tr> <tr> <td>15'</td> <td>30'</td> <td>45'</td> <td>60'</td> <td>75'</td> <td>90'</td> <td>105'</td> <td>120'</td> <td>135'</td> <td>150'</td> </tr> </table>		15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	15'	30'	45'	60'	75'	90'	105'	120'	135'	150'	<p style="font-size: small;">Dimension (mm.)</p> <table border="1"> <tr> <td>15°</td> <td>30°</td> <td>45°</td> <td>60°</td> <td>75°</td> <td>90°</td> <td>105°</td> <td>120°</td> <td>135°</td> <td>150°</td> </tr> <tr> <td>15'</td> <td>30'</td> <td>45'</td> <td>60'</td> <td>75'</td> <td>90'</td> <td>105'</td> <td>120'</td> <td>135'</td> <td>150'</td> </tr> </table>		15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	15'	30'	45'	60'	75'	90'	105'	120'	135'	150'	<p style="font-size: small;">Drawing No.</p> <table border="1"> <tr> <td>15°</td> <td>30°</td> <td>45°</td> <td>60°</td> <td>75°</td> <td>90°</td> <td>105°</td> <td>120°</td> <td>135°</td> <td>150°</td> </tr> <tr> <td>15'</td> <td>30'</td> <td>45'</td> <td>60'</td> <td>75'</td> <td>90'</td> <td>105'</td> <td>120'</td> <td>135'</td> <td>150'</td> </tr> </table>		15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	15'	30'	45'	60'	75'	90'	105'	120'	135'	150'	<p style="font-size: small;">Weight</p> <table border="1"> <tr> <td>15°</td> <td>30°</td> <td>45°</td> <td>60°</td> <td>75°</td> <td>90°</td> <td>105°</td> <td>120°</td> <td>135°</td> <td>150°</td> </tr> <tr> <td>15'</td> <td>30'</td> <td>45'</td> <td>60'</td> <td>75'</td> <td>90'</td> <td>105'</td> <td>120'</td> <td>135'</td> <td>150'</td> </tr> </table>		15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	15'	30'	45'	60'	75'	90'	105'	120'	135'	150'	<p style="font-size: small;">Mat. / Std.</p> <table border="1"> <tr> <td>15°</td> <td>30°</td> <td>45°</td> <td>60°</td> <td>75°</td> <td>90°</td> <td>105°</td> <td>120°</td> <td>135°</td> <td>150°</td> </tr> <tr> <td>15'</td> <td>30'</td> <td>45'</td> <td>60'</td> <td>75'</td> <td>90'</td> <td>105'</td> <td>120'</td> <td>135'</td> <td>150'</td> </tr> </table>		15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	15'	30'	45'	60'	75'	90'	105'	120'	135'	150'
UP	0.5	3	6	30	120	400	1000	15	50	120	400																																																																																																																																																																																																																																																																																																																																																						
Ls	3	6	30	120	400	1000	2000	50	120	400	4000																																																																																																																																																																																																																																																																																																																																																						
V	0.1	0.2	0.5	1	2.5	5	10	0.1	0.2	0.5	1																																																																																																																																																																																																																																																																																																																																																						
W	0.1	0.3	0.5	1	2.5	5	10	0.1	0.2	0.5	1																																																																																																																																																																																																																																																																																																																																																						
X	0.1	0.3	0.5	1	2.5	5	10	0.1	0.2	0.5	1																																																																																																																																																																																																																																																																																																																																																						
Y	0.1	0.3	0.5	1	2.5	5	10	0.1	0.2	0.5	1																																																																																																																																																																																																																																																																																																																																																						
Z	0.1	0.3	0.5	1	2.5	5	10	0.1	0.2	0.5	1																																																																																																																																																																																																																																																																																																																																																						
AA	0.1	0.3	0.5	1	2.5	5	10	0.1	0.2	0.5	1																																																																																																																																																																																																																																																																																																																																																						
BB	0.1	0.3	0.5	1	2.5	5	10	0.1	0.2	0.5	1																																																																																																																																																																																																																																																																																																																																																						
CC	0.1	0.3	0.5	1	2.5	5	10	0.1	0.2	0.5	1																																																																																																																																																																																																																																																																																																																																																						
DD	0.1	0.3	0.5	1	2.5	5	10	0.1	0.2	0.5	1																																																																																																																																																																																																																																																																																																																																																						
15°	30°	45°	60°	75°	90°	105°	120°	135°	150°																																																																																																																																																																																																																																																																																																																																																								
15'	30'	45'	60'	75'	90'	105'	120'	135'	150'																																																																																																																																																																																																																																																																																																																																																								
15°	30°	45°	60°	75°	90°	105°	120°	135°	150°																																																																																																																																																																																																																																																																																																																																																								
15'	30'	45'	60'	75'	90'	105'	120'	135'	150'																																																																																																																																																																																																																																																																																																																																																								
15°	30°	45°	60°	75°	90°	105°	120°	135°	150°																																																																																																																																																																																																																																																																																																																																																								
15'	30'	45'	60'	75'	90'	105'	120'	135'	150'																																																																																																																																																																																																																																																																																																																																																								
15°	30°	45°	60°	75°	90°	105°	120°	135°	150°																																																																																																																																																																																																																																																																																																																																																								
15'	30'	45'	60'	75'	90'	105'	120'	135'	150'																																																																																																																																																																																																																																																																																																																																																								
15°	30°	45°	60°	75°	90°	105°	120°	135°	150°																																																																																																																																																																																																																																																																																																																																																								
15'	30'	45'	60'	75'	90'	105'	120'	135'	150'																																																																																																																																																																																																																																																																																																																																																								
15°	30°	45°	60°	75°	90°	105°	120°	135°	150°																																																																																																																																																																																																																																																																																																																																																								
15'	30'	45'	60'	75'	90'	105'	120'	135'	150'																																																																																																																																																																																																																																																																																																																																																								
15°	30°	45°	60°	75°	90°	105°	120°	135°	150°																																																																																																																																																																																																																																																																																																																																																								
15'	30'	45'	60'	75'	90'	105'	120'	135'	150'																																																																																																																																																																																																																																																																																																																																																								
15°	30°	45°	60°	75°	90°	105°	120°	135°	150°																																																																																																																																																																																																																																																																																																																																																								
15'	30'	45'	60'	75'	90'	105'	120'	135'	150'																																																																																																																																																																																																																																																																																																																																																								
15°	30°	45°	60°	75°	90°	105°	120°	135°	150°																																																																																																																																																																																																																																																																																																																																																								
15'	30'	45'	60'	75'	90'	105'	120'	135'	150'																																																																																																																																																																																																																																																																																																																																																								
15°	30°	45°	60°	75°	90°	105°	120°	135°	150°																																																																																																																																																																																																																																																																																																																																																								
15'	30'	45'	60'	75'	90'	105'	120'	135'	150'																																																																																																																																																																																																																																																																																																																																																								
Design			Name			Date			TME INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 2627 1933 WWW.TME.CO.TH																																																																																																																																																																																																																																																																																																																																																								
Check			Model			Part Name			HYDRAULIC PRESS 100 TON																																																																																																																																																																																																																																																																																																																																																								
Verify			Heat Treatment			Coating			Title																																																																																																																																																																																																																																																																																																																																																								
Scale			Sheet No.			Drawing No.			HPP-03-001-000																																																																																																																																																																																																																																																																																																																																																								
Customer			File Name			HPP-03-000-000.dwg			Customer																																																																																																																																																																																																																																																																																																																																																								
Revise			Revise Description			Chk.			Date																																																																																																																																																																																																																																																																																																																																																								
00 - First Issue																																																																																																																																																																																																																																																																																																																																																																	
<p style="font-size: small;">Customer : HPP-03-000-000.dwg</p>																																																																																																																																																																																																																																																																																																																																																																	



