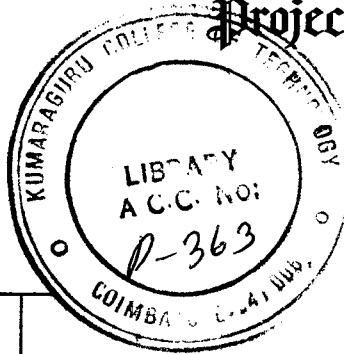
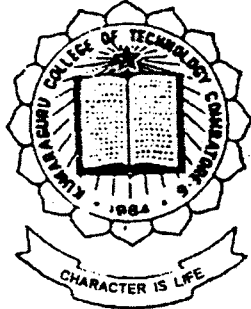


**DESIGN AND FABRICATION OF FIXTURE FOR
MACHINING STATOR BODY IN A H 800
MAZATECH CNC MACHINE**



Project Report 1998 - 99

Submitted by

L. RAKESH

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Under the Guidance of

MR. P. RAJENDRAN, M.Tech., M.I.S.T.E.

In partial fulfilment of the requirements
for the award of the Degree of
BACHELOR OF ENGINEERING
in Mechanical Engineering Branch
of Bharathiar University, Coimbatore

Department of Mechanical Engineering

Kumuraguru College of Technology

Coimbatore - 641 006

Department of Mechanical Engineering

Kumaraguru College of Technology

Coimbatore — 641 006.

Project Work 1998-99

Name : _____

Register No. _____ Roll No. _____

This is the Bonafide record of project work

DESIGN AND FABRICATION OF FIXTURE FOR MACHINING STATOR BODY IN A H 800 MAZATECH CNC MACHINE

Done by

Mr. _____

In partial fulfillment for the degree of Bachelor of Engg

in Mechanical Engg.

Branch of the Bharathiyar University.

Head of the Dept.

Project Guide

Submitted for the University Examination held on 15-3-99

Internal Examiner

External Examiner

*“ Dedicated to our parents who had been constant
source for motivation in whichever ventures we
Embarked Upon ”.*

My Inventions neither came by accident nor by luck but it came only through Hardwork.

– Sir Thomas Alva Edison

March 2, 1999

CERTIFICATE

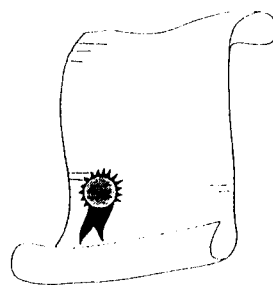
This is to certify that **Mr. B.SenthilRaja, Mr. L. Senthil Kumar and Mr.L.Rakesh-** Final year BE students of Kumaraguru College of Technology, Coimbatore have done the project titled "**Design and Fabrication of Fixtures**" for machining 16's Stator Body in CNC MAZAK-H800 machine. The project work was carried out from **21.09.98 to 19.12.98.**

The initiative and the hardwork exhibited by the team is **COMMENDABLE.**



(R.MOHAN)

DY.MANAGER - TRAINING



Acknowledgement

In Gratitude

An endeavour over a long period can be successful only with the advice and support many well wishers. we take this opportunity to express our gratitude and appreciation to all of them.

We are bound to express our sincere gratitude to Dr.K.K.Padmanabhan Principal K.C.T. College (affiliated to Bharathiyar University, Coimbatore) for his constant Encouragement throughout our course.

We wish to thank Prof. Seethrama Rao, Head of Department, Mechanical Engineering. K.C.T. for constantly encouraging us to pursue new goals and ideas.

We admit our heartfelt thanks to our internal project guide Mr.Rajendran, Faculty Member of Mechanical Engineering for being supportive throughout the tenure of our project.

We are truly thankful to the Head of Industrial Engineering department for having permitted us to carry out our project in an esteemed concern.

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We express our gratitude to Mr.Ganesan, Mr.Dorairaj, Mr.Gangadharan for having offered their valuable efforts in our project.

We owe much to our faculty members for their Inspiring advice, Immense help, wholehearted support and constant Encouragement throughout this project.

Last but not the least we would like to thank our friends for their comments and suggestion during the development of this project.

Synopsis

In recent years, newer fabrication techniques have been developed to satisfy the technological demands however emphasis is stressed on timely delivery and quality.

Our project deals with design and fabrication of fixture for stator body carried out at Elgi Equipments Coimbatore. The main purpose of our project is to eliminate time to increase production and lack of skilled operator.

This fixture is designed only to machine stator body but can be applied to all CNC machines. With the help of this fixture certain operations can easily be performed, eliminating time. Design calculations and principles to be followed in the design of fixture are taken into consideration.

Thus with the help of this fixture production rate is increased and time delay is considerably reduced.

Contents

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1. About the Company
 - 1.1 Definition and Concepts
 - 1.2 Present Practice
 - 1.3 About the Workpiece
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About the Company

Elgi Equipments Limited, founded in the year 1960 as a part of the large Elgi group of companies, Coimbatore has today emerged as the one of the leading manufactures in the world producing compressors. The collective contribution of Elgi is correspondingly very significant.

Elgi has been conceived and developed over the years as an industrial enterprise for providing high quality service in the field of compressors. They give at most importance in enforcing quality and in following the principles of TQM

A versatile base for taking up complex manufacturing processes coupled with the skilled man power available at Elgi has enabled the company to entire the manufacturing field of compressors so as to meet the demands.

The project work on design and fabrication of fixture has been conducted at Elgi Equipments, Coimbatore. This project is dedicated to Industrial Engineering division of Elgi Equipments, Coimbatore.

Concept

Fixture may be described as a structure for locating holding and supporting a component securely in definite position for a specific operation. Fixtures are designed based upon the workpiece and based upon our requirements.

We have designed and fabricated a fixture for stator body taking into consideration the various problems faced. The principles and design steps are followed in the design of fixture.

With the design this fixture we have minimised time delay and thus production was increased.

Present Practice

At present the stator body is manually handled and then the holes are drilled and tapped in respective places. But this results in consumption of more time and labour. Hence a fixture was designed to support the workpiece i.e. the stator body.

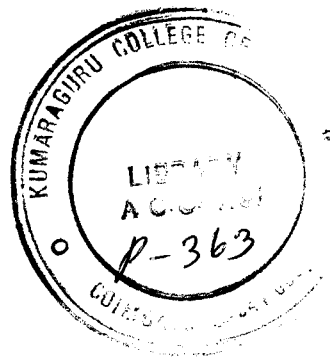
In the case of CNC machines involving complicated operations the W/p is fixed to the machining table using the necessary clamping devices. But the main problem in this case is that the idle time is more due to the manual clamping and transportation which will increase the idle cost of the machine. Hence the need for the design and fabrication of fixture arose.

The problems currently faced by the company prompted us to design a fixture.

About the Workpiece

The Workpiece that needs a fixture is nothing but the stator body of a compressor. The stator body is of different sizes. Any compressor consists of the gear cover, inlet housing stator body, outlet housing and outlet cover. The stator body houses male and female rotors

Certain operation like facing, drilling, reaming and tapping are performed in a CNC machines. Hence with the help of this fixture the idle time is considerably reduced and production rate is increased. Diagrams and photo of stator body of stator body is incorporated.



About the Machine

H800CNC mazatech machine used for production of the components considered is a horizontal machining center, which can perform milling, drilling, tapping, boring and reaming operations. Through automatic control under the guidance of CNC the tool is positioned at a desired point and hence different faces of workpiece can be machined.

The provision for part programming is available in the machine. The various specifications of the CNC M/c regarding the speed, feed, power require are shown below in a tabular column.

H800 CNC M/c Specifications :

Table horizontal Travelling stroke	X-axis	1250 mm
Head Vertical travelling stroke	Y-axis	1000 mm
Head cross travelling stroke	Z- axis	850 mm
Distance from the center of Spindle to the top surface of pallet		50-1050 mm
Distance from the end surface of the surface of the spindle to the center of the pallet		250 –1100 mm
M/c mass		20, 000 kg
overall M/c height		3183 mm
Floor space required		3270 x 5510 mm
Main drive motor		18,8 kW
Spindle speed		22 – 11500
Dimension of pallet configuration		800 x 800 mm
Max load on the pallet		2200 kg
Max tool diameter replaceable	260 mm	
Max diameter of tool accommodated in the magazine	130 mm	
Max tool mass replaceable		27 kg
Tool clamping force w		24.5 KN
No. of tools accommodated		40
Tool selection system		Random
Max. m/c noise		80 dB

Proposed System

The main objective of our project is to Eliminate all the problems that are currently faced by the industry. The fixture is designed in such a way that it would be able to hold the component very tightly. Our fixture consist of stud, pillar locator , housing locator, budding pad, base plate springs etc. The various functions of the parts will be dealt upon in later stages. By the design of this fixture idle time is minimized and production rate is increased.

When we place the stator body the locator positions itself. Then the component is tightened. The stator body is completely supported by four budding pads present in the base plate. Nuts and bolt are used wherever needed.

After the component being fixed then it is clamped on to the pallet table. Then the workpiece is machined according to the specifications provided to it in the form part program already stored in the machine memory. There are 2 pallet in a H800 CNC machine. When the leg of a stator body is being faced other operations would be performed in the next component. Thus thereby reducing idle time, skilled labour human intervention etc.

CNC System

Reasons for selecting CNC Machines '

- | | |
|--|--------|
| 1. No. of operations per component | many |
| 2. Complexity of operations carried out | high |
| 3. Size of batches | Medium |
| 4. Repetition of batches | Often |
| 5. Labour cost of the component | High |
| 6. Skill required by the operator | High |
| 7. Time lag between operations | High |
| 8. Cost of special tooling involved | High |
| 9. set up time / Inspection time | High |
| 10. Precision involved in the components | High |

Advantages Of NC Machines

1. Machines can switch over to different jobs as setup times are very low.
2. Increased machine effective utilization

3. Greater quality control
4. Eliminates re-work and scrap to a very great degree
5. Ability to combined operations on NC machines makes the production faster and eliminates waiting time of components in between machines and stage inspections.
6. Reduced floor space / no of men handling results in better management control over the production.
7. Cost accounting and production control becomes very precise.
8. Dependence on skilled operator can be dispensed with.

Principles to be borne in mind in the design of fixtures.

- The method of locations and clamping should be such as to reduce idle time to a minimum. Locating and clamping influence the accuracy and the quality of component.
- Locating surfaces should be as small as possible and the location must be done from the machined surfaces.
- Sharp corners in the locating surfaces must be avoided.
- Adjustable locators should be provided for rough surface.
- Quick acting clamps should be used wherever possible.
- The necessity of lifting the clamp by hand should be avoided by fitting a spring suitably to lift it.
- Enough clearance for clearing machining burrs should be provided
- Operator's safety and the manipulative difficulties in loading the component into the fixture must be given due consideration.

Description of Attachments

The complete Attachments of the fixture is described below :

Base Plate :

a. It acts as a base for all the other components. The dimensions of the base plate is 500 x 400 x 30 mm. Hence all sharp edges are given 1 x 45 chamfer. In the base plate the required holes are drilled and tapped. 4 holes are drilled for the purpose of budding pad. Holes for the pillar locator are being drilled. A slot is introduced in the base plate that acts as a reference for the operations to be performed. Here the material used is EN8 and it is hardened to optimum (35 to 40 HRC). Finish is by blackening process.

C. washer :

It is called as C washer because it resembles the shape of letter 'C'. It is used between the nut and the locator. The material used here is EN8. It is hardened to 35 to 40 HRC. final finishing is given by blackening process.

Distance bush :

It is used as a valve seating for the springs. The material used here is mild steel. Finish is by blackening process.

Stud :

It is placed in the center of the base plate. It helps in tightening the stator body finally by using nut locators and nuts. The material used here is EN 8 It is hardened upto 35 to 40 HRC. The finish is by blackening process.

Pillar Locator :

The Holes are drilled in the base plate in order to house the pillar locators. Pillar locators are 2 in number. The material used here is EN 8. It is hardened upto 35 to 40 HRC finish is by blackening process. The pillar locator houses the distance bush nuts housing locator and locators.

Housing Locator :

The housing locator is clamped to the base plate with the help of Allen bolts. The housing locator also consists of springs. The material used here is EN8 or M.S. It is hardened upto 35 to 40 HRC. Finish is by Blackening process Tolerances and surface finish is given due importance.

Budding Pad :

These are 4 in number. These are properly hardened so that it completely resists the weight of the body. The material used here is EN 1A. It is hardened upto 35 to 40 HRC. The finish is by Blackening process.

Advantages of project :

The fatigue on the part of the operator is eliminated.

No special skill is needed for loading the work pieces.

Setting time can be reduced.

More Accuracy than conventional methods.

Time consumed for finishing one workpiece is reduced compared to manual operation.

Since no. of components produced are more the cost of production of a single component is reduced.

Eliminates rework and scrap to a very great degree.

Production rate is Increased.

No need of transferring W/P from M/C to M/C.

Therefore transport cost and delay in transporting can be reduced

DESIGN ANALYSIS

Steps to be followed in the design of fixtures.

Draw the outline of the workpiece in position of machine.

Inspect the drawing carefully and note all limited dimensions and features which are strictly related.

Consider the sequence of operations.

Draw the location system for locating the component in fixture.

Draw the clamping system for clamping the component in the fixture.

Draw the tool guide.

Method of positioning the fixture relative to the machine.

Decide the most suitable fixture based upon the requirements.

Combine all the components as rigidly as possible.

Safety aspects to protect the user while using the fixture should be considered.

Design of Helical Springs :

In General springs are used to absorb energy due to shock, to control vibrations, to control. Motion and to apply forces. Here in our project the function of a helical spring is to raise the component to the stator body while removing after machining operations are performed.

Specifications of Helical Spring :

Width = 5mm

Inner diameter = 31 mm

Outer diameter = 40mm

Stiffness $K = \text{Load} / \text{Deflection}$

$K = 1700 / 6$

283.33 N/mm

Stiffness $K = 283.33 \text{ N/mm}$

FABRICATION

Every component that has to be finished to the required shape, size and accuracy specifications to suit our project requirements should be taken through various processes like machining, forming, heat treatment etc. This is collectively known as fabrication. The complete process should be in our project the fabrication of fixture components was done as per conventional machining processes like turning, shaping, grinding, gas cutting etc.

S.No.	Component	Material	Operation No.	Operations involved	Machines Used
1.	Base Plate	EN-8	1	Cutting Operation	Gas Cutting
			2	Rough Milling	Milling
			3	Drilling	Machine
			4	Threading	Drilling
			5	Grinding	Machine
			6	Inspection	Tap Set Surface Grinding Micro Meter Vernier callipers Steel Rule
2.	Stud	EN-8	1	Cutting Operation	Cutting
			2	Turning	Machine

			3	Operation	Lathe
			4	Facing Operation	Lathe
			5	Threading	Lathe
			6	Operation	Heat treatment
			7	Blackening	Heat treatment
				Hardening	Vernier
				Inspection	calliper
					Steel Rule
					Micro Meter
3.	Housing Locator	EN-8	1	Cutting Operation	Cutting
			2	Facing	Machine
			3	Turning	Lathe
			4	Boring	Lathe
			5	Drilling	Lathe
			6	Blackening	Drilling
			7	Hardening	Machine
			8	Grinding	Heat treatment
			9	Inspection	Heat treatment
					Cylindrical
					Steel Rule

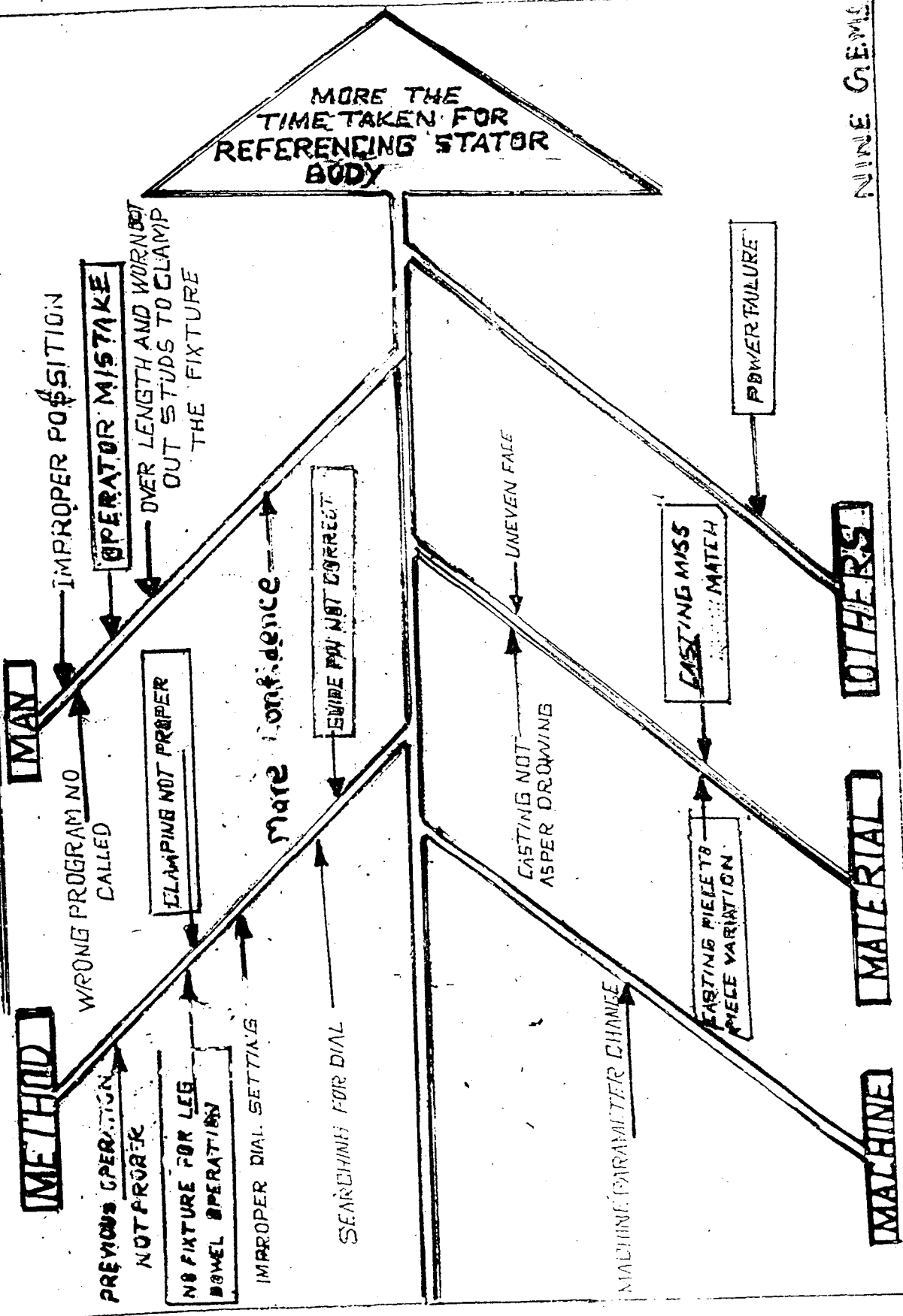
			3	Turning	Lathe
			4	Boring	Lathe
			5	Taper Turning	Lathe
			6	Milling	Lathe
			7	Blackening	Milling
			8	Hardening	Machine
			9	Grinding	Heat
			10	Inspection	Treatment
					Heat
					Treatment
					Internal
					Grinding
					Micro Meter
					Steel Rule
6	Distance	MS	1	Cutting Operation	Cutting
	Bush		2	Facing	Machine
			3	Turning	Lathe
			4	Boring	Lathe
			5	Drilling	Lathe
			6	Threading	Drilling
			7	Blackening	Machine