General Unless Specification do not show on the drawing

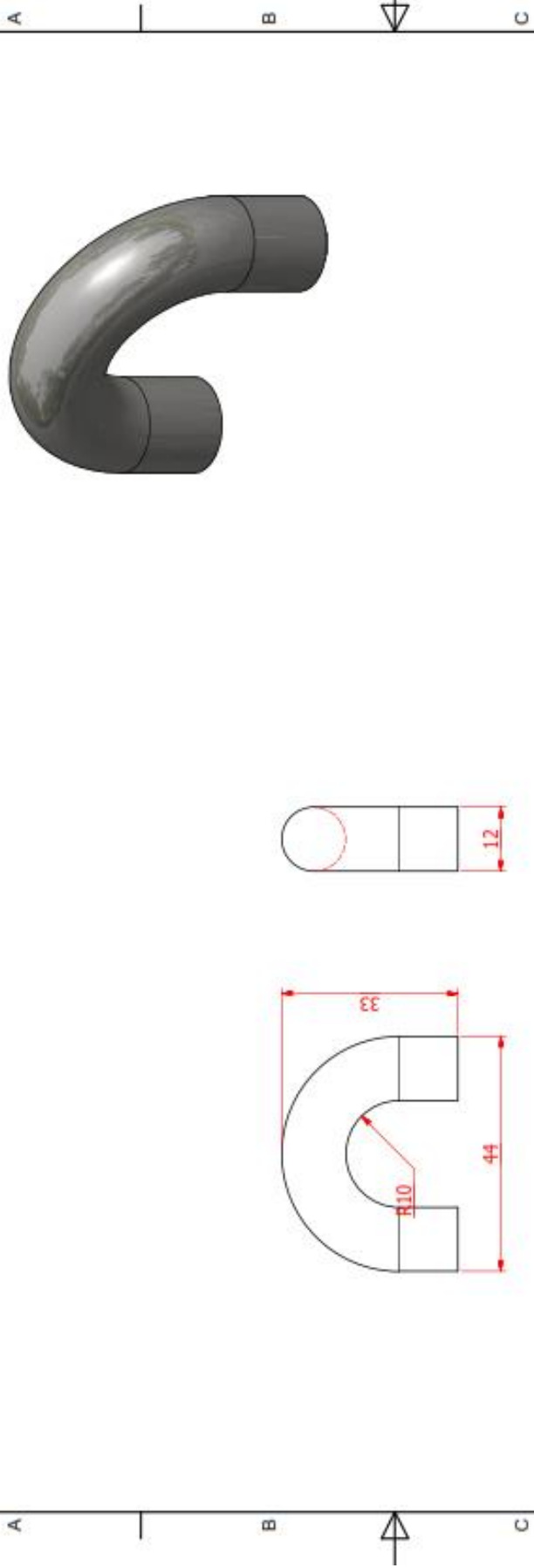
Machining	Welding	Chamfering	Angle Tolerance
(UP) 0.5 3 6 30 1.25 400 1000 15 30 1.25 400 (Unit mm.) 15 3 6 30 1.25 450 1000 2000 30 125 400 +90°	a = 	a = 	15 30 1.25 400 125 400 +90° 1.1 1.5 2.0 2.5 3.0 4.0 5.0 6.0 8.0 10.0 12.0 15.0 20.0 25.0 30.0 40.0 50.0 60.0 80.0 100.0

<input type="checkbox"/> Controlled Document <input type="checkbox"/> Uncontrolled Document Copy No. : <input type="checkbox"/> 01 <input type="checkbox"/> 02 <input type="checkbox"/> 03 Date : _____	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
---	----------------------------	----------------------------	----------------------------

TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone : 66 2627 8333 WWW.TMC.CO.TH	Name Model Part Name Title Weight Size Rev.	HYDRAULIC PRESS 100 TON FRAME 4.43 kg A4 Rev.
Design Check Verify Heat Treatment Coating Scale Sheet No. Dimension (mm.) Drawing No. HPP-03-002-000	Date Heat Treatment Coating Scale Sheet No. Dimension (mm.) Drawing No. HPP-03-002-000	Date Heat Treatment Coating Scale Sheet No. Dimension (mm.) Drawing No. HPP-03-002-000

1 2 3 4 5 6

Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____

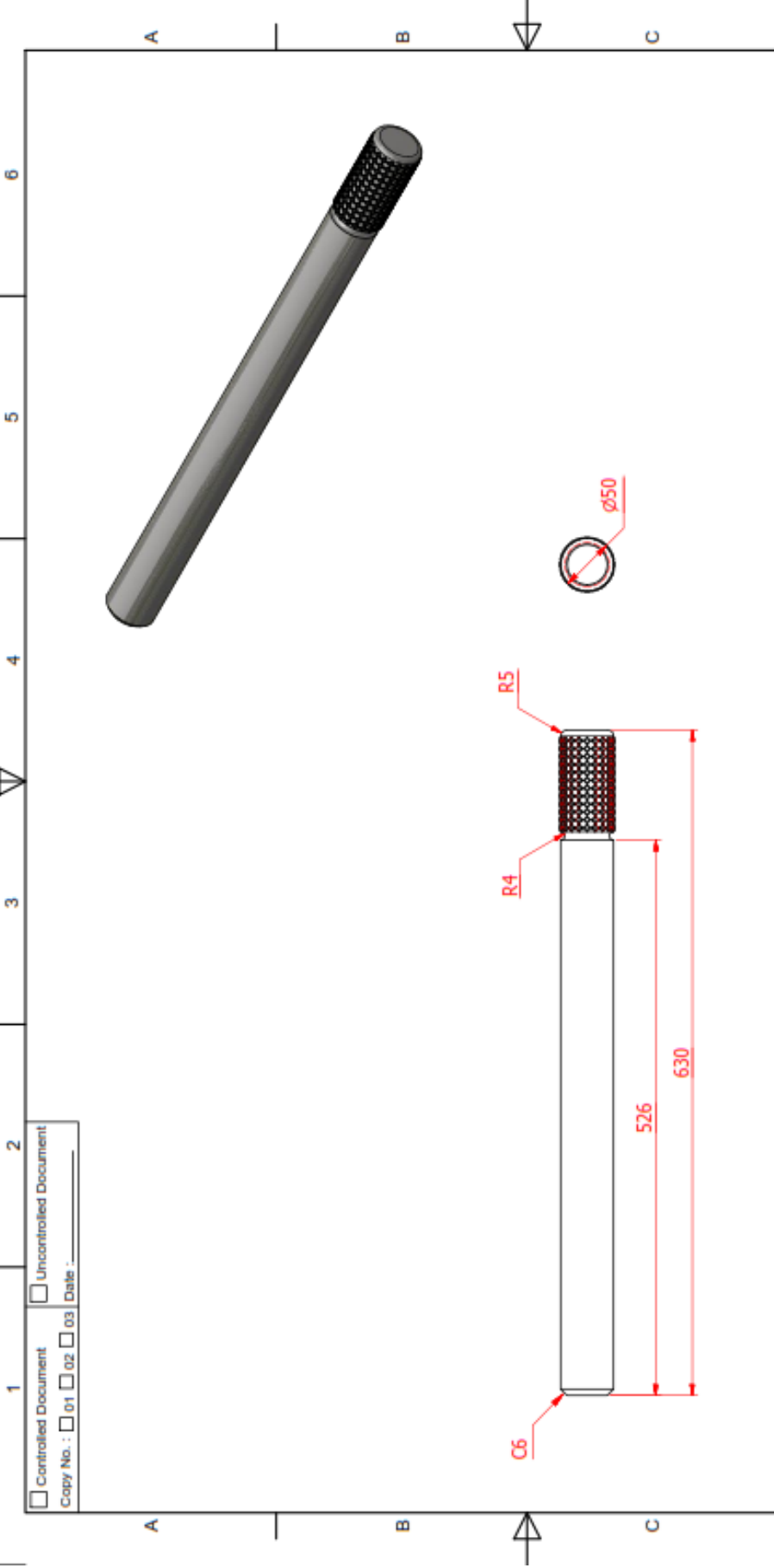


General Unless Specification do not show on the drawing

Machining	Welding	Angle Tolerance
Chamfering		
Ref. : JIS B 0005	Length Tolerance	Angle Tolerance
(Unit: mm.)		
	30 40 50 60 70 80 90 100 120 150 200 250 300 400 500	10 30 45 60 75 90 105 120 150 180 225 300 400 500
	±0.3 ±0.4 ±0.5 ±0.6 ±1.2 ±1.5 ±2.5 ±3 ±4 ±6 ±10 ±15 ±20 ±30 ±40 ±50 ±60 ±70 ±80 ±100 ±120 ±150 ±200 ±250 ±300 ±400 ±500	±0.2 ±0.3 ±0.4 ±0.5 ±0.6 ±1.2 ±1.5 ±2.5 ±3 ±4 ±6 ±10 ±15 ±20 ±30 ±40 ±50 ±60 ±70 ±80 ±100 ±120 ±150 ±200 ±250 ±300 ±400 ±500

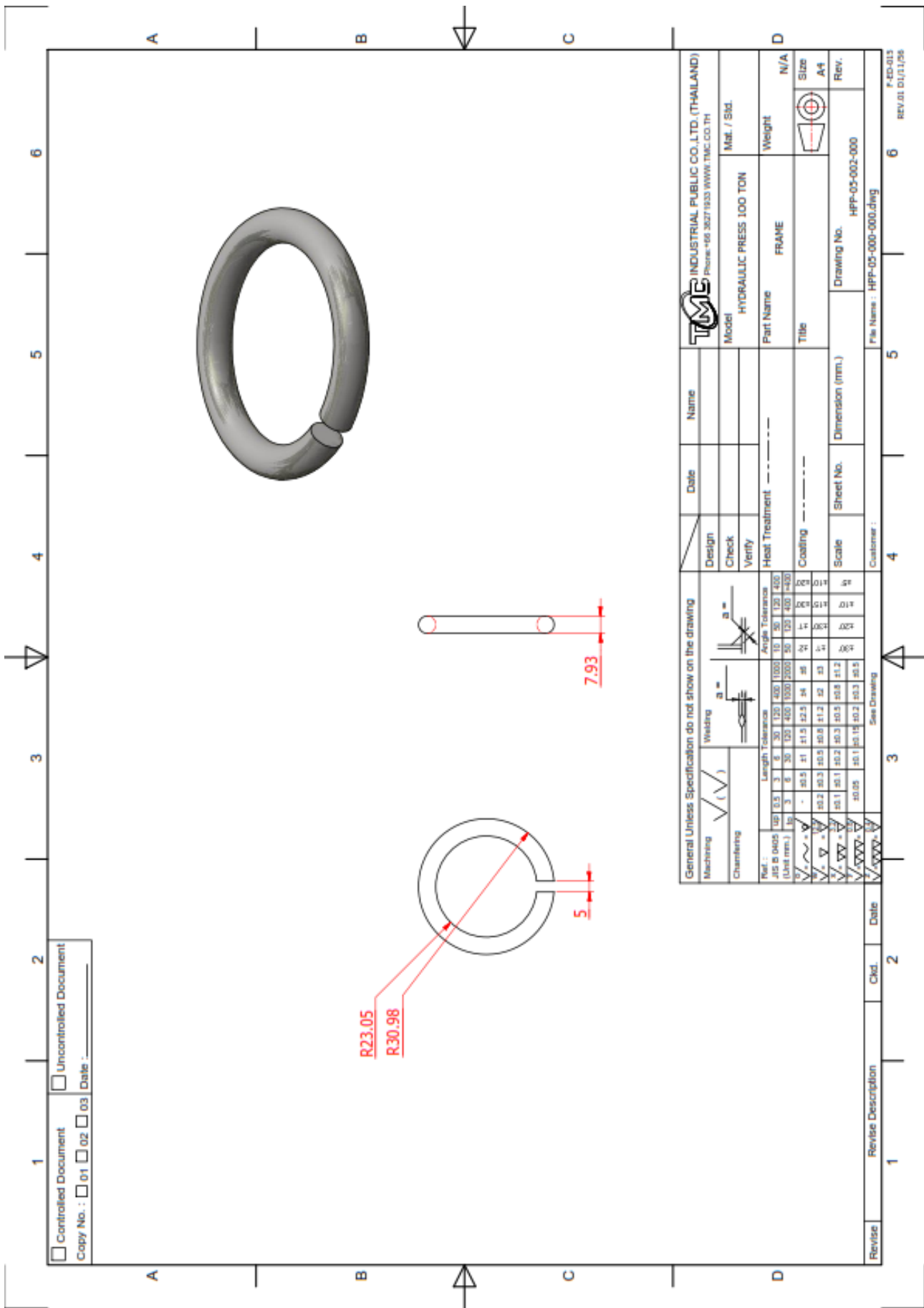
Design	Date	Name
Check		
Verify		
Heat Treatment	-----	
Coating	-----	
Scale	Sheet No.	Dimension (mm.)
Customer :		

TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 2027 9333 WWW.TMC.CO.TH	Model	Mat. / Std.
	HYDRAULIC PRESS 100 TON	
	Part Name	Weight
	FRAME	0.06 kg
	Title	Size
		A4
	Drawing No.	Rev.
	HPP-03-003-000	
File Name : HPP-03-000-000.dwg		