			8	Inspection	Tap Set Heat Treatment Micro Meter Steel Rule
7	C Washer	EN-8	1	Cutting Operation	Cutting
			2	Facing	Machine
			3	Turning	Lathe
			4	Knurling	Lathe
			5	Boring	Lathe
			6	Milling (Slot)	Lathe
			7	Blackening	Milling
			8	Hardening	Machine
			9	Inspection	Heat Treatment Heat Treatment Micro Meter Steel Rule
8	Nut Locator	EN-8	1	Cutting Operation	Cutting
			2	Facing	Machine

			3	Turning	Lathe
			4	Knurling	Lathe
			5	Boring	Lathe
			6	Threading	Lathe
			7	Drilling	Lathe
			8	Blackening	Drilling
			9	Hardening	Machine
			10	Inspection	Heat Treatment Heat Treatment Micro Meter
9	Clamp	EN-8	1	Cutting Operation	Gas Cutting
			2	Milling Operation	Milling
			3	Drilling	Machine
			4	Operation	Drilling
			5	Welding	Machine
				Operation	Arc Welding
				Inspection	Steel Rule Micro Meter

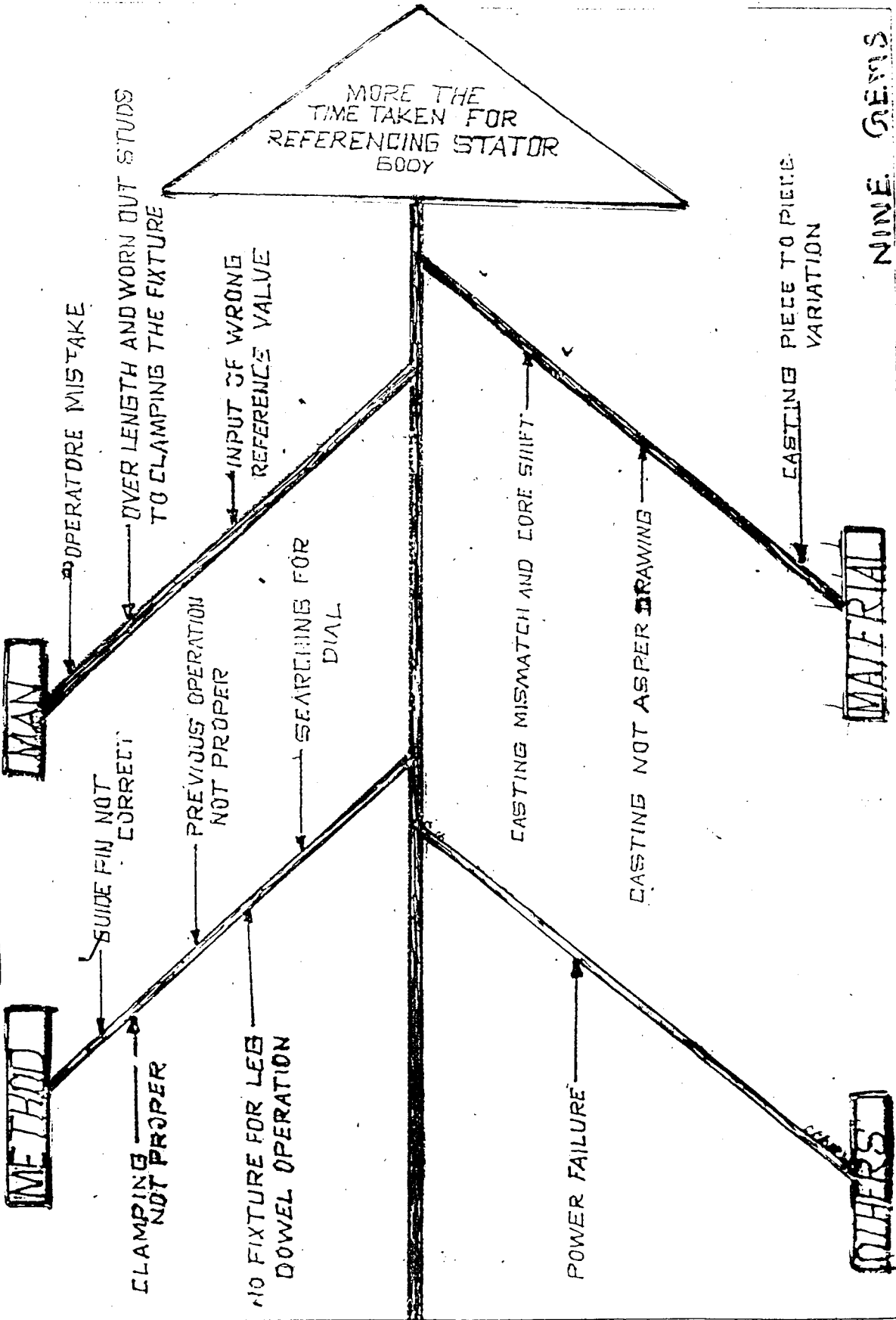
					Steel Rule
10	Nut	EN-8	1	Cutting Operation	Cutting
			2	Facing	Machine
			3	Drilling	Lathe
			4	Threading	Lathe
			5	Blackening	Tap Set
			6	Hardening	Heat Treatment Heat Treatment

FISH BONE DIAGRAM LEVEL - I

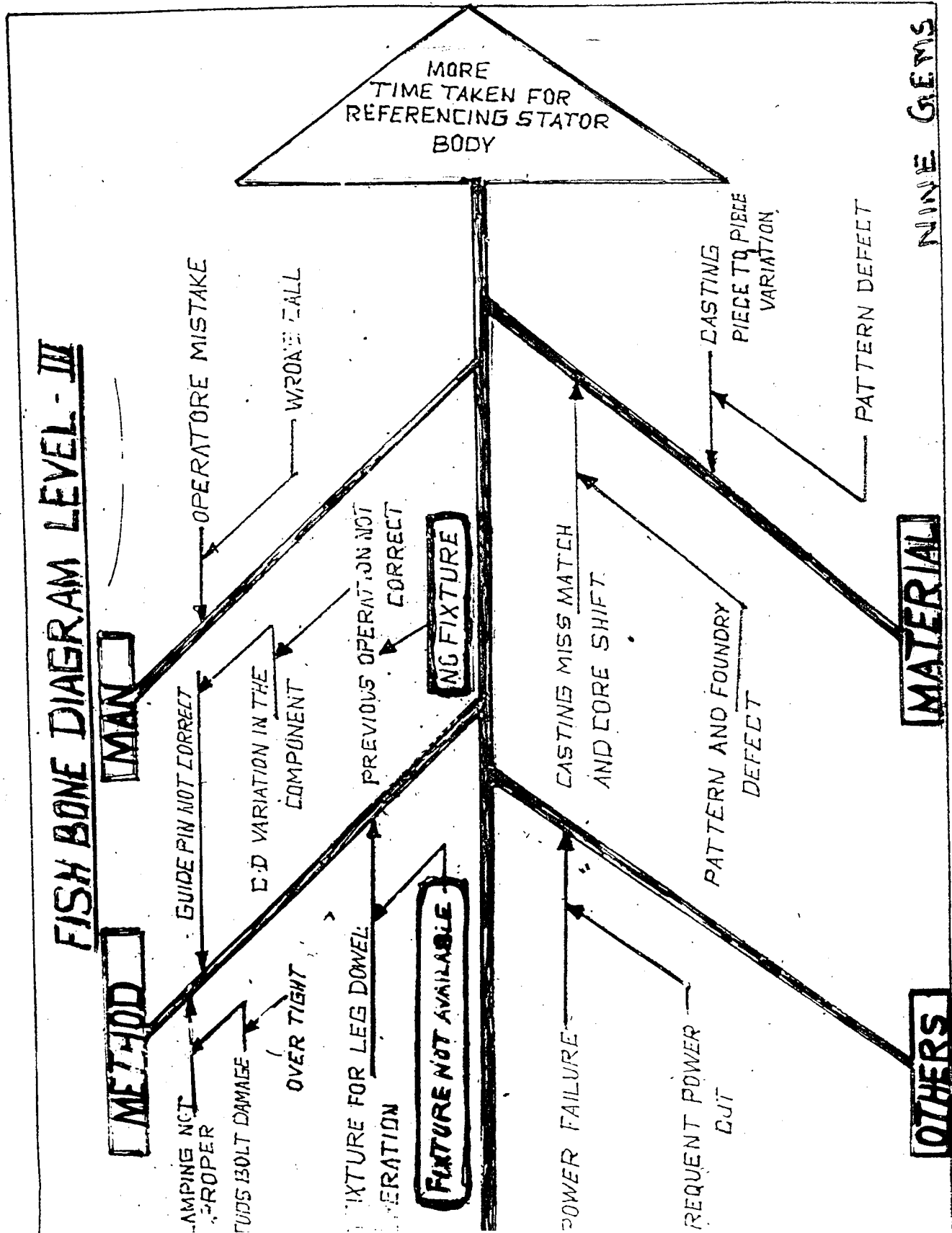


NINE GEMS

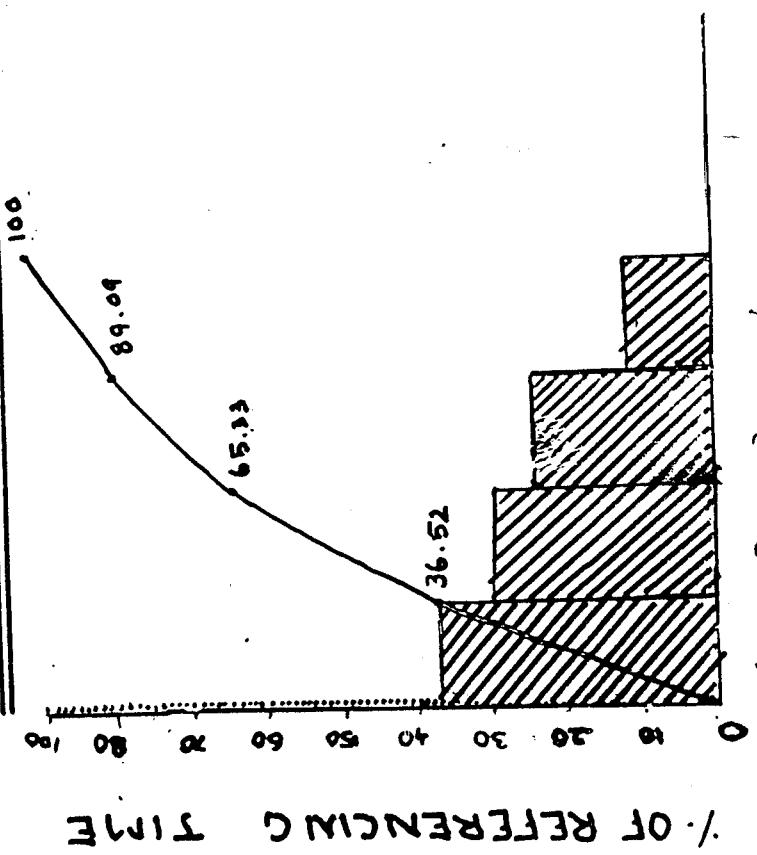
FISH BONE DIAGRAM LEVEL - II



FISH BONE DIAGRAM LEVEL - III



PARETO CHART - BQC



TYPE OF STATOR BODY

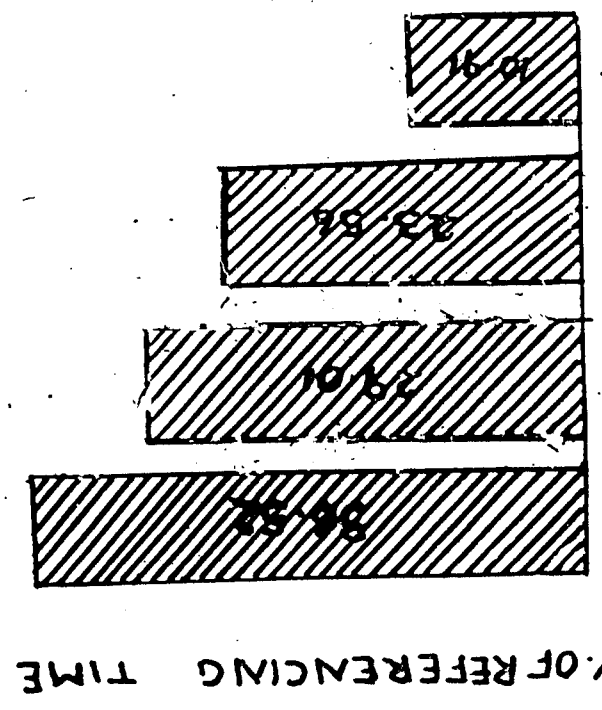


12'S

20'S

NINE GEN'S

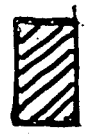
BAR CHART - BQC



TYPE OF STATOR BODY



16'S

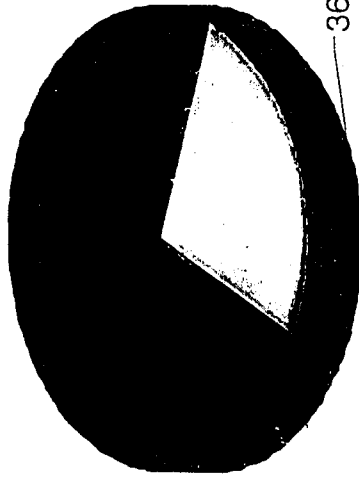


10'S

PIE CHART

%. OF REFERENCING TIME

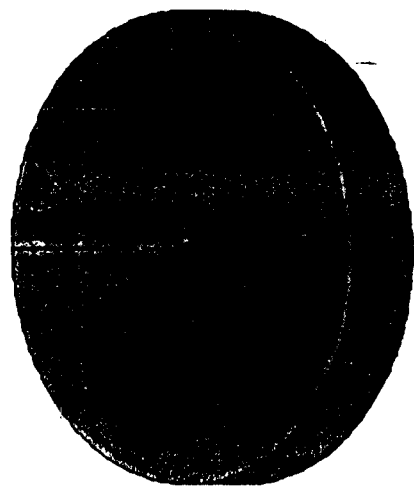
BEFORE QC



36.52%

REFERENCING TIME = 36.52%

AFTER QC

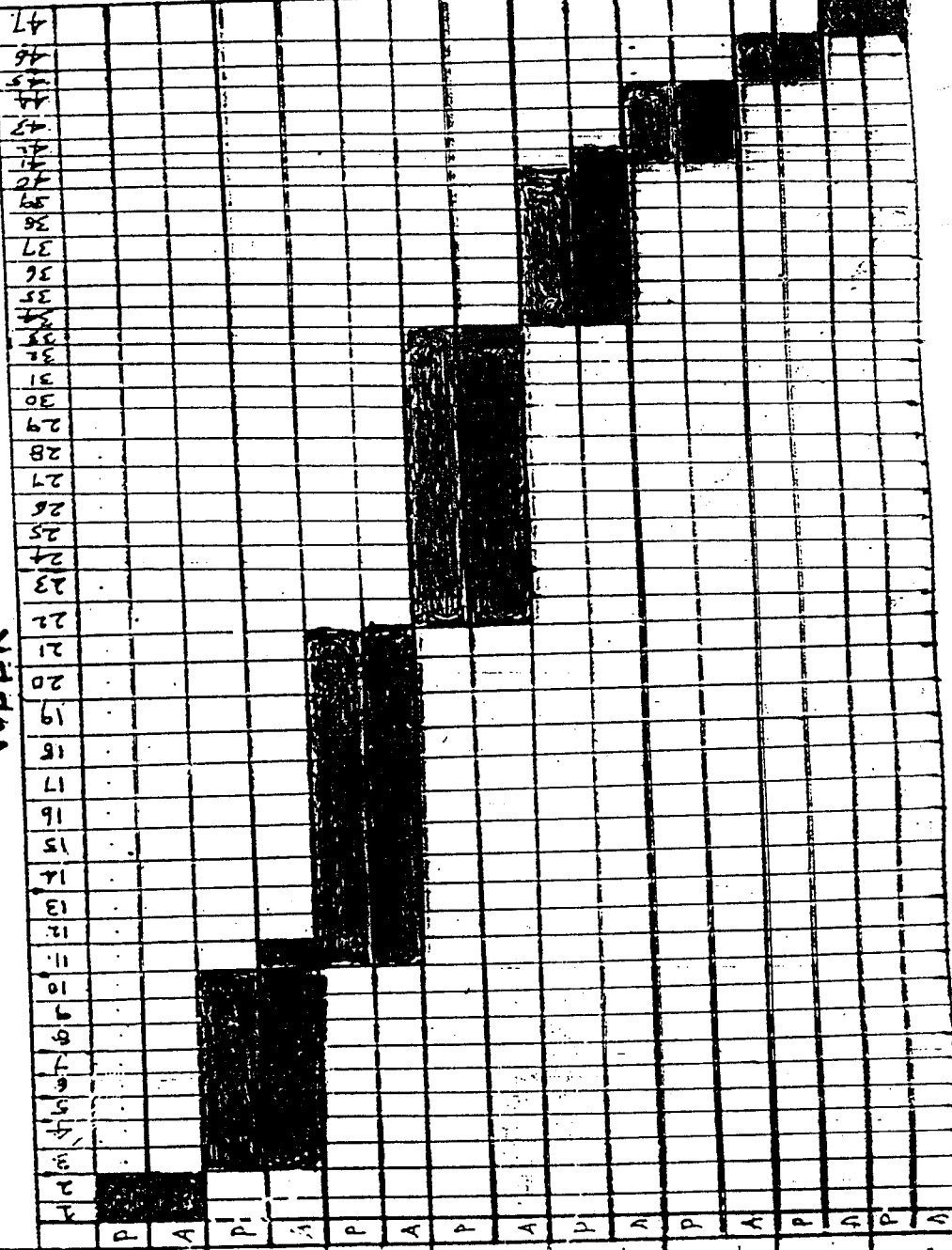


0%

REFERENCING TIME = 0%

NINE GEMS

WEEK



PLAN
 ACTION
 DELAY
 ADVANCE

COST ANALYSIS

16 series stator body fixture

No. of 16.. statorbody/year = 250 No's

PEGARD Boring m/c hour rate = Rs. 320

No. of components produced without fixture per shift = 4 No's

Components produced with new fixture per shift = 6 No's

Productivity Improvement = 150%

Time saved in hours

PEGARD boring m/c = 0.5×250

Due to new fixture = 125 hrs.