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 | Date : _____

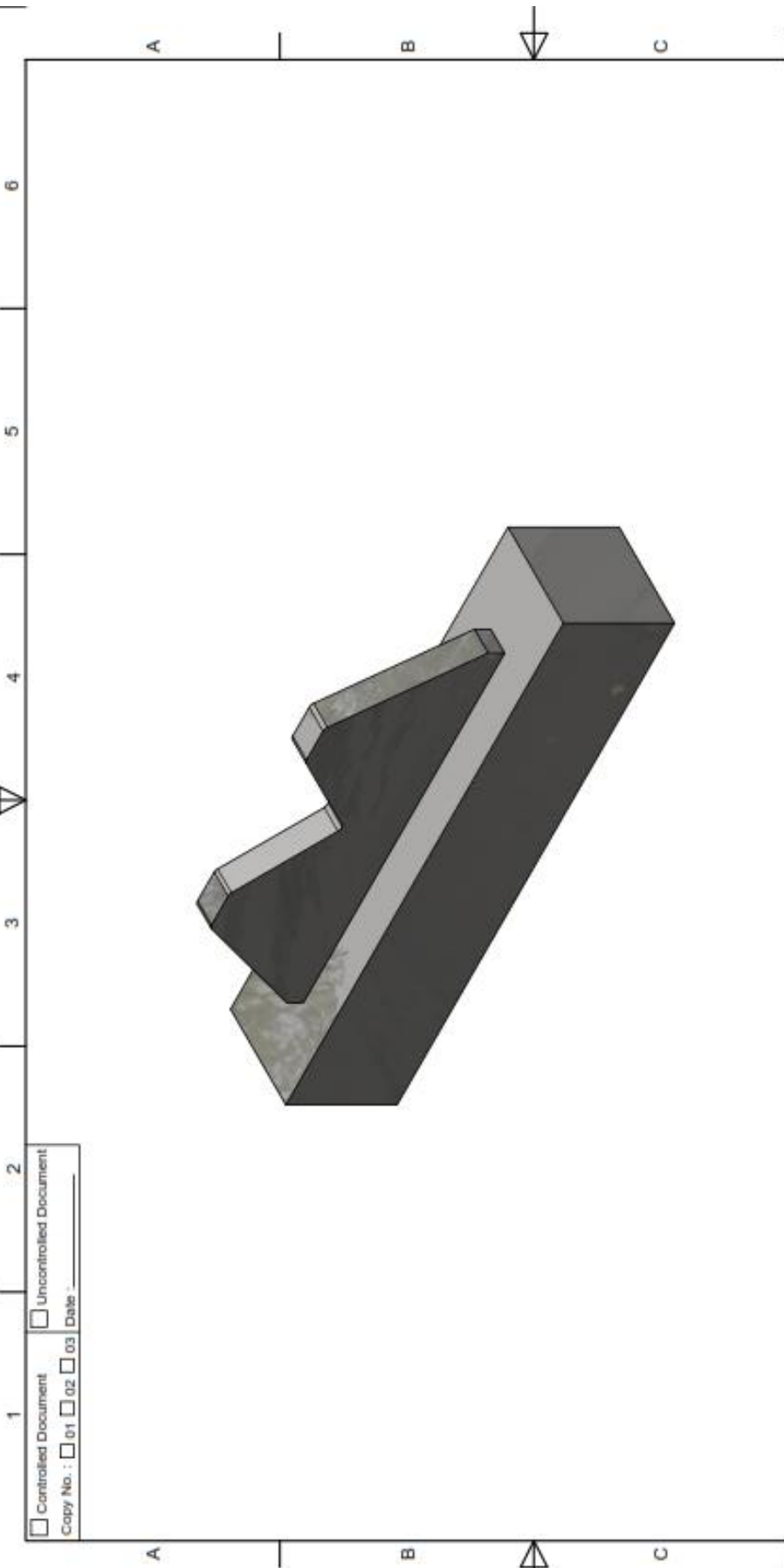
Machining $\sqrt{\quad}$		Welding $\sqrt{\quad}$		General Unless Specification do not show on the drawing		Design	Date	Name	TMC INDUSTRIAL PUBLIC CO.,LTD. (THAILAND) Phone : 66 2827 8333 WWW.TMC.CO.TH		
Chamfering $\sqrt{\quad}$		See Drawing		Angle Tolerance		Check			Model	Mat. / Std.	
				Length Tolerance		Verify			Part Name	Weight	
				10 30 120 400 1000 15 30 120 400		Heat Treatment	-----	-----	FRAME		
				15 30 120 400 1000 2000 30 120 400 +0.03		Coating	-----	-----	Title	N/A	
				45 60 75 90 105 120 135 150 165 180 195 210 225 240 255 270 285 300 315 330 345 360 375 390 405 420 435 450 465 480 495		Scale	-----	-----	Dimension (mm.)	Size	
				0.012 0.015 0.020 0.025 0.030 0.035 0.040 0.045 0.050 0.055 0.060 0.065 0.070 0.075 0.080 0.085 0.090 0.095 0.100 0.105 0.110 0.115 0.120 0.125 0.130 0.135 0.140 0.145 0.150 0.155 0.160 0.165 0.170 0.175 0.180 0.185 0.190 0.195 0.200 0.205 0.210 0.215 0.220 0.225 0.230 0.235 0.240 0.245 0.250 0.255 0.260 0.265 0.270 0.275 0.280 0.285 0.290 0.295 0.300 0.305 0.310 0.315 0.320 0.325 0.330 0.335 0.340 0.345 0.350 0.355 0.360 0.365 0.370 0.375 0.380 0.385 0.390 0.395 0.400 0.405 0.410 0.415 0.420 0.425 0.430 0.435 0.440 0.445 0.450 0.455 0.460 0.465 0.470 0.475 0.480 0.485 0.490 0.495		Sheet No.	HPP-05-001-000	Drawing No.	HPP-05-001-000	Rev.	
00 - First Issue											
Revise	Revise Description	Chd.	Date	Chd.	Date	Customer :		File Name : HPP-05-000-000.dwg			
						1	2	3	4	5	6



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03
 Date : _____

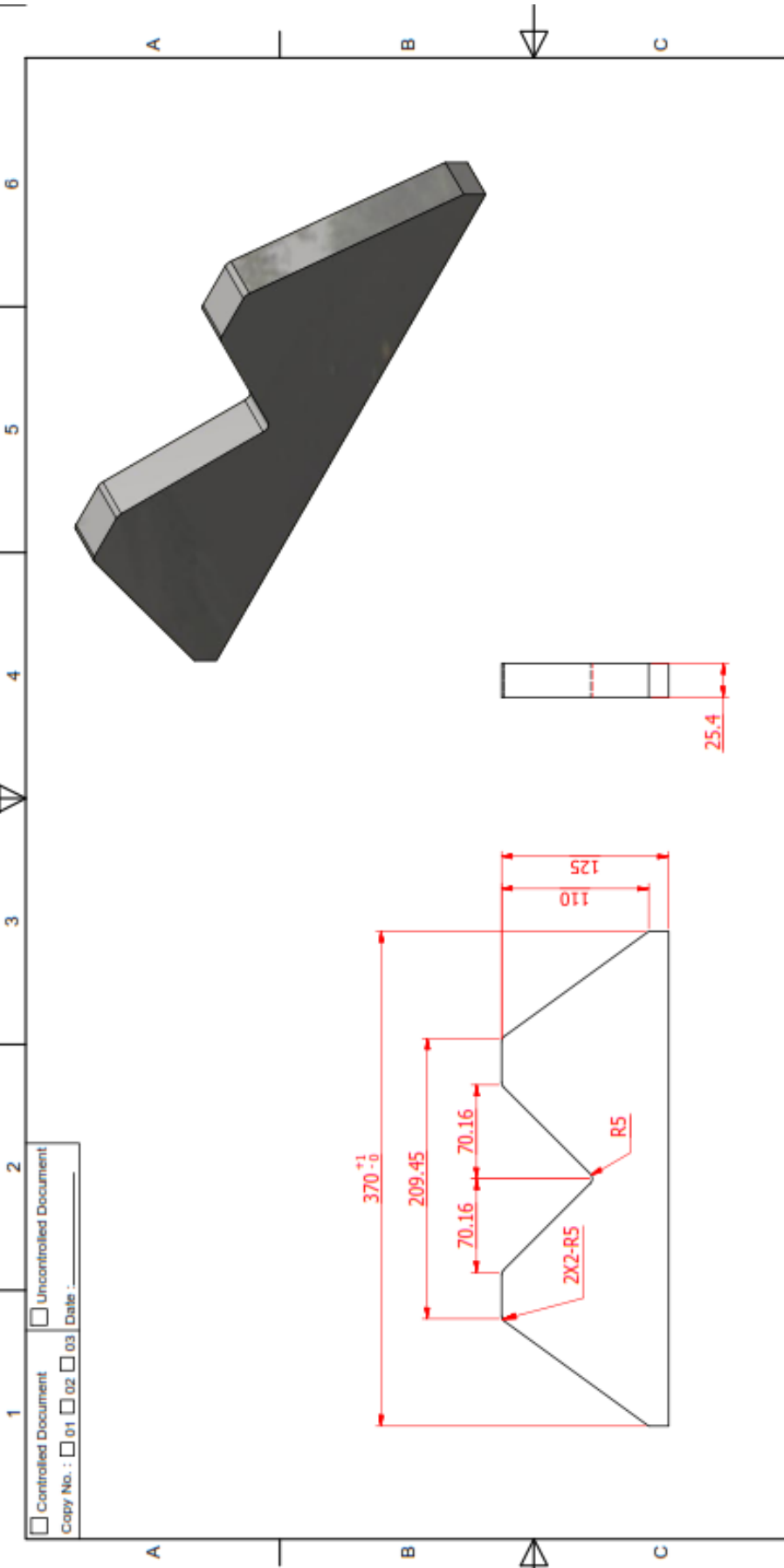
Revise	1	Revise Description	2	Chk.	Date	3	4	5	6
Customer : _____						File Name : HFP-05-000-000.dwg			
General Unless Specification do not show on the drawing			Design		Date	Name		TMC INDUSTRIAL PUBLIC CO.,LTD. (THAILAND)	
Machining <input checked="" type="checkbox"/> (√)			Check					Phone: +66 2627 8333 WWW.TMC.CO.TH	
Chamfering <input checked="" type="checkbox"/> (√)			Verify					Model HYDRAULIC PRESS 100 TON	
Ref.: JIS B 0405			Welding		Heat Treatment		Title		Weight
UP 0.5 3 6 30 120 400 1000 15 30 120 400			<input checked="" type="checkbox"/> (√)		-----		FRAME		N/A
3 6 30 120 400 1000 2000 30 120 400 +0.05			<input checked="" type="checkbox"/> (√)		-----		Coating		Size
0.05 0.1 0.15 0.2 0.3 0.5 0.8 1.2 2 3 4 5 6 10 15 20 30 40 50 60 80 100 150 200 300 400 500 600 800 1000 1500 2000 3000 4000 5000			Angle Tolerance		-----		N/A		A4
0.1 0.15 0.2 0.3 0.5 0.8 1.2 2 3 4 5 6 10 15 20 30 40 50 60 80 100 150 200 300 400 500 600 800 1000 1500 2000 3000 4000 5000			Length Tolerance		-----		Drawing No.		HFP-05-002-000
0.1 0.15 0.2 0.3 0.5 0.8 1.2 2 3 4 5 6 10 15 20 30 40 50 60 80 100 150 200 300 400 500 600 800 1000 1500 2000 3000 4000 5000			See Drawing		-----		Scale		1:1
0.1 0.15 0.2 0.3 0.5 0.8 1.2 2 3 4 5 6 10 15 20 30 40 50 60 80 100 150 200 300 400 500 600 800 1000 1500 2000 3000 4000 5000					-----		Dimension (mm.)		6
0.1 0.15 0.2 0.3 0.5 0.8 1.2 2 3 4 5 6 10 15 20 30 40 50 60 80 100 150 200 300 400 500 600 800 1000 1500 2000 3000 4000 5000					-----		Sheet No.		4

Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03
 Date : _____



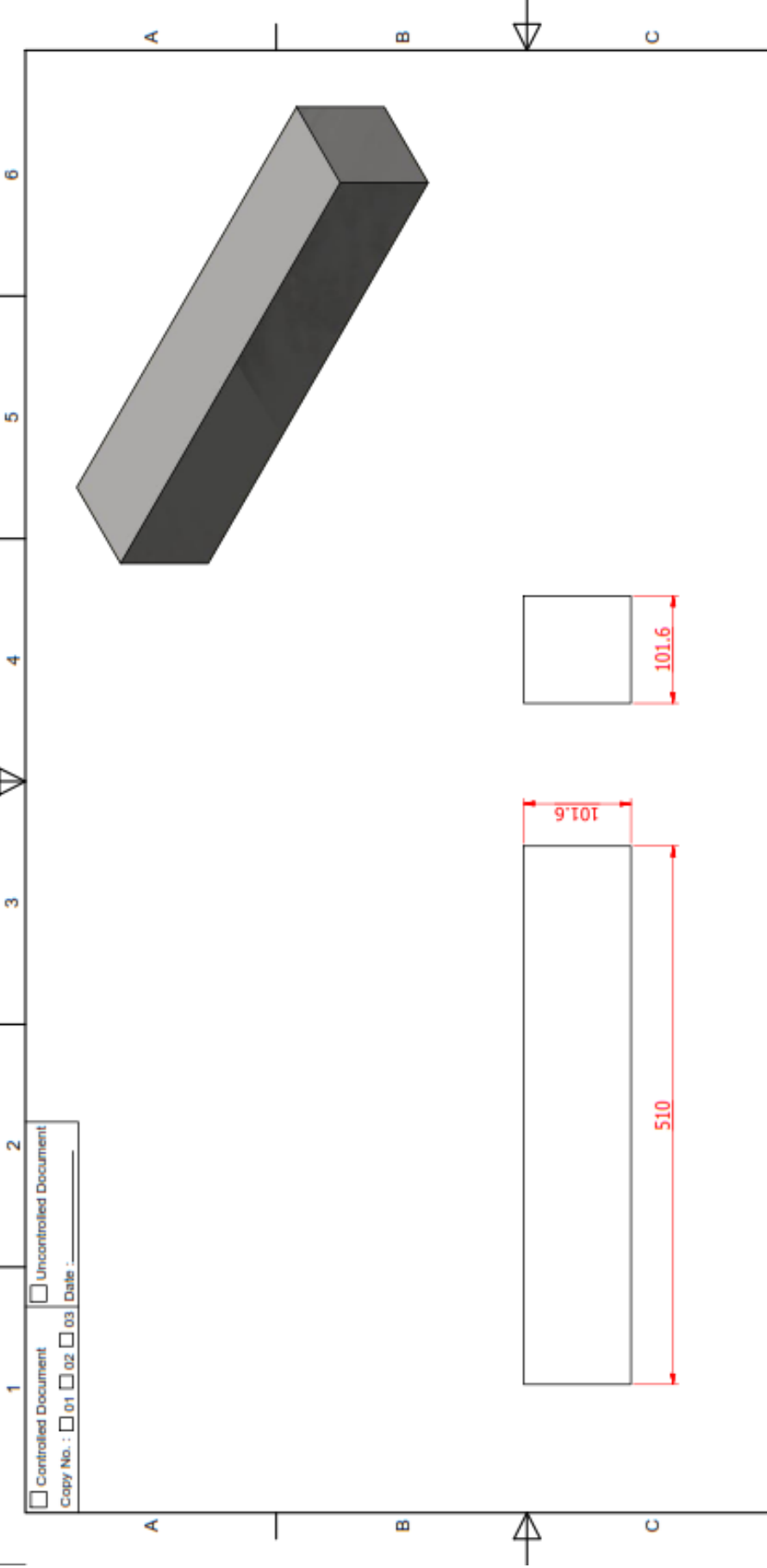
Machining		Welding		General Unless Specification do not show on the drawing		Design	Date	Name	TME INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 2627 9333 WWW.TME.CO.TH	
Chamfering		Angle		Angle Tolerance		Check			Model	Mat. / Std.
						Verify			HYDRAULIC PRESS 100 TON	Weight
						Heat Treatment		Part Name		
								SUPPORT BEAM		N/A
								Title		Size
								Coating		A4
								Scale		Rev.
								Sheet No.		HPP-02-001-000
								Dimension (mm.)		Drawing No.
								Customer		HPP-04-000-000 (support beam).dwg
								File Name		HPP-04-000-000 (support beam).dwg

Revise	00 - First Issue	1	2	3	4	5	6
Revised Description							



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____

Machining Chamfering		Welding Angle Tolerance		Design Check Verify		Name Date		INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 2627 1933 WWW.TMC.CO.TH		Mat. / Std. Model Part Name Title Weight	
Ref.: JIS B 9405 (Unit:mm.)		Length Tolerance h9/k9 h8/k7 h7/k6 h6/k5 h5/k4 h4/k3 h3/k2 h2/k1 h1/k0		Angle Tolerance 10° 15° 20° 25° 30° 45° 60° 90° 120° 150° 180°		Heat Treatment Coating Scale		Drawing No. HPP-04-001-000		N/A Size A4 Rev#	
00 - First Issue		01 02 03 04 05 06 07 08 09 10		01 02 03 04 05 06 07 08 09 10		Sheet No. Dimension (mm.)		File Name : HPP-04-000-000.dwg		Customer :	



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____

General Unless Specification do not show on the drawing

Machining	Welding	Chamfering	Angle Tolerance
<input checked="" type="checkbox"/> (√) <input type="checkbox"/> (X)	<input checked="" type="checkbox"/> (√) <input type="checkbox"/> (X)	<input checked="" type="checkbox"/> (√) <input type="checkbox"/> (X)	<input checked="" type="checkbox"/> (√) <input type="checkbox"/> (X)
Ref.: JIS B 0405 (Unit mm.)	Length Tolerance 0 - 0.1 0.1 - 0.3 0.3 - 0.5 0.5 - 1.2 1.2 - 2.0 2.0 - 3.0 3.0 - 6.0 6.0 - 30.0 30.0 - 100.0 100.0 - 200.0 200.0 - 400.0 400.0 - 600.0	Welding a = a = a =	Angle Tolerance 10 30 45 60 75 90 120 150 180 15 30 45 60 75 90 120 150 180 30 45 60 75 90 120 150 180 45 60 75 90 120 150 180 60 75 90 120 150 180 75 90 120 150 180 90 120 150 180 120 150 180 150 180

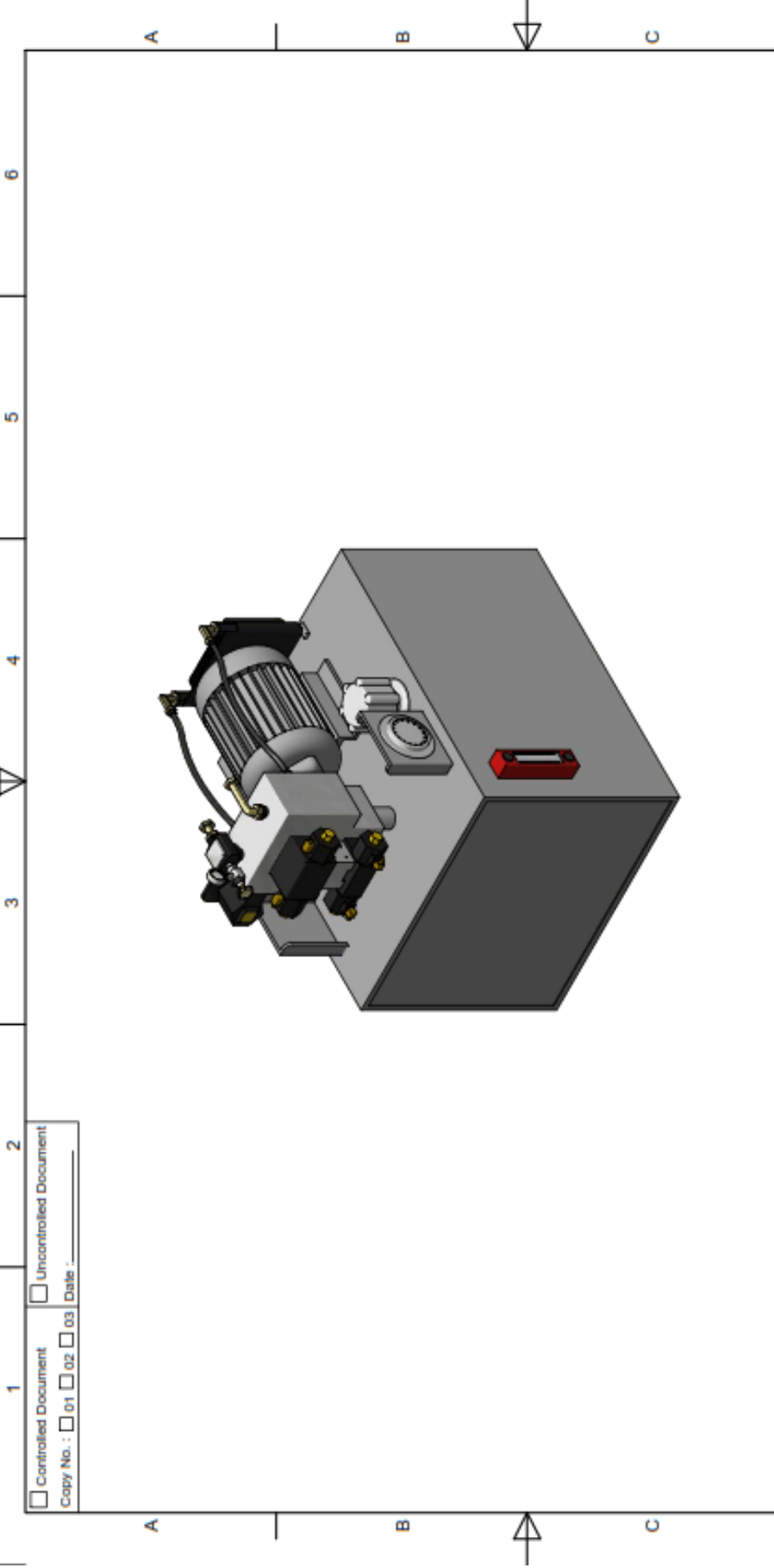
Design	Date	Name
Check		
Verify		
Heat Treatment	-----	
Coating	-----	
Scale	Sheet No.	Dimension (mm.)
Customer :		