Annual savings in Rs = 125×320

= 40,000/-

Mazak H800 m/c hour rate = 0.5×250

= 125

Annual savings in Rs = 125×955

= 1,19,375

Total savings $1,19,375 + 40,000$

= 1,59,375

New fixture cost = 12,5000/-

Pay back period for fixture = $\frac{12,500 \times 12}{1,59,375}$

1,59,375

Investment in months = 0.94 months 1 month.

OPERATIONAL INSTRUCTIONS

The base plate is correctly fixed in the pallet table of a CNC machine

The stator body is placed and it is tightened properly.

Check should be carried out whether the nuts and bolts are properly tightened.

Then it should be fixed in the pallet and the operations should be carried out.

To start the CNC m/c the start button provided is pushed and thus the machining process starts as per part program.

The work piece is machined to the required specifications.

In case of Emergency the operator can push the red button.

CNC FUNDAMENTALS

This project is partly concerned with the development of an user-friendly software for CNC.

NC or numerical control is defined as a software in which the process is controlled by alphanumeric characters or symbols.

Part program is a sequence of Instructions, which describe the work that has to be done on a part in the form required by the computer under the control of a NC computer program.

Basically there are 2 types of part programming. They are manual part programming and computer Aided part programming

The part programming requires a NC programmer to consider some fundamentals elements before the actual programming.

The elements to be considered are as follows :

Type of dimensioning system

Axis designation

NC Words

Standard G and M Codes.

Tape programming format.

CADD TOOLS AND UTILITIES

The various statements given here are with reference to the Tektronix system.

PAGE statement

It is used to erase the screen and sends the cursor to 'home' position at the upper left-hand corner of the screen.

HOME statement

It is used to 'home' the cursor without erasing the screen.

INIT (for initialize) statement

It is used to set the system width to 130 units and the screen height to 100 units

MOVE statement

It allows positioning the cursor at any point on the screen without producing a visible line.

DRAW statement

It allows producing a visible line between the last position of the cursor and the coordinates specified by the DRAW statement.

MAPPING

Mapping is the process of graphic system used to transform the data units one is working with (mm, N/sq.mm, microseconds, etc.) into the units actually used by the system to plot the data on the screen. In other words,

mapping establishes the correspondence between the user data space and the screen space.

WINDOW statement

It is used to select whatever portion of the user data space one wants to see on the screen.

GRAPHIC DISPLAY UNITS (GDU)

A GDU is the unit of measurement used internally for graphics, which is one hundredth of the vertical dimensions of the screen. The screen is precisely defined internally as being 100 GDU's high and 130 GDU's wide.

VIEWPORT STATEMENT

'Viewport' refers to the drawing of boundaries on the display screen, i.e. the area containing the information in the window. The desired portion of the screen is specified in terms of the GDU's.

SCALE STATEMENT

It provides an alternate method of establishing window.

RMOVE AND RDRAW STATEMENTS

These statements permit to move the cursor to a location, which is relative to its present location. 'R' stands for relative.

ROTATE STATEMENT

This is used to rotate a line through an arc. We must execute a SET deg/rad/grad statement before we execute the rotate statement.

Commands in AutoCAD

The more commonly used commands are :

ARC, ARRAY, BLOCK, BREAK, CIRCLE, COPY, DIM, ERASE, GRID, LINE, LINE TYPE, MIRROR, MOVE, POINT, REDRAW, SNAP, TEXT, WINDOW, ZOOM.

The readers may refer to Appendix – C for various AutoCAD commands.

Settings Screen Parameters

The commands used for setting screen parameters are :

LIMITS, GRID, SNAP, UNITS, ORTHO

The LIMITS command is used to establish the size of the screen area, which represents the size of the paper on which a drawing will be plotted.

LINE COMMAND

A LINE command is used to draw a line in 2D or 3D-coordinates.

LINE UNDO

This is used to erase the most recent segment and continue from the end of the previous segment when drawing a sequence of lines.

CLOSING POLYGONS

If the sequence of lines being drawn forms a closed polygon, then the final line segment can be drawn automatically by responding to the “To point” prompt with a “C” (for “close”).

LINE/ARC CONTINUATION

This is used for constructing tangential connected lines and arcs. This is achieved by responding to the "From point" prompt with a space or RETURN. Its format is :

CIRCLE COMMAND

The circle can be drawn in five ways.

Center and Radius.

Command : CIRCLE 3P/2P/TTR/<centre point> : <(value)>

Diameter/<radius> : (value)

Center and Diameter

Command : CIRCLE 3P/2P/TTR/<centre point> : <(value)>

Diameter / <Radius> : D

Diameter : (value)

Three-point circles

Command : CIRCLE 3P/2P/TTR/<centre point> : 3P

First point : (value)

Second point : (value)

Third point : (value)

Two point circle

Command : CIRCLE 3P/2P/TTR/<centre point> : 2 P

First point on diameter : (value)

Second point on diameter : (value)

Tangent, Tangent and Radius

Command : CIRCLE 3P/2P/TTR/<centre point> : TTR

Enter Tangent spec : (first line or circle, P1)

Enter second Tangent spec : (other lines or circle, P2)

ARC COMMAND

The Arcs are partial circles. The ARC command option letters have the following meanings :

A – included Angle

C- center

D – starting direction

E – End point

L – Length of chord

R – Radius

There are eight different methods of specifying an arc.

TRACE COMMAND

The TRACE command is used to draw solid lines with a specified width.

Its format is :

Command : TRACE Trace width <current> : (value)

From point : (value)

To point : (value)

To point : (value)

To point : RETURN

POLYLINES

It is a connected sequence of line and arc segments.

PLINE Command – 2 D Polyines.

Command : PLINE

From point : (value)

3D POLY Command – 3D Polyines.

Command : 3DPOLY

From point : (value)

POLYGON COMMAND

The many-sided figure composed of equal sides can be drawn using the POLYGON command. The center is located, the number of sides given, and inscribing or circumscribing the polygon entered. A maximum of 1024 sides can be drawn with this command.

Command : POLYGON

DO NUT or DOUGHNUT COMMAND

To draw filled circles and rings

Command : DONUT

Inside diameter <current> :

Outside diameter <current> :

Center to doughnut < > :

Center of doughnut : RETURN

DIMTAD Text Above Dimension line

DIMTOL Tolerance

DIMLIM Limits

DIMALT Alternate units

DIMASO Associative dimensioning

DIMSHO Show new dimension.

DIMTOFL Text outside force line.

DIMTIX Text forced inside extension lines.

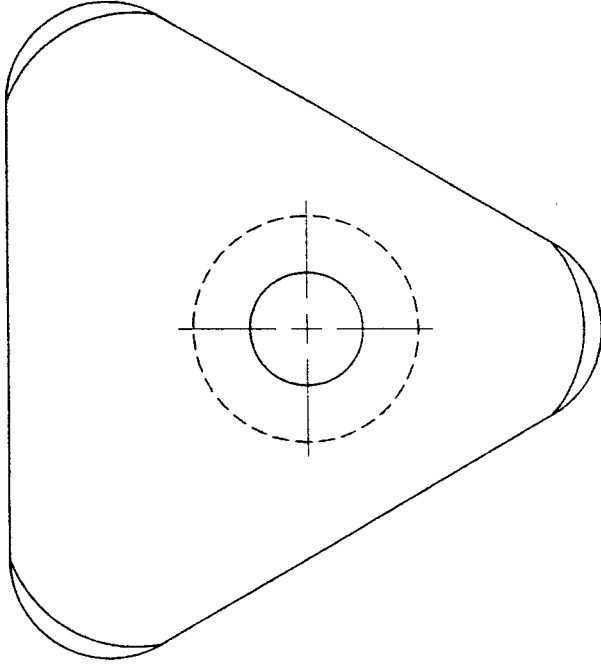
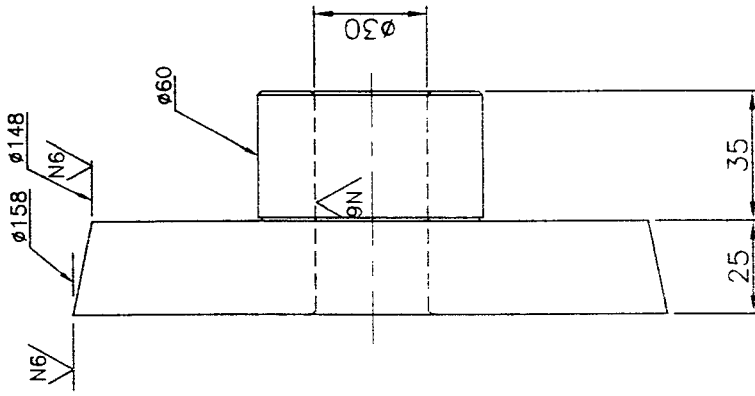
DIMSOXD Suppress outside – extension dimension lines.

TEXT STYLES

In AutoCAD a variety of text styles are available. Each text style can be drawn at different heights, slopes and widths. The command STYLE with its prompts allows making changes.

NAME	QTY
1.BASE PLATE	:1No.
2.STUD	:1No.
3.PILLAR LOCATOR.	:2Nos.
4.BUDDING PAD.	:4Nos.
5.HSG LOCATOR	:2Nos.
6.LOCATOR NO:1	:2Nos.
7.LOCATOR NO:2	:2Nos.
8.DISTANCE BUSH.	:2Nos.
9.C-WASHER CLAMP.	:1No.
10.C-WASHER LOCATOR.	:2Nos.
11.NUT LOCATOR.	:2Nos.
12.CLAMP.	:1No.
13.ASSEMBLY.	:1No.
14.∅16 NUTS.	:4Nos.
15.∅24 NUTS.	:3Nos.

TAPER 1:1.30'

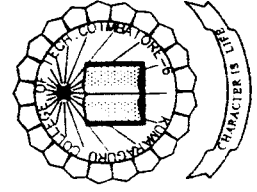


All Sharp edges 1X45° chamfer
All dimensions in mm

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SPONSORED BY : ELGI EQUIPMENTS LTD.

LOCATOR NO :-2 - BODY STATOR 16S H800 FIX

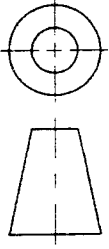


MAT : - EN 8

SCALE: 1:2

QTY : 2

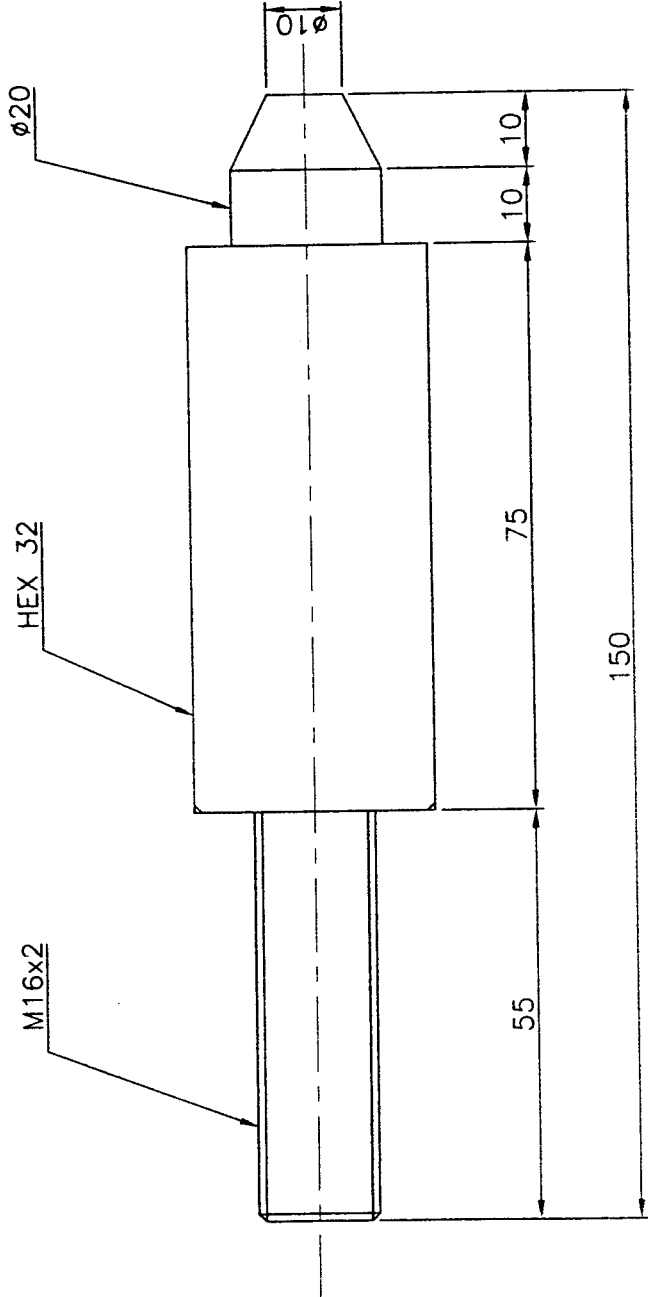
Harden :40Hrc



DRG.NO:

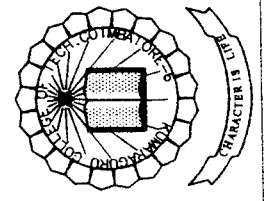
Finish : Blackening

002

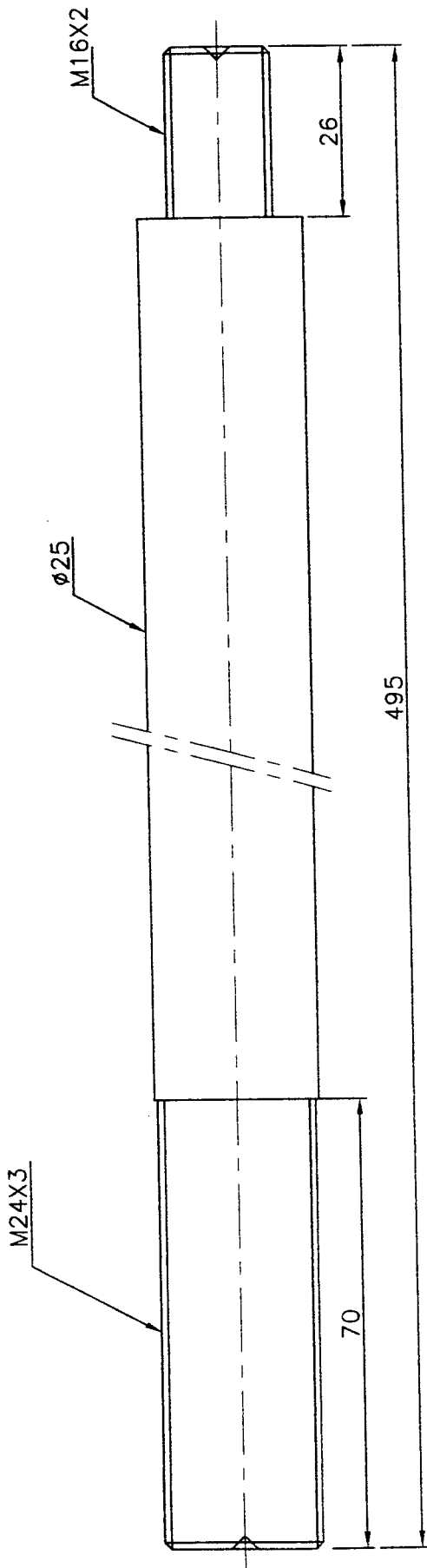


All Sharp edges 1X45° chamfer
 All dimensions in mm

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BUDDING PAD - BODY STATOR 16s H800 FIX		SCALE: 1:1	QTY : 4
MAT : HEX32 EN1A	Harden :35to40Hrc		
Finish : Blackening			

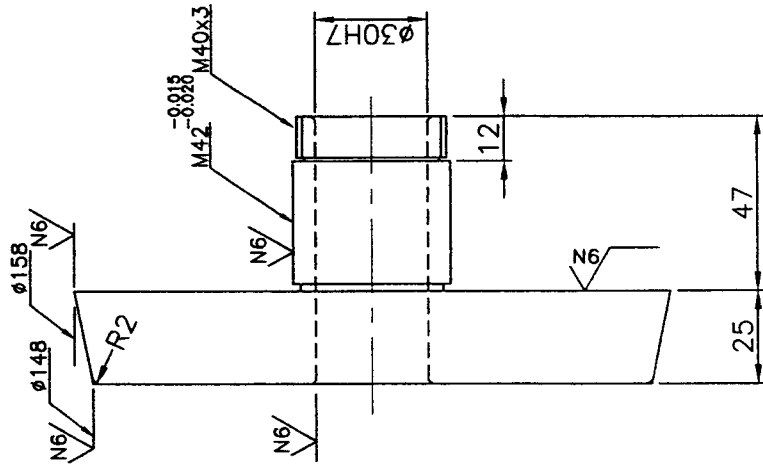
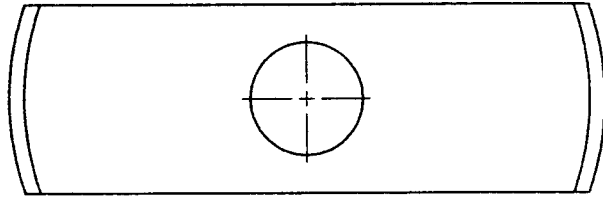


All Sharp edges 1X45° chamfer
 All dimensions in mm

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	STUD - STATOR BODY 16S H800 FIX		
	MAT : - EN 8	SCALE: 1:1	QTY : 1
Harden :35to40Hrc			DRG.NO: 004
Finish : Blackening			

TAPER 11.30'
 FLAT : M/C 17mm

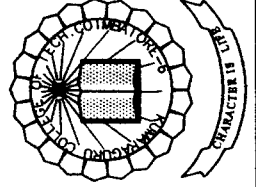


All Sharp edges 1X45° chamfer
 All dimensions in mm

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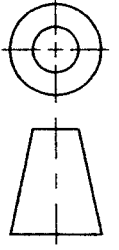
SPONSORED BY : ELGI EQUIPMENTS LTD.

LOCATOR NO :-1 - STATOR 16S H800 FIX



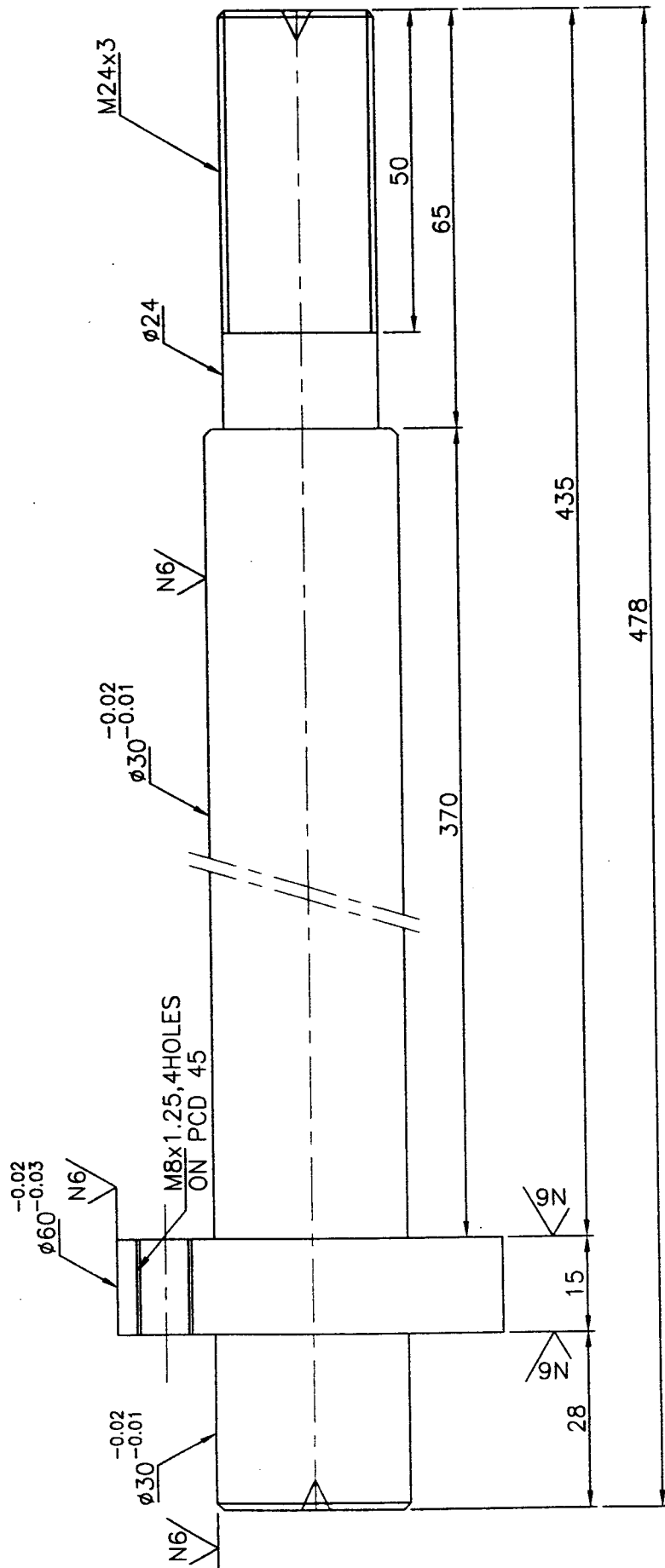
MAT : - EN 8 SCALE: 1:2 QTY : 2

Harden : 40Hrc



DRG.NO:
005

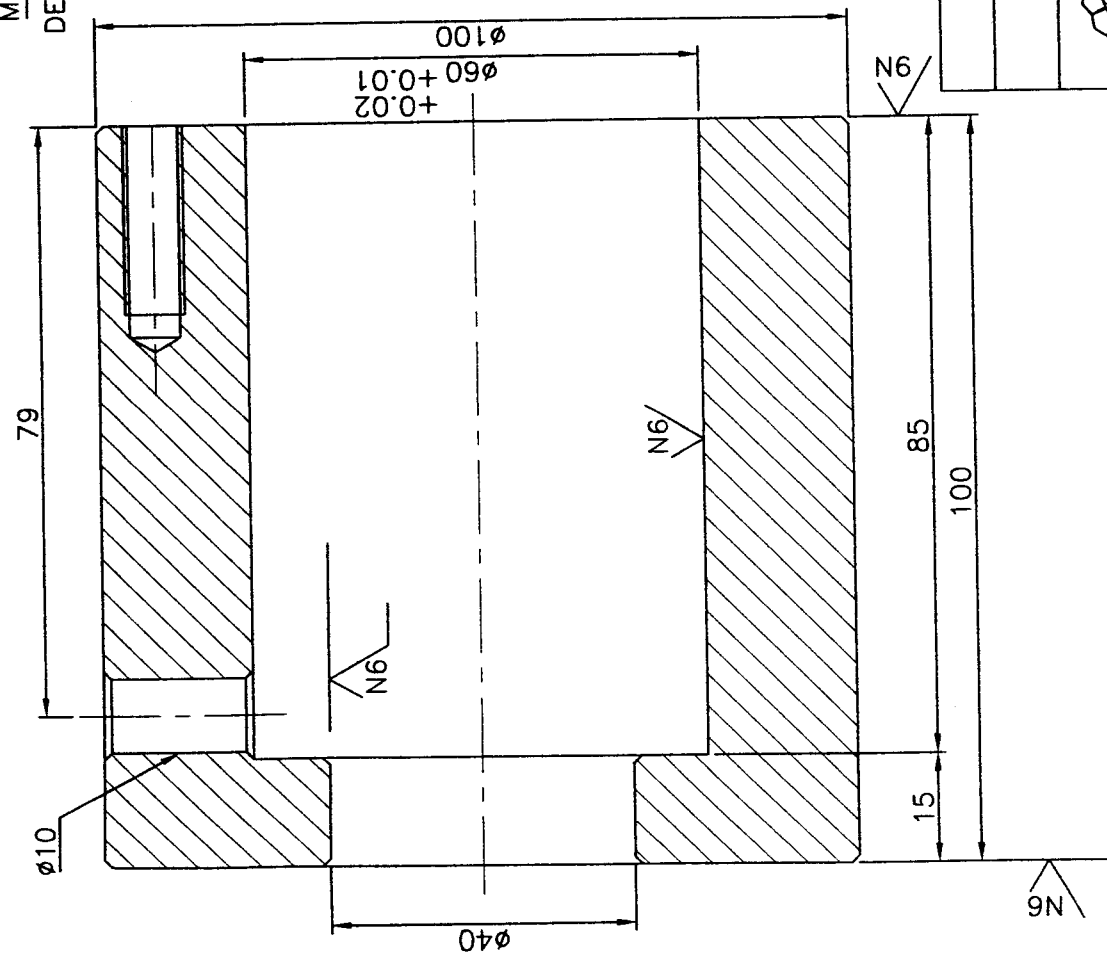
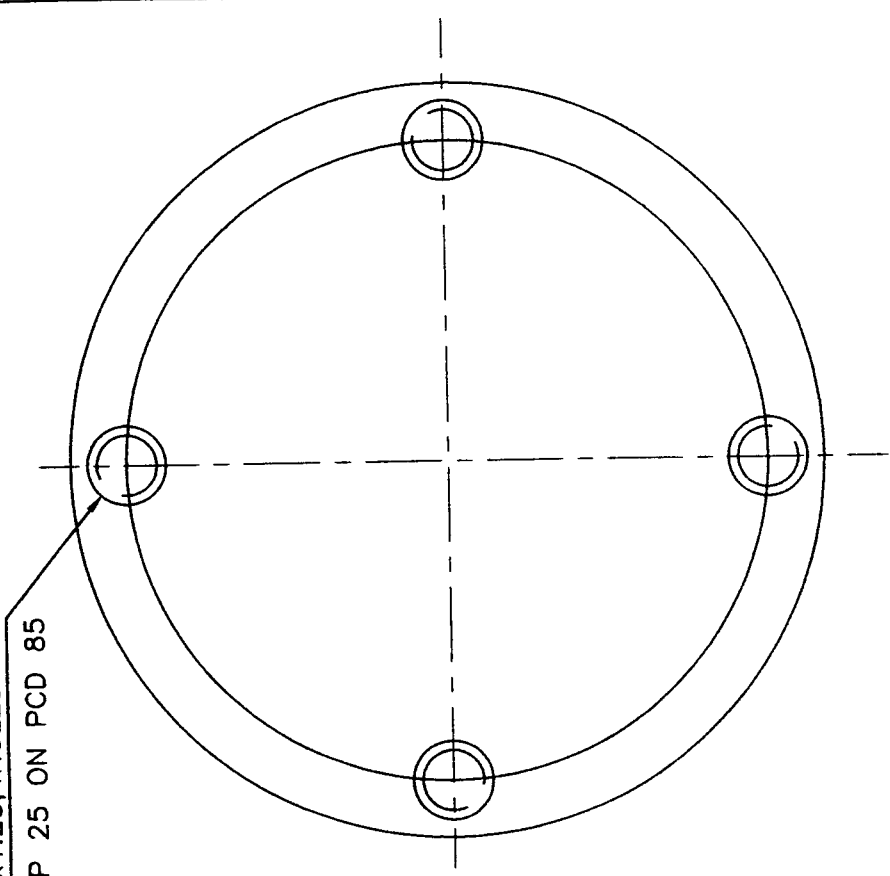
Finish : Blackening



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SPONSORED BY : ELGI EQUIPMENTS LTD.	
PILLAR LOCATOR - BODY STATOR 16S H800	
MAT : - EN 8	SCALE: 1:1
Harden :35to40Hrc	QTY : 2
Finish : Blackening	DRG.NO: 006

All Sharp edges 1X45° chamfer
All dimensions in mm

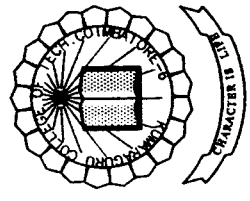
M8x1.25,4HOLES
DEEP 25 ON PCD 85



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HSG LOCATOR - BODY STATOR 16S H800 FIX.

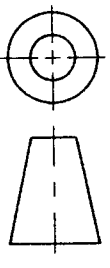


MAT : EN8 or M.S

SCALE: 1:1

QTY : 2

Harden :35to40Hrc

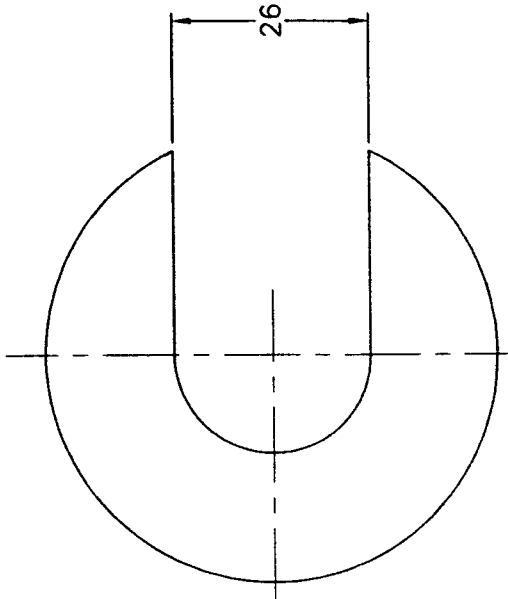
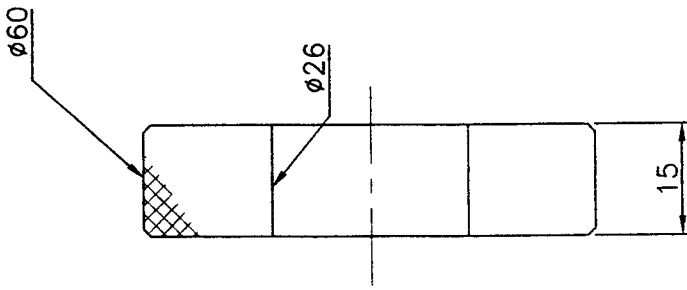


DRG.NO:

Finish : Blackening

007

All Sharp edges 1X45° chamfer
All dimensions in mm



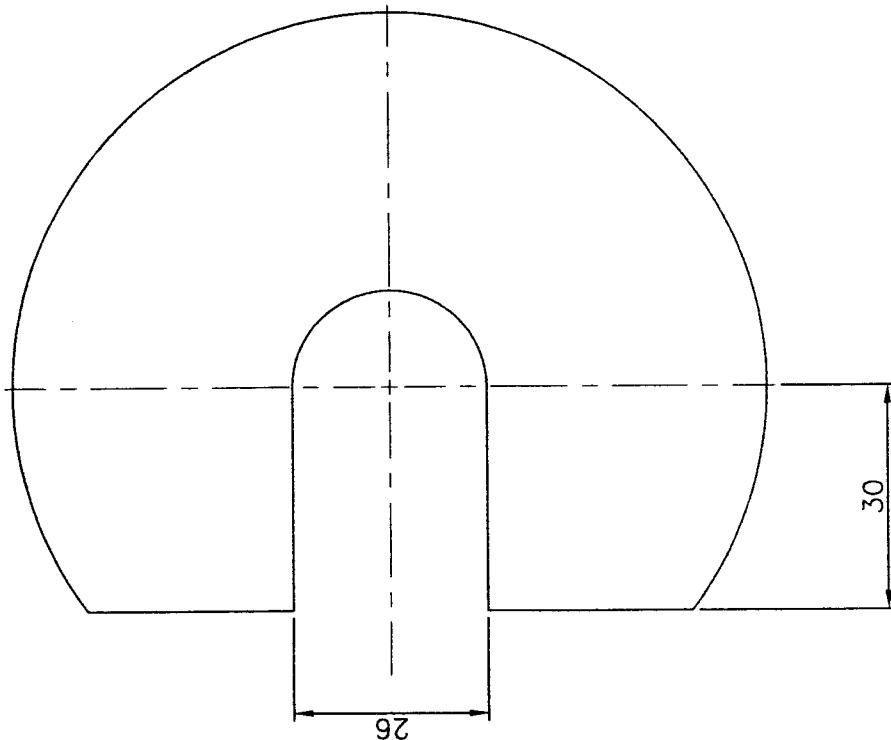
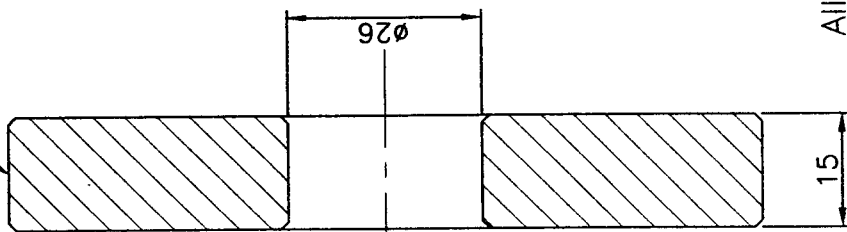
All Sharp edges 1X45° chamfer
 All dimensions in mm

KUMARAGURU COLLEGE OF TECHNOLOGY.

SPONSORED BY : ELGI EQUIPMENTS LTD.

	C WASHER CLAMP – BODY STATOR 16S H800 FIX	
	MAT : EN8	SCALE: 1:1 QTY : 1
	Harden : 35to40Hrc	DRG.NO: 008
	Finish : Blackening	

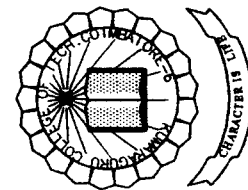
Ø100



All Sharp edges 1X45° chamfer
All dimensions in mm

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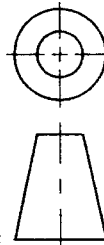
C WASHER

MAT : - EN 8

Harden :35to40Hrc

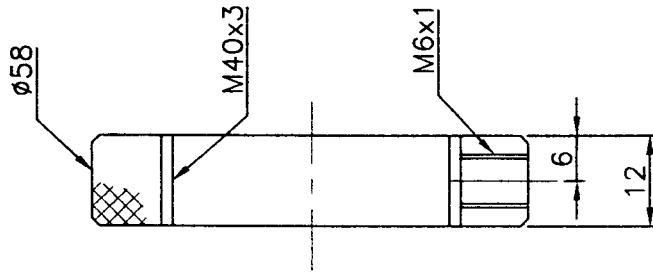
Finish : Blackening

SCALE: 1:1



QTY : 2

DRG.NO:
009



All Sharp edges 1X45° chamfer
All dimensions in mm

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SPONSORED BY : ELGI EQUIPMENTS LTD.

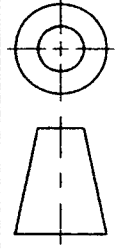
NUT LOCATOR – BODY STATOR 16S H800 FIX.

MAT : – EN 8

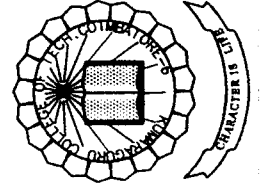
SCALE: 1:1

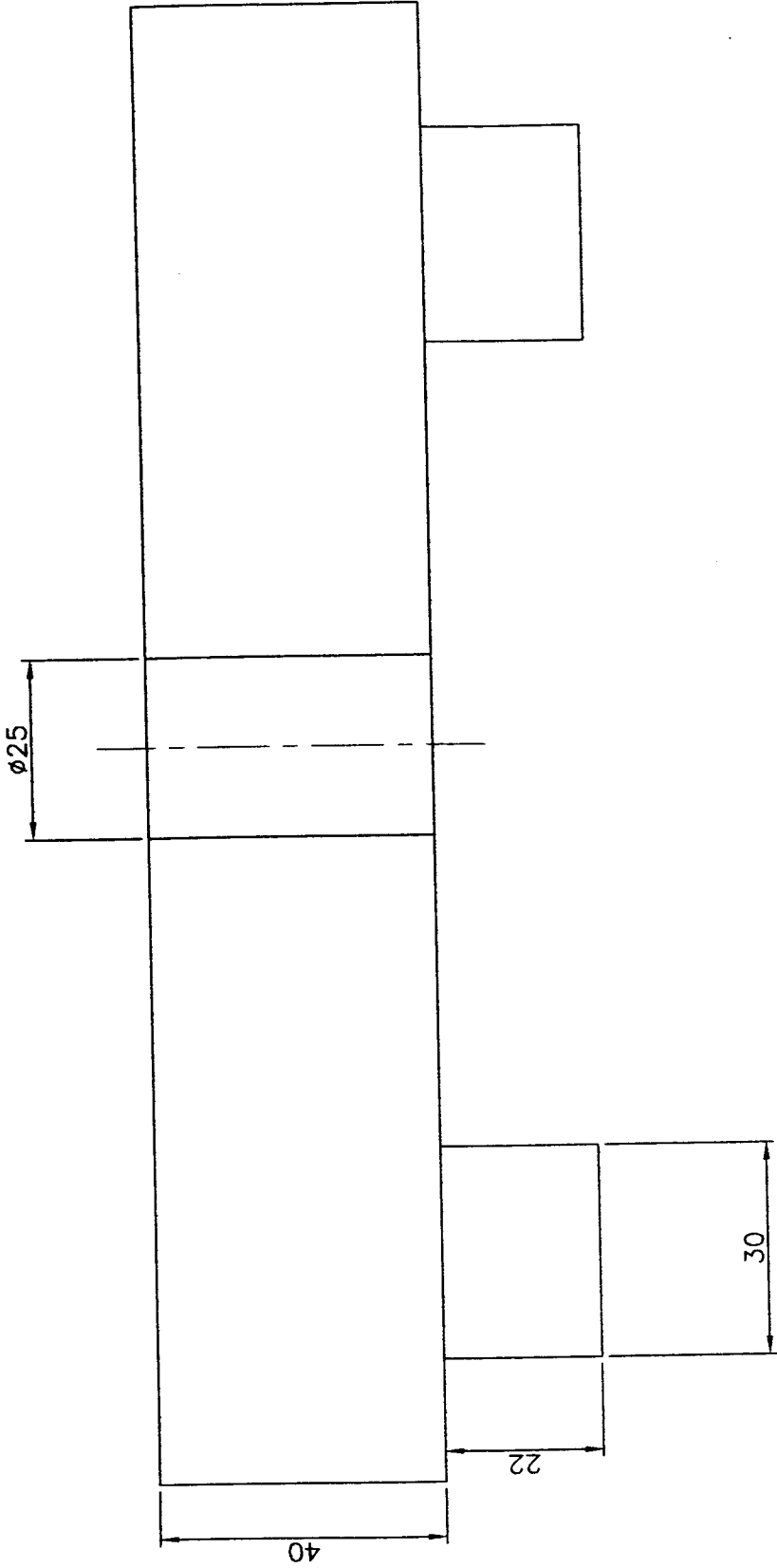
QTY : 2

Harden :35to40Hrc



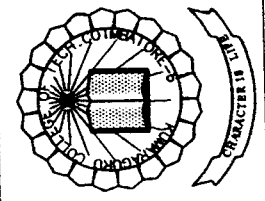
DRG.NO:
010



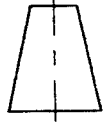
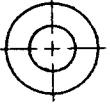


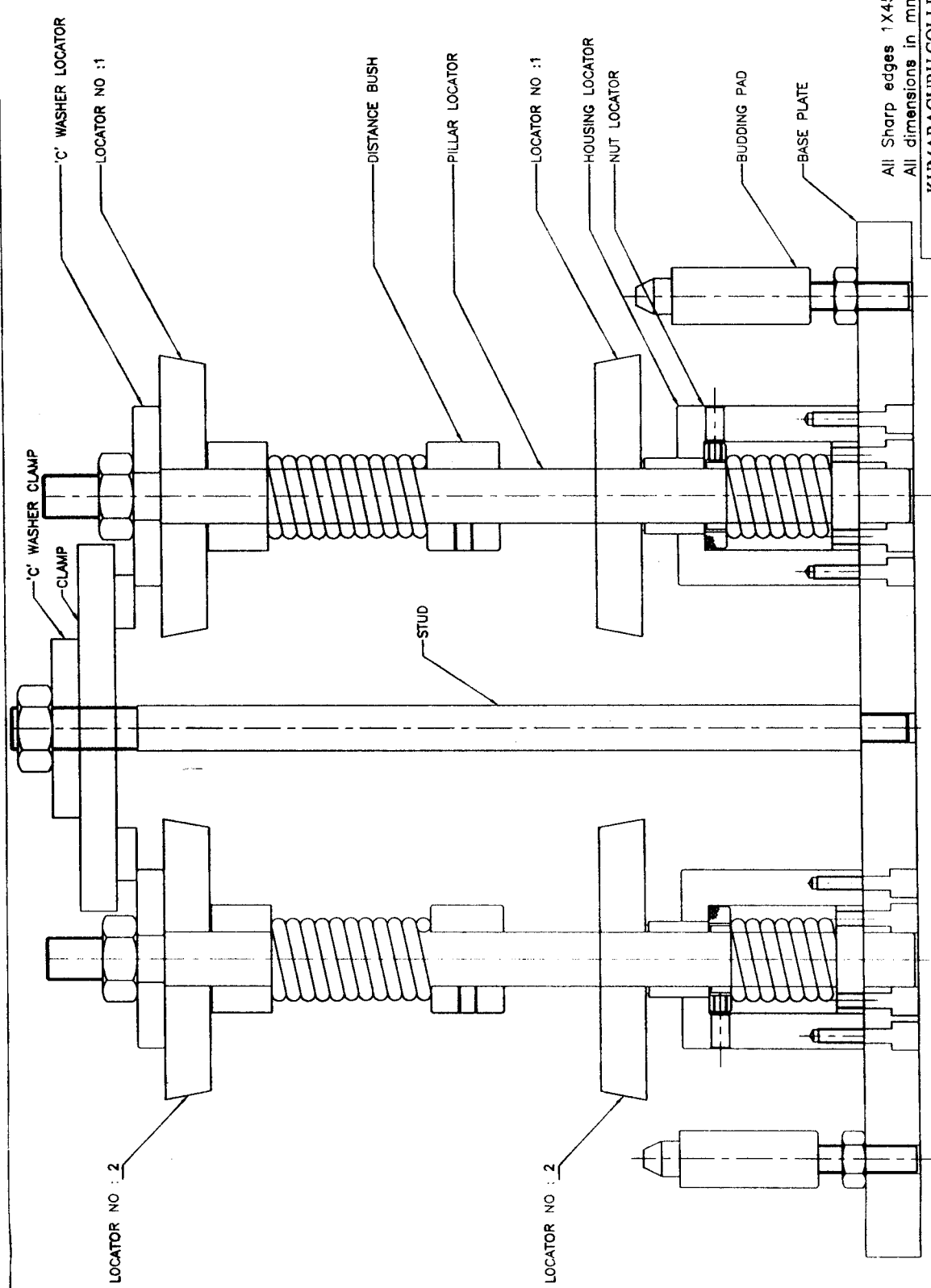
All Sharp edges 1X45° chamfer
 All dimensions in mm

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SPONSORED BY : ELGI EQUIPMENTS LTD.



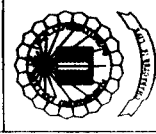
CLAMP

MAT : - EN 8	SCALE: 1:4	QTY : 1
Harden : 40Hrc		
Finish : Blackening	DRG.NO: 012	



All Sharp edges 1X45° chamfer
 All dimensions in mm

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ASSEMBLY DRAWING

MAT : - EN 8	SCALE : 1:2	QTY : 1
Harden : 35to40Hrc		
Finish : Blackening		DRG.NO: 013

CONCLUSION

The aim of our project is to eliminate setting time, to increase production and to reduce fatigue On the operator. The word Quality has been given due consideration. We hope that this project would serve their purpose in manufacturing processes involving simple, safe and economical methods.

BIBLIOGRAPHY

Title	Author
Production Technology	HMT
Production Technology	R.K.Jain
Data book	PSG
CNC machines.	M.S. SEHRAWAT
Production Technology	S.R.J. Shantha Kumar
CNC m/c catalogue	Mazatech
Clamping devices catalogue	Elgi Equipments Ltd.

DOWN CLAMP Type: CES - DMC

For holding work-pieces during cutting forces

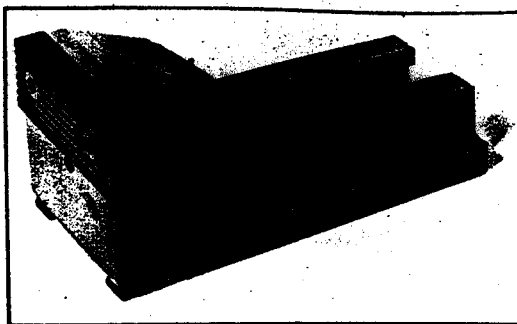
Applied from top and side

Applications: Suitable for heavy
milling, shaping, drilling, grinding

Material: Body - high tensile S.G. Iron

Dimensions: Overall size depends on
clamping force, weight, etc.

Standard sizes available on request.

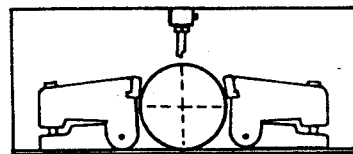
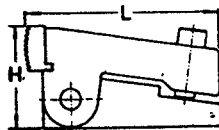
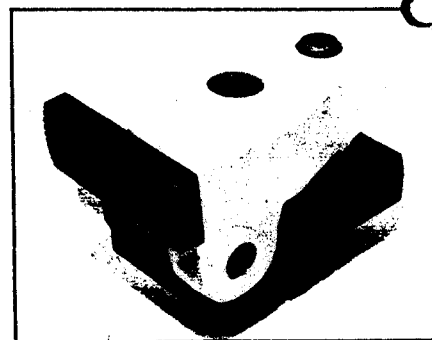


Type	Size	Suitable for T-slot screw	Clamping force approx. kg	Weight/each kg
DMC-1	58Bx55Hx138L	16 upto M16	1500	1.500
DMC-2	78Bx80Hx190L	26 upto M24	3000	4.000
DMC-3	120Bx135Hx250L	35 upto M30	4500	14.150

LEVER CLAMP Type: CES - LC

For Angular clamping/medium duty applications.

- Vertical down thrust and horizontal clamping force available simultaneously with the operation of leverage screw.
- Clamping force adjustable by leverage action.
- Material: Body - high tensile S.G. Iron, enamelled, base plate and jaw - Medium carbon steel, jaw heat treated and blackened.
- Applications: Suitable for side clamping of big size castings, flanges and regular work-pieces on milling, shaping, drilling, plano-milling, grinding machines. Popular with tool designers as clamping element in the design of clamping fixtures.

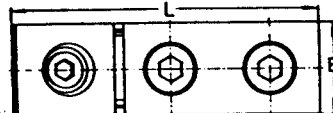
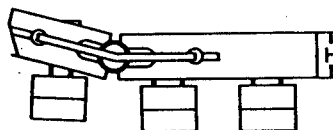
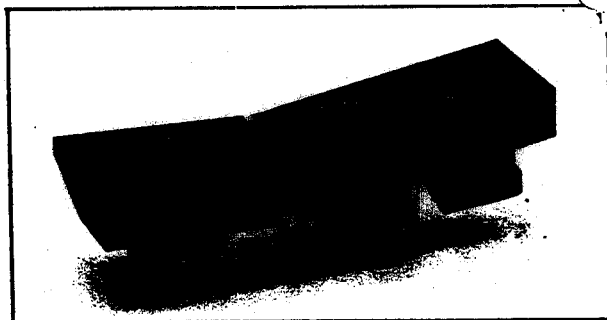


Type	Size (without T-nut)	Suitable for T-slot	Wt. (without T-nut)
LC-1	61Bx57x110L	14 to 28mm	1.850 kg

THICK PLATE CLAMP Type: CES - TPC

Composite forces hold thick plate while machining.

- Forward and downward forces hold work-piece firmly parallel to bed leaving no gap between work and bed surfaces.
- Low height design suitable to hold thick plates from side for machining top of plate in one setting.
- More than one pair employed to hold longer/wider work-piece.
- Material: Body and jaw - Medium carbon steel, jaw heat treated and blackened.
- Applications: For side holding of thick plates on milling, shaping, planing, plano-milling, drilling, jig boring machines. Suitable for use in design of clamping fixtures.
- Supplied with screws and T-nuts of respective sizes.

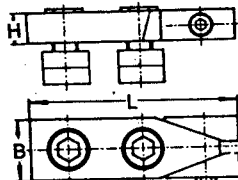
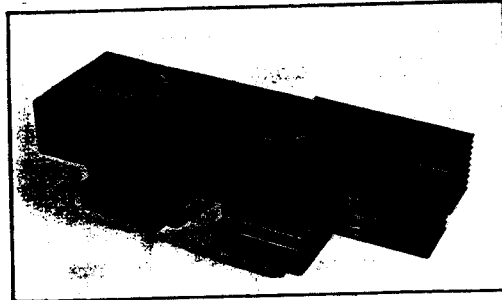


Type	Suitable for T-slot mm	Overall size (without T-nut)	Clamping force Kg (approx.)	Weight/each (without T-slot)
TPC-1	8 or 10	24Bx12Hx82L	500	0.140 kg
TPC-2	12 or 14	29Bx15Hx112L	700	0.280 kg
TPC-3	16 or 18	39Bx19Hx134L	1000	0.750 kg
TPC-4	20 or 22	49Bx24Hx195L	1500	1.400 kg

COMPOSITE TAPER CLAMP Type: CES - CTC

Low type wedge action side clamp for thick plate holding.

- Tightening of screw moves both the jaws offering forward and downward forces, holding the work-piece parallel to bed.
- Low height design suitable to hold thick plates from sides for machining entire top surface in one setting without obstruction.
- Due to split jaw design cylindrical/slightly irregular work-pieces can be clamped effectively.
- More than one pair employed to hold longer/wider work-piece.
- Material: Body and jaws - medium carbon steel, jaws heat treated and blackened.
- Applications: for side holding of thick plates on milling, shaping, planing, plano-milling, drilling, jig boring machines. Suitable for use in design of clamping fixtures.
- Supplied with screws and T-nuts of respective sizes.



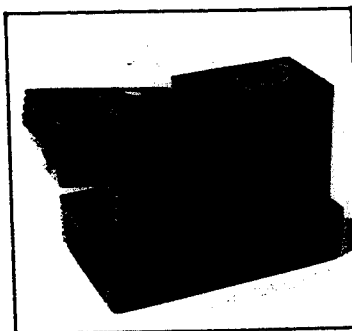
Type	Suitable for T-slot mm	Overall size (without T-nut) mm	Clamping force Kg (approx.)	Weight (without T-nut)
CTC-1	8 or 10	24Bx12Hx75L	400	0.150 kg
CTC-2	12 or 14	29Bx15Hx100L	600	0.300 kg
CTC-3	16 or 18	39Bx19Hx115L	750	0.470 kg
CTC-4	20 or 22	49Bx24Hx160L	900	1.200 kg

SLOT CLAMP

Type: CES - SC

Low type direct action edge-touch side clamp for thin plate holding.

- Major part of clamp body occupied inside T-slot to achieve low height advantage.
- Jaw applies clamping force on edge of thin plate, exerting forward and downward forces, avoiding top of surface holding.
- Material: Body and jaw - medium carbon steel, jaw heat treated blackened.
- Applications: suitable for holding thin plates and work-pieces of thickness 3mm and above from sides for machining on milling, planing, plano-milling, grinding, drilling machines.
- Supplied with screws of respective sizes.



Type	Suitable for T-slot	Overall Size MM	Wt./piece kg
SC-10	10	15Bx21HX41L	0.055
SC-12	12	20Bx24Hx42L	0.100
SC-14	14	23Bx27Hx51L	0.140
SC-16	16	25Bx31Hx52L	0.180
SC-18	18	29Bx35Hx54L	0.230
SC-20	20	32Bx38Hx60L	0.320
SC-22	22	35Bx43Hx68L	0.520

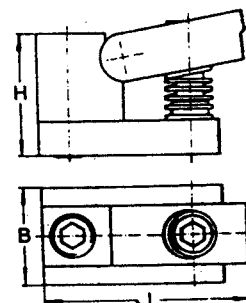
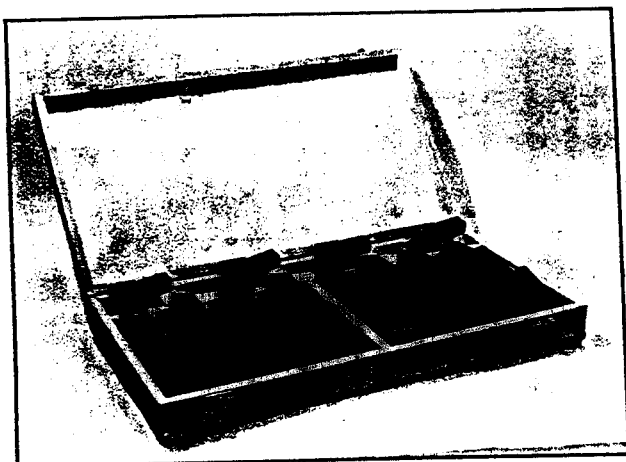


PLATE HOLDING CLAMPS SET [TPC-SC-CTC Combination]

Essentially required in tool room.

- 3 types of low ht. clamps, of respective T-slot sizes, housed in wooden box.
- Side holding of thick/thin plate assures entire top surface obstruction-free

Type	Suitable for T-slot size	Thick Plate Clamp 4 Nos. each	Composite Taper Clamp 4 Nos. each	Slot Clamp 4 Nos. each
PHC-10	10 mm	TPC-1/10	CTC-1/10	SC-10
PHC-12	12 mm	TPC-2/12	CTC-2/12	SC-12
PHC-14	14 mm	TPC-2/14	CTC-2/14	SC-14
PHC-16	16 mm	TPC-3/16	CTC-3/16	SC-16
PHC-18	18 mm	TPC-3/18	CTC-3/18	SC-18
PHC-20	20 mm	TPC-4/20	CTC-4/20	SC-20
PHC-22	22 mm	TPC-4/22	CTC-4/22	SC-22



VERTICAL THRUST CLAMP - Type: CES - VTC

Quick acting clamp with upward thrust

Clamp is used for further machining work-piece, which is already machined on one side, and this side used as datum.

Surface of clamping pad is toleranced at 100 mm (when work-piece is clamped, datum surface is always at height of 100 mm from base). When number of clamps are used it assures that machined face is held at same level from bed all times.

Movable bottom prismatic hub exerts upward thrust when eccentric clamping lever is turned through 90°.

Clamping pad and bottom hub swivellable through 360° making it suitable for location at any point on bed.

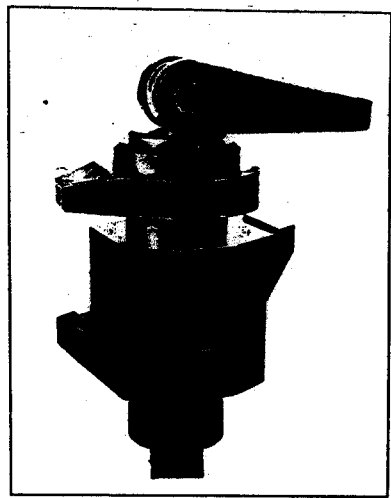
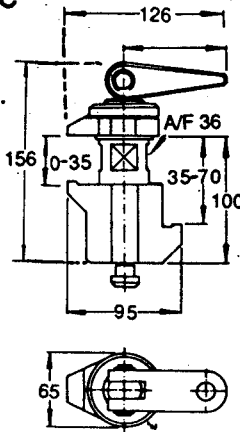
Two height ranges available: 0-35 mm and 35-70 mm.

Minimum 2 Nos. of units required to hold intricate work-piece.

Height adjustable cylinders type CES-HAC can be used to increase the height of clamp.

Material: Heat treated steel, blackened.

Applications: Machining of odd-shaped work-pieces, large rings, discs, flanges in tool rooms, aeronautical/defence/automobile industries and on NC machines. Supplied with T-nut/stud (of M12 size) of desired size.



Type	Range	Overall Dimensions without T-nut MM	Weight without T-nut Kg
VTC-100	0-35mm 35-70mm	65B x 156H x 126L	2.750

STEPLESS HEIGHT CLAMP - MINI Type: CES - SHC - MINI

Instant clamping action suitable for vertically acting forces.

Quick action clamping achieved by flicking of clamping lever through 90°, by means of eccentric action.

Clamping pad offers vertically down-thrust on the work.

Requires clamping at minimum two points on job.

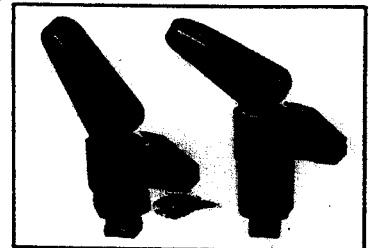
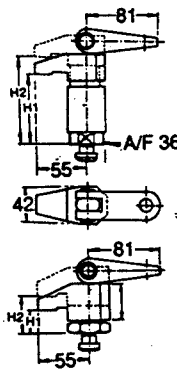
Clamping pad swinging through 360°, rendering job location at any place for operation.

Height adjusting cylinders type CES - HAC can be used to increase the height of clamp.

Material: Heat treated steel, blackened.

Applications: suitable for top clamping on machines with T-slots, on pallets with tapped holes and a part of instant clamping element of clamping fixture.

Supplied with T-nut/stud (of M12 size) of respective size.



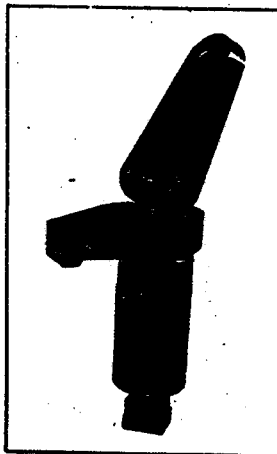
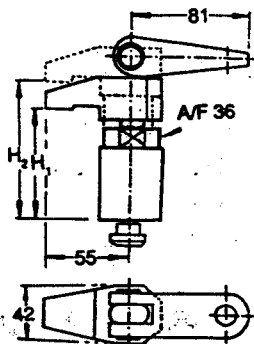
Type	H ₁ - H ₂ MM	Weight (without T-nut)
SHC-25	25-30	1.000 kg
SHC-30	30-35	1.150 kg
SHC-35	35-40	1.225 kg
SHC-40	40-45	1.245 kg
SHC-45	45-50	1.275 kg

STEPLESS HEIGHT CLAMP - MAXI

Type: CES - SHC - MAXI

Instant clamping action suitable for vertically acting forces.

- Description as per SHC - MINI!



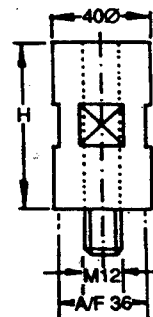
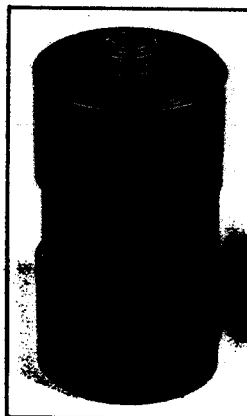
Type	H ₁ - H ₂ MM	Weight/piece (without T-nut)
SHC-70	70-105	1.400 kg
SHC-100	100-135	1.650 kg

HEIGHT ADJUSTABLE CYLINDERS

Type: CES - HAC

(For SHC - Mini & Maxi)

- Basic height of clamps can be increased by adding HAC of desired size.
- Material:** Heat treated steel, blackened.
- Any other sizes supplied on request.

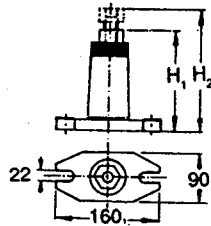
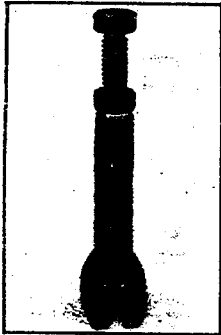


Type	Height mm	Hole size mm	Weight/piece kg
HAC-35	35	M12	0.350
HAC-70	70	M12	0.650
HAC-100	100	M12	0.950
HAC-140	140	M12	1.350

Type: CES - 50DF

With double side flange and ring type Locknut

- Description same as CES-50SF



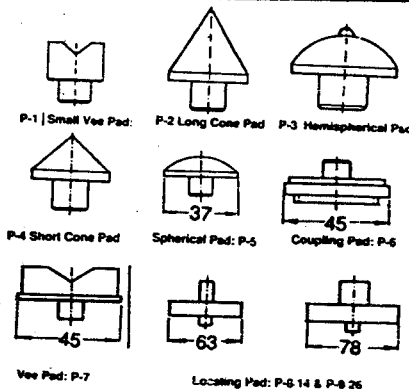
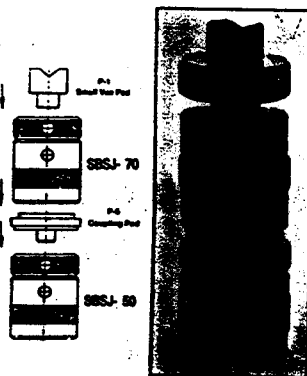
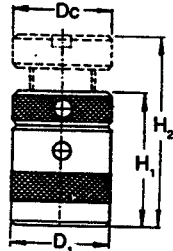
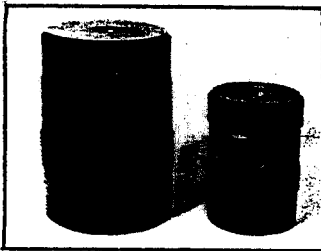
TYPE	RANGE H ₁ -H ₂ MM	BARREL DIA-MM	SLOT WIDTH MM	BASE MM	STATIC LOAD MAX - KN	Wt. Kg.
50 DF-200	200-320	50	22	90 x 160	40	4.000
50 DF-320	320-550	50	22	90 x 160	25	5.450

Type: CES - SBSJ

Screw jack with steel body

- **Material:** Body and spindle - medium carbon steel, heat treated, blackened.
- **Threads:** Trapezoidal
- Stopper provided to avoid accidental dis-engagement of spindle during operation

TYPE	RANGE H ₁ -H ₂ MM	BASE DIA-D ₁ MM	CAP DIA D _c MM	STATIC LOAD MAX KN	Wt. Kg.
CES-SBSJ- 40	40- 50	32	32	12	0.230
CES-SBSJ- 50	50- 70	50	50	60	0.600
CES-SBSJ- 70	70-100	50	50	60	0.800
CES-SBSJ-100	100-140	70	65	100	2.500
CES-SBSJ-140	140-210	80	70	165	4.560
CES-SBSJ-190	190-300	98	80	350	9.100

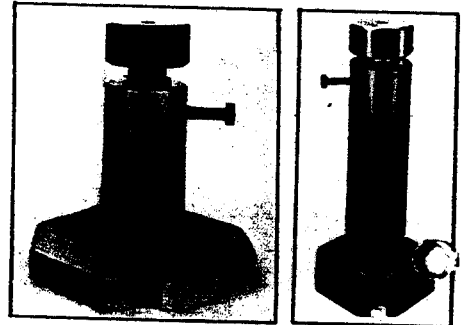
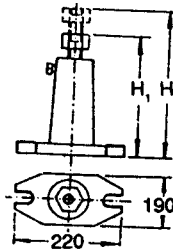


Type: CES - 70DF CES - 90DF

Heavy duty with double side flange and side locking brass screw

- Description same as CES-50SF

TYPE	RANGE H ₁ -H ₂ MM	BARREL DIA-MM	SLOT WIDTH MM	BASE MM	STATIC LOAD MAX - KN	Wt. Kg.
70 DF-200	200-300	70	26	190 x 220	80	9.500
70 DF-280	280-460	70	26	190 x 220	60	10.750
70 DF-430	430-750	70	26	190 x 220	50	14.900
90 DF-320	320-450	90	26	190 x 220	80	15.350
90 DF-410	410-720	90	26	190 x 220	60	19.200

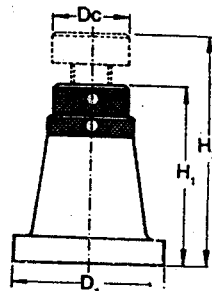


Type: CES-BBLN

Broader base with ring type lock-nut

- **Material:** Body - high tensile S.G. Iron, enamelled. Spindle and lock-nut - medium carbon steel, heat treated, blackened.
- **Threads:** Trapezoidal
- Stopper provided to avoid accidental dis-engagement of spindle during operation.
- Base modified to suit mounting of locating plate and height block types BBLP and BBHB respectively.

TYPE	RANGE H ₁ -H ₂ MM	BASE DIA-D ₁ MM	CAP DIA D _c MM	STATIC LOAD MAX KN	Wt. Kg.
BBLN-160	160-220	120	50	100	4.650



Pads for Screw jacks:

- Designed to load work-pieces for specific applications.
- **Material:** Medium carbon steel, heat treated, blackened.
- Coupling pad type P-6 useful to pile up height of screw jacks type CES-SBSJ-50 and CES-SBSJ-70 by keeping above the other.
- Locating pad type P-8 suitable to old U clamps with slot width of 14 mm. Type P-9 suitable to hold U clamps with slot width of 26 mm and above.

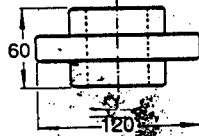
Locating Plate

Type: BBLP-120 Wt: 2.760 Kg.

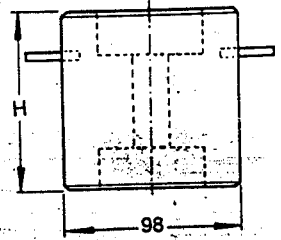
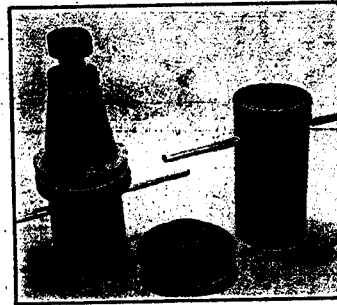
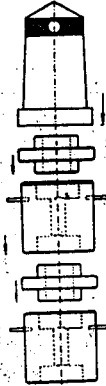
Working height of screw jack type BBLN-160 can be pulled up by using locating plates (type BBLP) and height blocks (type BBHB).

Height of jack instantly adjustable to suit holding surface of work-piece/holding level of clamp.

Material: Locating plate and blocks-- medium carbon steel, blackened.



Type: BBHP Height Block

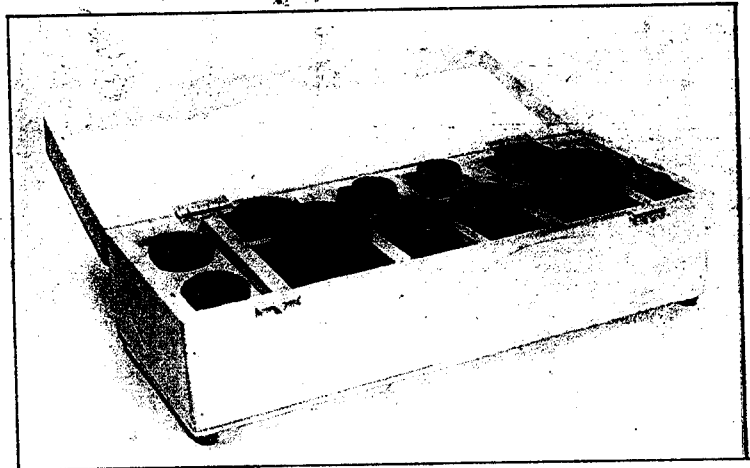
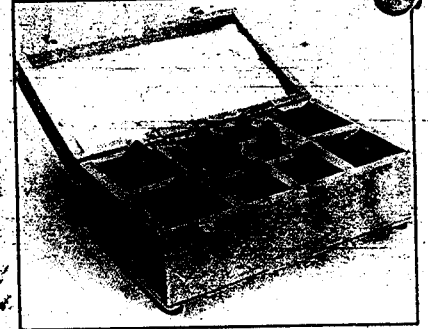
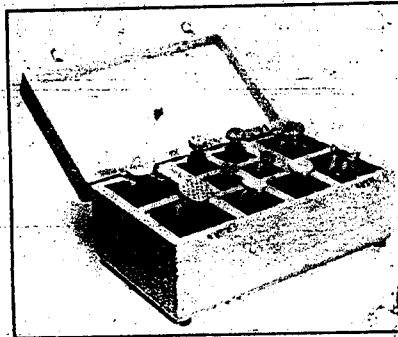


TYPE	H-MM	Wt. Kg.
BBHB-50	50	1.690
BBHB-100	100	4.110
BBHB-200	200	9.480
BBHB-300	300	15.100
BBHB-400	400	20.100

Screw Jack Kits

Screw jacks of different sizes housed in wooden boxes for ease of handling and safe keeping.

KIT TYPE	CONTENTS.	QTY.
KSJ-4001	CES-SJ-50	2 Nos.
	CES-SJ-70	2 Nos.
	CES-SJ-100	2 Nos.
KSJ-4002	CES-SJLN-60	2 Nos.
	CES-SJLN-85	2 Nos.
	CES-SJLN-120	2 Nos.
KSJ-4003	CES-SJCH-55	2 Nos.
	CES-SJCH-75	2 Nos.
	CES-SJCH-110	2 Nos.
KSJ-4004	CES-SCL-65	2 Nos.
	CES-SCL-90	2 Nos.
	CES-SCL-130	2 Nos.
KSJ-4005	CES-SJ-50	4 Nos.
	CES-SJ-70	4 Nos.
KSJ-4006	CES-SJLN-60	4 Nos.
	CES-SJLN-85	4 Nos.
KSJ-4007	CES-SJCH-55	4 Nos.
	CES-SJCH-75	4 Nos.
KSJ-4008	CES-SCL-65	4 Nos.
	CES-SCL-90	4 Nos.
KSJ-4009	CES-STSB-45	2 Nos.
	CES-STSB-55	2 Nos.
	CES-STSB-75	2 Nos.
	CES-STSB-95	2 Nos.
	CES-STSB-105	2 Nos.
KSJ-4010	CES-CHSB-40	2 Nos.
	CES-CHSB-55	2 Nos.
	CES-CHSB-75	2 Nos.
	CES-CHSB-85	2 Nos.
	CES-CHSB-95	2 Nos.
KSJ-4011	CES-SBSJ-40	2 Nos.
	CES-SBSJ-50	2 Nos.
	CES-SBSJ-70	2 Nos.
	CES-SBSJ-100	2 Nos.
	Pads Coupling Pad	P-1, P-2, P-3, P-4 P-6
KSJ-4012	CES-50SF-100	2 Nos.
	CES-50SF-140	2 Nos.
	Pads	P-1, P-2, P-3, P-4



CLATI ENGINEERING SYSTEMS

1/2, 6th Cross, Mysore Road, Byatarayanpura, Bangalore-560 026
Phone: 604597, 626171, 600420 Grams P.P. TISTOOL

All sizes are nominal and functional

Since improvements are made from time to time, specifications are subject to alteration without notice.

CAT NO. CD- SJ-94

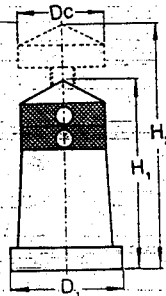
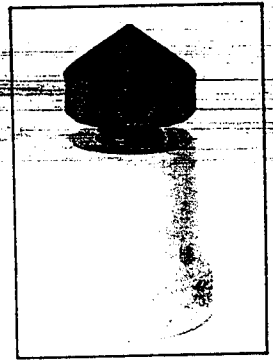
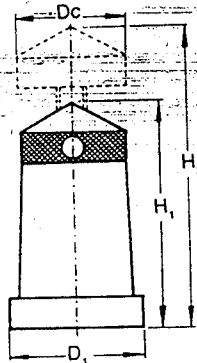
SCREW JACKS FOR USE IN QUALITY WORK LAYOUT/STANDARDS ROOM MEDIUM TO LIGHT DUTY APPLICATIONS

Type: CES-SJCH

With conical head (Without Locknut)

- Material: Body - High tensile S.G. Iron, enamelled, spindle - medium carbon steel, heat treated and blackened
- Threads: Trapezoidal
- Stopper provided to avoid accidental dis-engagement of spindle during operation

TYPE	RANGE H ₁ -H ₂ MM	BASE DIA-D ₁ MM	MAJOR DIA OF CONE MM	Wt. Kg.
SJCH- 55	55- 75	35	25	0.190
SJCH- 75	75-105	45	35	0.510
SJCH-110	110-150	76	60	2.200



Type: CES-SCL

With Conical Head and ring type locknut

- Description same as CES-SJCH

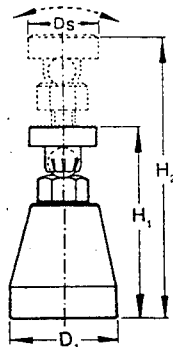
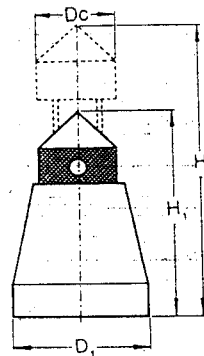
TYPE	RANGE H ₁ -H ₂ MM	BASE DIA-D ₁ MM	MAJOR DIA OF CONE MM	Wt. Kg.
SCL- 65	65- 85	35	25	0.225
SCL- 90	90-120	45	35	0.590
SCL-130	130-170	76	60	2.600

Type: CES-CHSB

With Conical Head and steel body

- Material: Body and spindle - medium carbon steel, heat treated, blackened
- Thread: V-rolled
- Stopper provided to avoid accidental dis-engagement of spindle during operation

TYPE	RANGE H ₁ -H ₂ MM	BASE DIA-D ₁ MM	MAJOR DIA OF CONE MM	Wt. Kg.
CHSB- 40	40- 55	25	16	0.085
CHSB- 55	55- 75	32	20	0.200
CHSB- 75	75- 95	40	25	0.385
CHSB- 85	85-110	56	32	0.900
CHSB- 95	95-130	60	32	1.100
CHSB-140	140-195	78	40	3.100



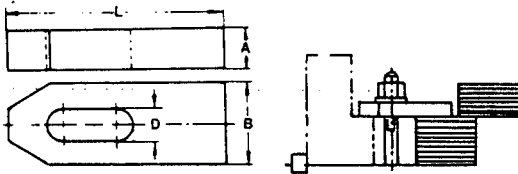
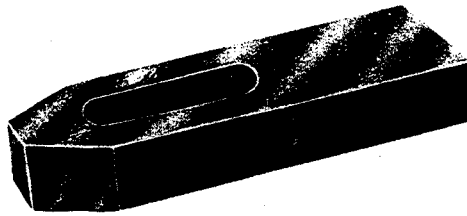
Type: CES-STSB

(With Swivel Head and steel body)

- Description same as CES-CHSB
- Swivel head: with diamond serrations and floating on a ball. Medium carbon steel, heat treated, chrome plated.

TYPE	RANGE H ₁ -H ₂ MM	BASE DIA-D ₁ MM	SWIVEL HEAD DIA-Ds	HEAD OF SPINDLE	Wt. Kg.
STSB- 45	45- 60	25	16	HEX A/F 13	0.090
STSB- 55	55- 75	32	20	HEX A/F 13	0.190
STSB- 75	75- 95	40	25	HEX A/F 19	0.380
STSB- 95	95-120	56	32	HEX A/F 24	0.920
STSB-105	105-135	60	32	ROUND Ø25	1.050
STSB-160	160-215	78	40	ROUND Ø35	3.100

TYPE: T1-FSC FLAT STRAP CLAMP
IS: 4292 - 1984

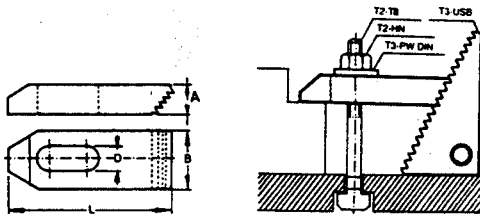
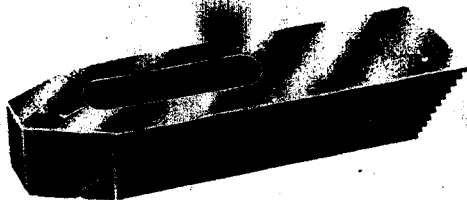


TYPE	D x L	A	B	Suitable for screw size
T1-FSC- 960	9x 60	14	25	M8
T1-FSC- 1180	11x 80	16	30	M10
T1-FSC-14100	14x100	20	40	M12
T1-FSC-14125	14x125	20	40	M12
T1-FSC-18125	18x125	25	50	M16
T1-FSC-18160	18x160	25	50	M16
T1-FSC-22160	22x160	35	60	M20
T1-FSC-22200	22x200	35	60	M20
T1-FSC-26200	26x200	35	70	M24
T1-FSC-26250	26x250	40	70	M24

Material: En-8/En-9 hardened and tempered to 24-32-HRC, working surfaces ground, chemically blackened.

Applications: On machine tools for work holding, on presses for tool holding, on plastic moulding machines for mould holding.

TYPE: T1-SSC SERRATED STRAP CLAMP

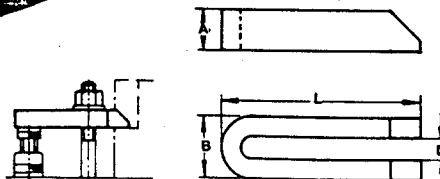
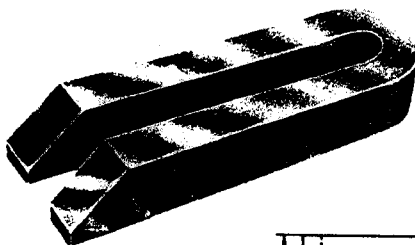


TYPE	D x L	A	B	Suitable for screw size
T1-SSC- 960	9x 60	12	25	M8
T1-SSC- 1180	11x 80	15	30	M10
T1-SSC-14100	14x100	20	40	M12
T1-SSC-14125	14x125	20	40	M12
T1-SSC-18125	18x125	25	50	M16
T1-SSC-18160	18x160	25	50	M16
T1-SSC-22160	22x160	30	60	M20
T1-SSC-22200	22x200	30	60	M20
T1-SSC-26200	26x200	30	70	M24
T1-SSC-26250	26x250	30	70	M24

Material: En-8/En-9 hardened and tempered to 24-32 HRC, working surfaces ground, chemically blackened.

Applications: on machines for work holding in combination with Universal Serrated Blocks (Type : T3-USB) for instant height adjustment.

TYPE: T1-UC U-CLAMP
IS: 4293-1984

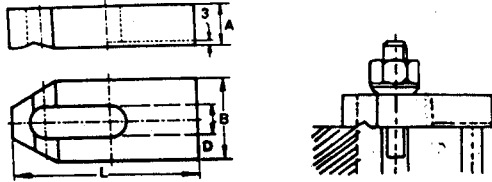
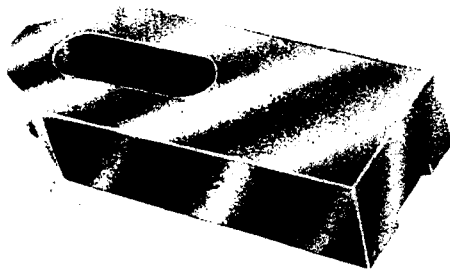


TYPE	D x L	A	B	Suitable for screw size
T1-UC-11100	11x100	20	31	M10
T1-UC-14125	14x125	25	38	M12
T1-UC-14160	14x160	25	38	M12
T1-UC-18160	18x160	30	48	M16
T1-UC-18200	18x200	30	48	M16
T1-UC-22200	22x200	40	52	M20
T1-UC-22250	22x250	40	62	M20
T1-UC-26200	26x200	40	66	M24
T1-UC-26250	26x250	40	66	M24

Material: En-8/En-9 hardened and tempered to 24-32 HRC, chemically blackened.

Applications: On machines/presses for work/ tool holding. Due to openness of slot, the clamp can be inserted/removed without disturbing the clamping system.

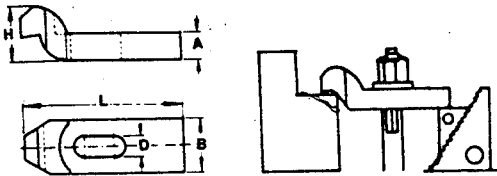
TYPE: T1-SC SLOTTED CLAMP
IS: 6082-1985



TYPE	D x L	A	B	Suitable for screw size
T1-SC-1175	11 x 75	16	30	M10
T1-SC-1195	11 x 95	18	30	M10
T1-SC-14100	14x100	20	40	M12
T1-SC-14115	14x115	20	40	M12
T1-SC-18120	18x120	25	50	M16
T1-SC-18135	18x135	25	20	M16
T1-SC-22140	22x140	30	60	M20
T1-SC-22150	22x150	30	60	M20
T1-SC-26200	26x200	35	70	M24
T1-SC-26240	26x240	35	70	M24

Material: En-8/En-9 hardened and tempered to 24-32 HRC, working surfaces ground, chemically blackened.
Applications: Clamping of medium duty work pieces. Suitable as clamping element in work holding fixture.

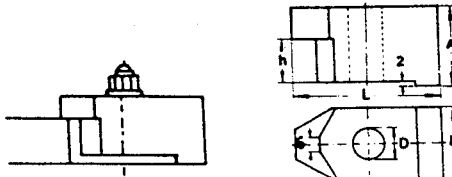
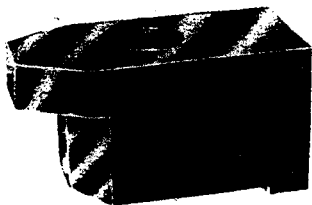
TYPE: T1-GNC GOOSE NECK CLAMP
IS: 4279-1975



TYPE	D x L	A	B	H	Suitable for screw size
T1-GNC-11100	11x100	15	30	30	M10
T1-GNC-14125	14x125	20	40	40	M12
T1-GNC-18160	18x160	25	50	50	M16
T1-GNC-22200	22x200	30	60	60	M20
T1-GNC-26250	26x250	35	70	80	M24

Material: En-8/En-9 hardened and tempered to 24-32 HRC, working surfaces ground, chemically blackened.
Applications: Holding of press-tool and huge castings/dies while machining.

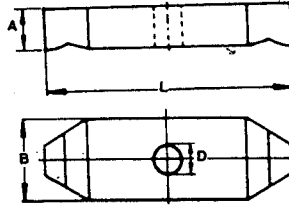
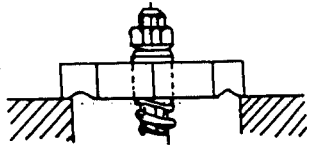
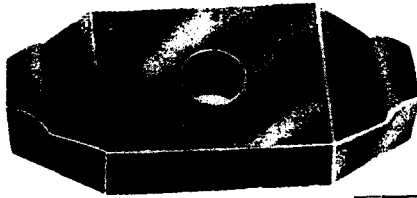
TYPE: T1-TC TABLE CLAMP
IS: 5251 - 1984



TYPE	D x A	L	B	h	Suitable for screw size
T1-TC-1123	11x23	50	25	13	M10
T1-TC-1130	11x30	50	25	20	M10
T1-TC-1426	14x26	60	30	13	M12
T1-TC-1433	14x33	60	30	20	M12
T1-TC-1835	18x35	75	40	20	M16
T1-TC-1840	18x40	75	40	25	M16
T1-TC-2240	22x40	90	45	20	M20
T1-TC-2245	22x45	90	45	25	M20

Material: En-8/En-9 hardened and tempered to 24-32 HRC, working surfaces ground, chemically blackened.
Applications: For tool plate holding and for use in jigs & fixtures as holding element.

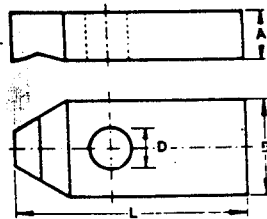
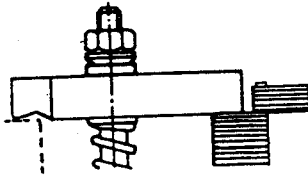
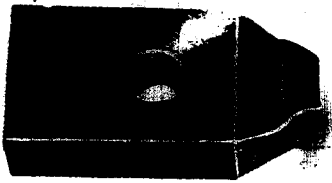
TYPE: T1-DEC DOUBLE ENDED CLAMP
IS: 6080-1985



TYPE	D x L	A	B	Suitable for screw size
T1-DEC- 1160	11x60	16	30	M10
T1-DEC- 1185	11x85	16	30	M10
T1-DEC-14100	14x100	20	40	M12
T1-DEC-14125	14x125	20	40	M12
T1-DEC-18125	18x125	25	50	M16
T1-DEC-18150	18x150	25	50	M16
T1-DEC-22150	22x150	30	60	M20
T1-DEC-22200	22x200	30	60	M20

Material: En-8/En-9 hardened and tempered to 24-32 HRC, working surfaces ground, chemically blackened.
Applications: For work holding on machine beds.

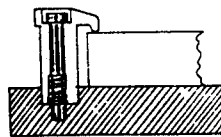
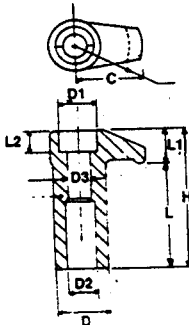
TYPE: T1-PC PLAIN CLAMP
IS: 6081-1971



TYPE	D x L	A	B	Suitable for screw size
T1-PC- 1170	11x70	16	30	M10
T1-PC- 1480	14x80	20	40	M12
T1-PC-18100	18x100	25	50	M16
T1-PC-22120	22x120	25	50	M20

Material: En-8/En-9 hardened and tempered to 24-32 HRC, chemically blackened.
Applications: Work holding on machine beds.

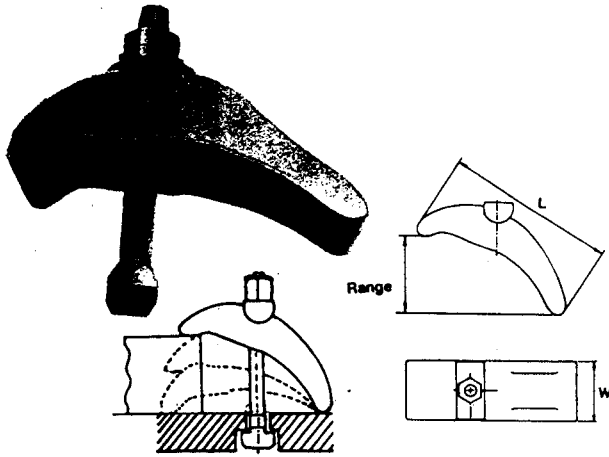
TYPE:T1-HK HOOK CLAMP



TYPE	D	H	L	L1	C	D3	D1	L2	D2	Socket headscrew Dia x L
T1-HK-1642	16	42	32	10	20	6.5	11	6	10	M6x50
T1-HK-2052	20	52	40	12	25	8.5	14	8	12	M8x60
T1-HK-2566	25	66	50	16	32	10.5	17	10	14	M10x70
T1-HK-3283	32	83	63	20	40	12.5	20	12	17	M12x90

Material: En-8/En-9 hardened and tempered to 24-32 HRC chemically blackened
Supplied along with spring and socket head screw.
Applications: For use in the design of jigs & fixtures for holding flat components/plates/castings etc.

TYPE: T1-PTMC PRESS TOOL/MILLING CLAMP



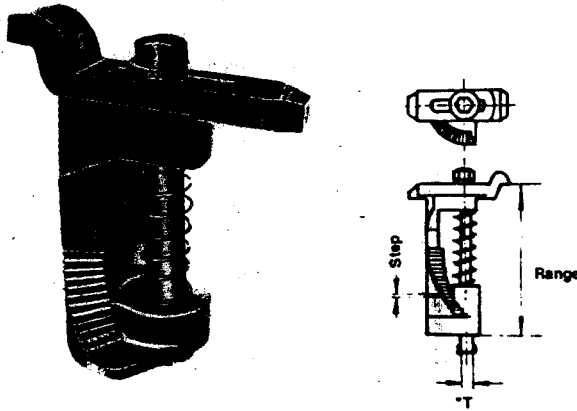
TYPE	Suitable for T-solt	CLAMP		Range	T-bolt Type
		width	Length		
T1-PTMC- 8	8	30	100	0-40	T2-TB- 880
T1-PTMC-10	10	30	100	0-35	T2-TB- 1080
T1-PTMC-12	12	50	140	0-70	T2-TB-12125
T1-PTMC-14	14	50	140	0-70	T2-TB-14125
T1-PTMC-16	16	50	140	0-60	T2-TB-16160
T1-PTMC-18	18	60	175	0-95	T2-TB-18200
T1-PTMC-20	20	60	175	0-90	T2-TB-20200
T1-PTMC-22	22	60	175	0-90	T2-TB-22200
T1-PTMC-24	24	65	235	0-140	T2-TB-24200
T1-PTMC-28	28	65	235	0-140	T2-TB-28200

Set consists of clamp, T-bolt, washer, hex-nut one each.

Materials: High tensile S.G. Iron for clamp, heat treated steel for T-bolt, hex nut, washer.

Applications: For holding tools/dies on presses and flat components/castings on milling machines.

TYPE: T1-HC HELISTEP CLAMP

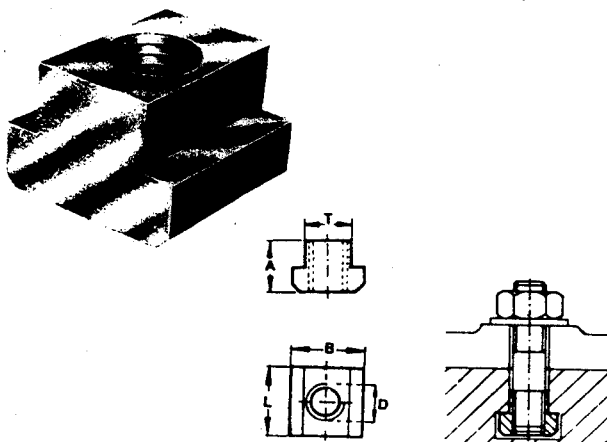


TYPE	SLOT SIZE	STEP	CLAMPING HEIGHT
T1-HC-10S	10	1.25	30- 80
T1-HC-10L	10	3.00	75-175
T1-HC-12S	12	1.25	30- 80
T1-HC-12L	12	3.00	75-175
T1-HC-14S	14	1.25	30- 80
T1-HC-14L	14	3.00	75-175
T1-HC-16S	16	1.25	45- 95
T1-HC-16L	16	3.00	75-175
T1-HC-18S	18	1.25	45- 95
T1-HC-18L	18	3.00	75-175
T1-HC-22S	22	1.25	45- 95
T1-HC-22L	22	3.00	75-175

Material: Serrated body - High tensile S.G. Iron; Clamp, T-nut, bolt, washer: heat treated steel, chemically blackened.

Features: Clamping elements assembled compactly for instant use of the system. Choice of strap or goose neck clamp to suit particular operation available. Vertical/horizontal positioning of clamp instantly adjustable.

TYPE:T2-TN T-NUT
IS: 2015-1977



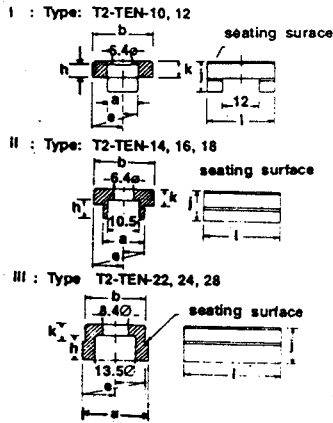
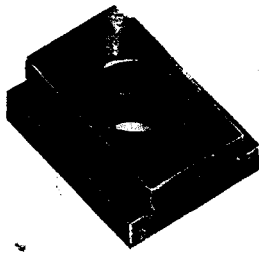
TYPE	TXØD	A	BXL
T2-TN- 86	8XM6	10	13X13
T2-TN-108	10xM8	12	15x15
T2-TN-128	12xM8	14	18x18
T2-TN-1210	12xM10	14	18x18
T2-TN-1410	14xM10	16	22x22
T2-TN-1412	14xM12	16	22x22
T2-TN-1612	16xM12	18	25x25
T2-TN-1614	16xM14	18	25x25
T2-TN-1816	18xM16	20	28x28
T2-TN-2016	20xM16	24	32x32
T2-TN-2018	20xM18	24	32x32
T2-TN-2216	22xM16	28	35x35
T2-TN-2220	22xM20	28	35x35
T2-TN-2420	24xM20	32	40x40
T2-TN-2824	28xM24	36	44x44

Tolerances: As per IS: 2015.

Material: En-8/En-9 hardened and tempend to 24-32 HRC, chemically blackened;

Applications: For use along with clamping stud for work holding

TYPE:T2-TEN TENON: T3: 2990-1965

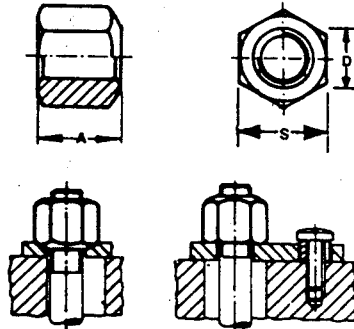
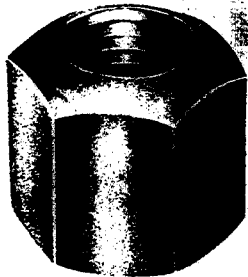


TYPE	a h7	b j6	l	e	h	j	k
T2-TEN-10	10	20	22	0.02	4.2	10	5.5
T2-TEN-12	12	20	22	0.02	4.2	10	5.5
T2-TEN-14	14	20	25	0.02	6.3	10	5.5
T2-TEN-16	16	20	25	0.02	6.3	10	5.5
T2-TEN-18	18	20	25	0.02	6.3	10	5.5
T2-TEN-22	22	20	32	0.02	8.3	12	5.5
T2-TEN-24	24	20	32	0.02	8.3	12	5.5
T2-TEN-28	28	20	32	0.02	8.3	12	5.5

a=Tenon size for T-Slot.

Applications: For use in the ground slots of machine tool tables for precision mounting of jigs and fixtures.

TYPE:T2-HN HEX HI-NUT: (HEIGHT=1.5 X DIA)
DIN 6330



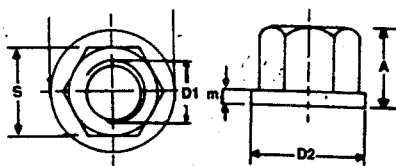
TYPE	∅D x A	S
T2-HN-812	M 8x12	13
T2-HN-1015	M10x15	17
T2-HN-1218	M12x18	19
T2-HN-1624	M16x24	24
T2-HN-2030	M20x30	30
T2-HN-2436	M24x36	36

Material: En-8/En-9 hardened and tempered to 24-32 HRC, chemically blackened.

Features & Applications: Extra height of the nut covers more thread length effecting better clamping. Flat end used along with plain washer (thick)

Type: T3-PW-DIN and spherical end used along with conical seat (Type: T3-SWCS) washer.

TYPE:T2-FHN
FLANGED HEX NUT (COLLAR NUT)
DIN: 6331: HEIGHT = 1.5 x DIA.



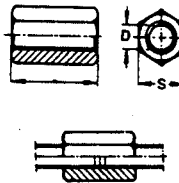
TYPE	D1	D2	m	A	S
T2-FHN-818	M 8	18	3.5	12	13
T2-FHN-1022	M10	22	4	15	17
T2-FHN-1225	M12	25	4	18	19
T2-FHN-1631	M16	31	5	24	24
T2-FHN-2037	M20	37	6	30	30
T2-FHN-2445	M24	45	6	36	36



Material: En-8/En-9 hardened and tempered to 22-32 HRC, chemically blackened.

Applications: For general work holding. Built-in washer provides even force distribution.

TYPE:T2-EN EXTENSION NUT:
HEIGHT = 3 X DIA

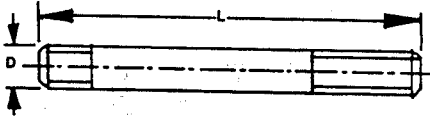
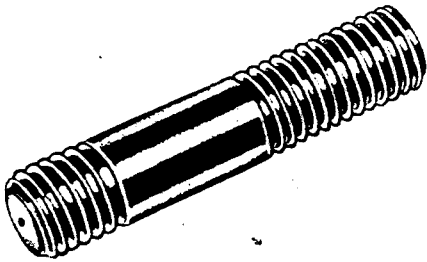


TYPE	∅D x A	S
T2-EN-824	M8 x24	13
T2-EN-1030	M10x30	17
T2-EN-1236	M12x36	19
T2-EN-1648	M16x48	24
T2-EN-2060	M20x60	30
T2-EN-2472	M24x72	36

Material: Heat treated steel, blackened

Application: Used as coupler to join two studs for increasing clamping height.

TYPE: T2-CS CLAMPING STUD
IS: 1862-1967



TYPE	ØD x L
T2-CS- 832	M8x32
T2-CS- 840	M8x40
T2-CS- 850	M8x50
T2-CS- 863	M8x63
T2-CS- 880	M8x80
T2-CS- 8100	M8x100
T2-CS- 1040	M10x40
T2-CS- 1050	M10x50
T2-CS- 1063	M10x63
T2-CS- 1080	M10x80
T2-CS-10100	M10x100
T2-CS-10125	M10x125
T2-CS- 1250	M12x50
T2-CS- 1263	M12x63
T2-CS- 1280	M12x80
T2-CS-12100	M12x100
T2-CS-12125	M12x125
T2-CS-12160	M12x160
T2-CS-12200	M12x200
T2-CS- 1663	M16x63
T2-CS- 1680	M16x80
T2-CS-16100	M16x100
T2-CS-16125	M16x125

TYPE	ØD x L
T2-CS-16160	M16x160
T2-CS-16200	M16x200
T2-CS-16250	M16x250
T2-CS- 2080	M20x80
T2-CS-20100	M20x100
T2-CS-20125	M20x125
T2-CS-20160	M20x160
T2-CS-20200	M20x200
T2-CS-20250	M20x250
T2-CS-20315	M20x315
T2-CS-20400	M20x400
T2-CS-20500	M20x500
T2-CS-24100	M24x100
T2-CS-24125	M24x125
T2-CS-24160	M24x160
T2-CS-24200	M24x200
T2-CS-24250	M24x250
T2-CS-24315	M24x315
T2-CS-24400	M24x400
T2-CS-24500	M24x500

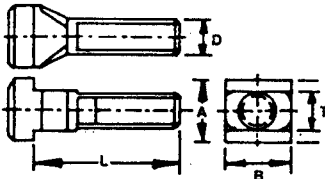
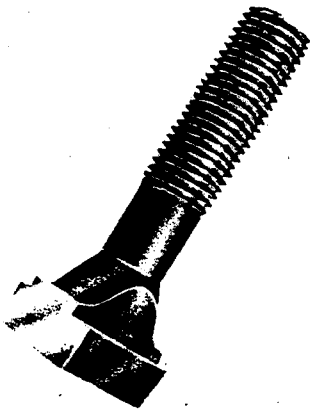
Other sizes available on request.

Material: En-8/En-9 hardened and tempered to 24-32 HRC, chemically blackened.

Applications: As a clamping element on machine tools/ presses/fixtures.

Note: Thread length as per IS: 1862, Type B, Stud length L overall.

TYPE: T2-TB T-BOLT
IS: 2014-1977



TYPE	Threads/SlotLength ØD x T x L	A x B
T2-TB- 832	M 8 x 8 x 32	13x13
T2-TB- 840	M 8 x 8 x 40	13x13
T2-TB- 850	M 8 x 8 x 50	13x13
T2-TB- 865	M 8 x 8 x 65	13x13
T2-TB- 880	M 8 x 8 x 80	13x13
T2-TB- 1040	M10 x 10 x 40	15x15
T2-TB- 1050	M 10 x 10 x 50	15x15
T2-TB- 1065	M10 x 10 x 65	15x15
T2-TB- 1080	M10 x 10 x 80	15x15
T2-TB-10100	M10 x 10 x 100	15x15
T2-TB- 1240	M 12 x 12 x 40	18x18
T2-TB- 1250	M12 x 12 x 50	18x18
T2-TB- 1265	M12 x 12 x 65	18x18
T2-TB- 1280	M12 x 12 x 80	18x18
T2-TB-12100	M12 x 12 x 100	18x18
T2-TB-12125	M12 x 12 x 125	18x18
T2-TB-12160	M12 x 12 x 160	18x18
T2-TB-12200	M12 x 12 x 200	18x18
T2-TB- 1440	M 12 x 14 x 40	22x22
T2-TB- 1450	M12 x 14 x 50	22x22
T2-TB- 1465	M12 x 14 x 65	22x22
T2-TB- 1480	M12 x 14 x 80	22x22
T2-TB-14100	M12 x 14 x 100	22x22
T2-TB-14125	M12 x 14 x 125	22x22
T2-TB-14200	M12 x 14 x 200	22x22
T2-TB-14250	M12 x 14 x 250	22x22
T2-TB- 1665	M16 x 16 x 65	25x25
T2-TB- 1680	M16 x 16 x 80	25x25
T2-TB-16100	M16 x 16 x 100	25x25
T2-TB-16125	M16 x 16 x 125	25x25
T2-TB-16160	M16 x 16 x 160	25x25
T2-TB-16200	M16 x 16 x 200	25x25
T2-TB-16250	M 16 x 16 x 250	25x25
T2-TB- 1865	M16 x 18 x 65	28x28
T2-TB- 1880	M16 x 18 x 80	28x28
T2-TB-18100	M 16 x 18 x 100	28x28
T2-TB-18125	M 16 x 18 x 125	28x28
T2-TB-18160	M 16 x 18 x 160	28x28
T2-TB-18200	M 16 x 18 x 200	28x28

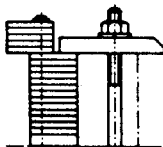
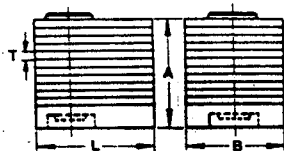
TYPE	Threads/SlotLength ØD x T x L	A x B
T2-TB-18250	M 16 x 18 x 250	28x28
T2-TB-2080	M 20 x 20 x 80	32x32
T2-TB-20100	M 20 x 20 x 100	32x32
T2-TB-20125	M 20 x 20 x 125	32x32
T2-TB-20160	M 20 x 20 x 160	32x32
T2-TB-20200	M 20 x 20 x 200	32x32
T2-TB-20250	M 20 x 20 x 250	32x32
T2-TB-20320	M 20 x 20 x 320	32x32
T2-TB-2280	M 20 x 22 x 80	35x35
T2-TB-22100	M 20 x 22 x 100	35x35
T2-TB-22125	M 20 x 22 x 125	35x35
T2-TB-22160	M 20 x 22 x 160	35x35
T2-TB-22200	M 20 x 22 x 200	35x35
T2-TB-22250	M 20 x 22 x 250	35x35
T2-TB-22320	M 20 x 22 x 320	35x35
T2-TB-24100	M 24 x 24 x 100	40x40
T2-TB-24125	M 24 x 24 x 125	40x40
T2-TB-24160	M 24 x 24 x 160	40x40
T2-TB-24200	M 24 x 24 x 200	40x40
T2-TB-24250	M 24 x 24 x 250	40x40
T2-TB-24320	M 24 x 24 x 320	40x40
T2-TB-24400	M 24 x 24 x 400	40x40
T2-TB-28100	M 24 x 28 x 100	44x44
T2-TB-28125	M 24 x 28 x 125	44x44
T2-TB-28160	M 24 x 28 x 160	44x44
T2-TB-28200	M 24 x 28 x 200	44x44
T2-TB-28250	M 24 x 28 x 250	44x44
T2-TB-28320	M 24 x 28 x 320	44x44
T2-TB-28400	M 24 x 28 x 400	44x44

Other sizes available on request:

Material: En-8/En-9, forged, hardened and tempered to 24-32, HRC, chemically blackened.

Applications: Suitable as clamping element on T-slotted beds.

**TYPE:T3-SHP
SUPPORTING HEIGHT PLATES**



TYPE	A	B x L	B x C	T
T3-SHP- 425	25	50 x 60	50 x 20	4
T3-SHP- 450	50	50 x 60	50 x 20	4
T3-SHP- 475	75	50 x 60	50 x 20	4
T3-SHP- 4100	100	50 x 75	50 x 35	4
T3-SHP- 4125	125	50 x 75	50 x 35	4
T3-SHP- 4150	150	50 x 75	50 x 35	4
T3-SHP- 4200	200	50 x 75	50 x 35	4
T3-SHP- 225	25	35 x 50	35 x 25	2
T3-SHP- 250	50	35 x 50	35 x 25	2
T3-SHP- 275	75	35 x 50	35 x 25	2
T3-SHP- 2100	100	50 x 60	50 x 35	2
T3-SHP- 2125	125	50 x 60	50 x 35	2
T3-SHP- 2150	150	50 x 60	50 x 35	2
T3-SHP- W275	75	50 x 75	50 x 50	2
T3-SHP-W2100	100	50 x 75	50 x 50	2
T3-SHP-W2125	125	50 x 75	50 x 50	2
T3-SHP-W2150	150	50 x 75	50 x 50	2

B x L x T — Plate size
B x C — Clamp-rest area

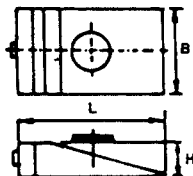
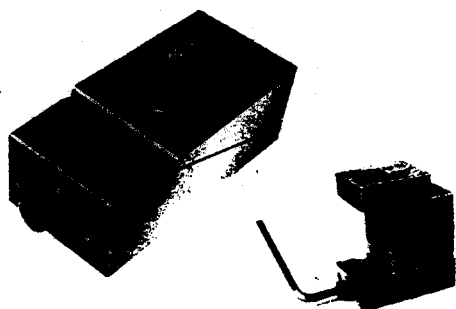
Material: Rolled sheet, flattened and chemically blackened.

Applications: Useful as a support for clamp/work piece.

Features: Desired clamp support height achieved by swinging of top plates in steps of 2mm/4mm.

- Desired precise height adjustment is possible with the help of Smooth Sliding Block Type: T3-SSB.
- Blocks can be stacked one above the other to achieve increased clamp-support height.
- Use of this arrangement saves time and avoids hazardous trials with stray/scrap support pieces.
- For higher sizes base broadened for stability.

**TYPE:T3-SSB SMOOTH SLIDING BLOCK
(FOR FINER HEIGHT ADJUSTMENT)
For use alongwith supporting height plate type: T3-SHP**



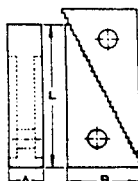
TYPE	SIZE mm. B x H x L	Height Variation: mm	Suitable for use alongwith Type: T3-SHP
T3-SSB-12	35 x 20 x 68	3	225, 250, 275
T3-SSB-22	50 x 25 x 88	5	2100, 2125, 2150
T3-SSB-24	50 x 25 x 88	5	425, 450, 475
T3-SSB-32	50 x 35 x 105	5	W275, W2100, W2100, W2150.
T3-SSB-34	50 x 35 x 105	5	4100, 4125, 4150

Features