Revise	Revise Description	Chd.	Date
1		2	

		TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND) Phone: +66 2027 1933 WWW.TMC.CO.TH	
Model	HYDRAULIC PRESS 100 TON	Mat. / Std.	
Part Name	FRAME	Weight	N/A
Title		Size	A4
Drawing No.	HPP-04-002-000	Rev.	
File Name : HPP-04-000-000.dwg			

ATTACHMENT 3

Design of Power Unit



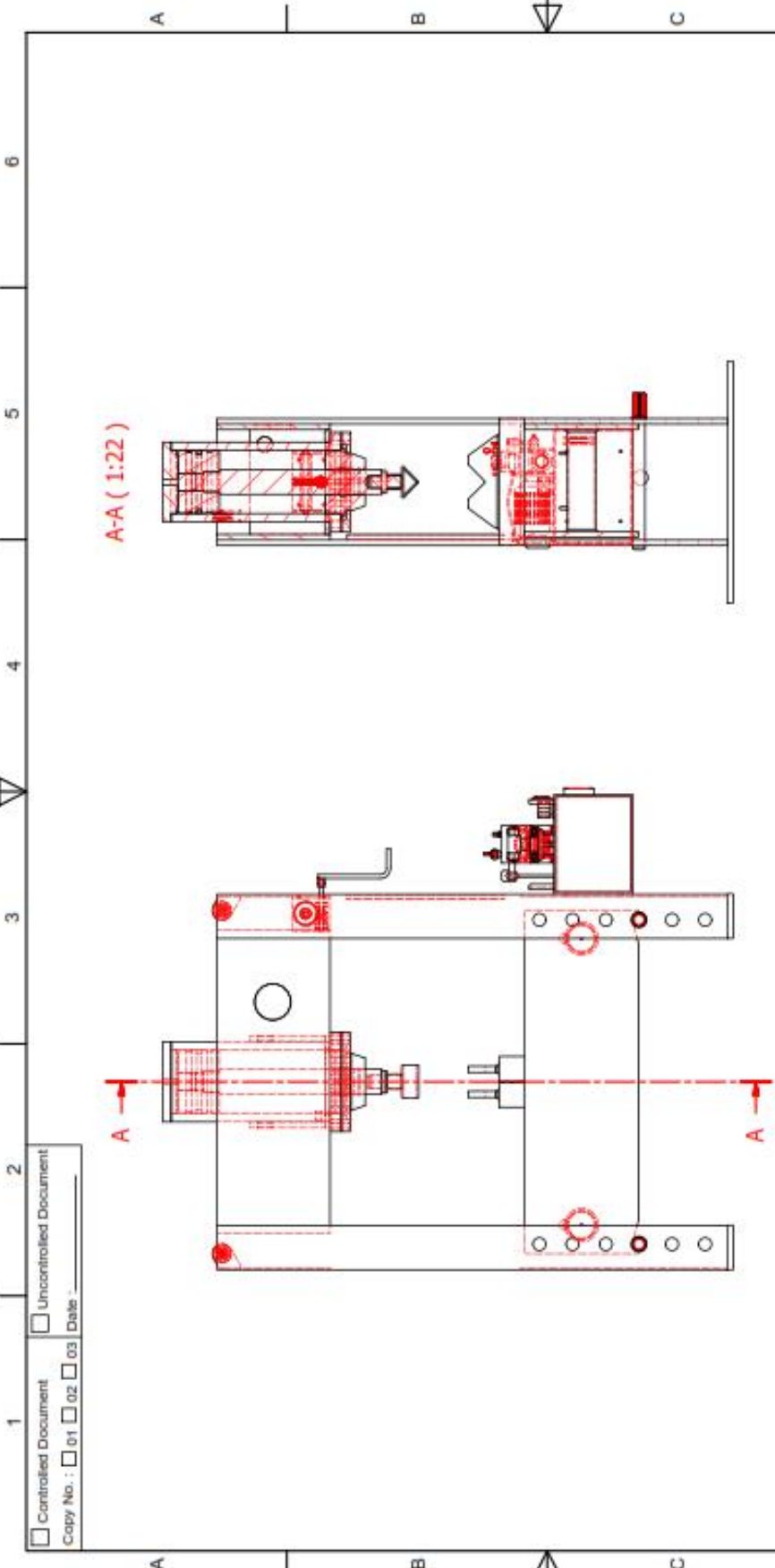
Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03
 Date : _____

Machining $\sqrt{(\quad)}$		Welding $\begin{matrix} a \\ \text{---} \\ a \end{matrix}$		Chamfering $\begin{matrix} a \\ \text{---} \\ a \end{matrix}$		General Unless Specification do not show on the drawing		Design	Date	Name	TMC INDUSTRIAL PUBLIC CO.,LTD. (THAILAND) Phone : 66 2627 8333 WWW.TMC.CO.TH		
Check		Verify		Heat Treatment		Coating		Check			Model	HYDRAULIC PRESS 100 TON	
Verify		Scale		Sheet No.		Dimension (mm.)		Verify			Part Name	FRAME	
Heat Treatment		Drawing No.		HPP-02-001-000		Weight						N/A	
Coating		Customer :		File Name : power unit-1.dwg		Rev.						Size	A4
Scale		Customer :		See Drawing		Rev.							

Revise	Revise Description	Chd.	Date
00	First Issue		

ATTACHMENT 4

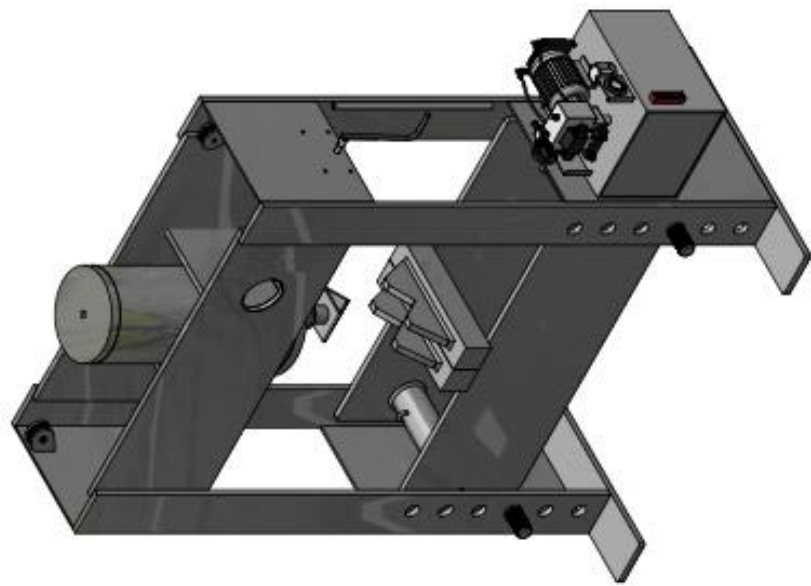
Design of Hydraulic Press Machine 100 Tons



Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03
 Date : _____

General Unless Specification do not show on the drawing Machining $\sqrt{\quad}$ Welding $\sqrt{\quad}$ Chamfering $\sqrt{\quad}$		Design Check Verify Heat Treatment: ----- Coating: ----- Scale: ----- Sheet No.: ----- Dimension (mm.): ----- Drawing No.: HPP-01-000-000 File Name: Assembly All FDX.dwg	Date Name Model: HYDRAULIC PRESS 100 TON Part Name: DESIGN HYDRAULIC PRESS Title: ----- Weight: ----- Mat. / S3L: N/A Size: A4 Rev.																																																																																																																																																																																																											
Ref.: JIS B 0005 (Unit:mm.)	Length Tolerance <table border="1"> <tr> <td>0.1</td><td>0.2</td><td>0.3</td><td>0.5</td><td>0.8</td><td>1.2</td><td>2.0</td><td>3.0</td><td>4.0</td><td>6.0</td><td>10</td><td>15</td><td>20</td><td>30</td><td>40</td><td>50</td><td>63</td><td>80</td><td>100</td><td>125</td><td>160</td><td>200</td><td>250</td><td>315</td><td>400</td><td>500</td><td>630</td><td>800</td><td>1000</td></tr> <tr> <td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td></tr> </table>	0.1	0.2	0.3	0.5	0.8	1.2	2.0	3.0	4.0	6.0	10	15	20	30	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	Angle Tolerance <table border="1"> <tr> <td>10°</td><td>30°</td><td>45°</td><td>60°</td><td>90°</td><td>120°</td><td>150°</td><td>180°</td><td>225°</td><td>270°</td><td>315°</td><td>360°</td></tr> <tr> <td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td></tr> </table>	10°	30°	45°	60°	90°	120°	150°	180°	225°	270°	315°	360°	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	Welding <table border="1"> <tr> <td>1.5</td><td>2.0</td><td>3.0</td><td>4.0</td><td>5.0</td><td>6.0</td><td>8.0</td><td>10</td><td>12</td><td>15</td><td>20</td><td>25</td><td>30</td><td>40</td><td>50</td><td>60</td><td>70</td><td>80</td><td>100</td><td>125</td><td>160</td><td>200</td><td>250</td><td>315</td><td>400</td><td>500</td><td>630</td><td>800</td><td>1000</td></tr> <tr> <td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td></tr> </table>	1.5	2.0	3.0	4.0	5.0	6.0	8.0	10	12	15	20	25	30	40	50	60	70	80	100	125	160	200	250	315	400	500	630	800	1000	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	Chamfering <table border="1"> <tr> <td>0.5</td><td>1.0</td><td>1.5</td><td>2.0</td><td>3.0</td><td>4.0</td><td>5.0</td><td>6.0</td><td>8.0</td><td>10</td><td>12</td><td>15</td><td>20</td><td>25</td><td>30</td><td>40</td><td>50</td><td>60</td><td>70</td><td>80</td><td>100</td><td>125</td><td>160</td><td>200</td><td>250</td><td>315</td><td>400</td><td>500</td><td>630</td><td>800</td><td>1000</td></tr> <tr> <td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td><td>±0.05</td></tr> </table>	0.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0	10	12	15	20	25	30	40	50	60	70	80	100	125	160	200	250	315	400	500	630	800	1000	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05
0.1	0.2	0.3	0.5	0.8	1.2	2.0	3.0	4.0	6.0	10	15	20	30	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000																																																																																																																																																																																		
±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05																																																																																																																																																																																	
10°	30°	45°	60°	90°	120°	150°	180°	225°	270°	315°	360°																																																																																																																																																																																																			
±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05																																																																																																																																																																																																			
1.5	2.0	3.0	4.0	5.0	6.0	8.0	10	12	15	20	25	30	40	50	60	70	80	100	125	160	200	250	315	400	500	630	800	1000																																																																																																																																																																																		
±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05																																																																																																																																																																																		
0.5	1.0	1.5	2.0	3.0	4.0	5.0	6.0	8.0	10	12	15	20	25	30	40	50	60	70	80	100	125	160	200	250	315	400	500	630	800	1000																																																																																																																																																																																
±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05																																																																																																																																																																																	
Revise 00 - First Issue	Revise Description	Chd. Date	1 2 3 4 5 6																																																																																																																																																																																																											

Controlled Document
 Uncontrolled Document
 Copy No. : 01 02 03 Date : _____



General Unless Specification do not show on the drawing

Machining	Welding	Chamfering	Angle Tolerance	Heat Treatment	Coating	Scale	Sheet No.	Dimension (mm.)	Drawing No.
UP 0.5 3 8 30 120 400 1000 15 30 120 400 (Unit:mm.) L6 3 8 30 120 400 1000 200 50 120 400 +030 0.1	a = a = a =	a = a = a =	15° 30° 45° 60° 75° 90° 105° 120° 135° 150° 15° 30° 45° 60° 75° 90° 105° 120° 135° 150°	--- --- ---	--- --- ---	1:1 1:1 1:1	001 002 003	1000 1000 1000	HPP-01-000-000 VIEW HPP-01-000-000 VIEW

Revise	1	Revise Description	2	Chd.	3	Date	4	Customer	5	6
								File Name - Assembly All FIX.dwg		

TMC INDUSTRIAL PUBLIC CO., LTD. (THAILAND)
 Phone: +66 3027 1933 WWW.TMC.CO.TH
 Model: HYDRAULIC PRESS 100 TON
 Part Name: 3D MODEL OF HYDRAULIC PRESS
 Title: N/A
 Weight: N/A
 Size: A4
 Rev: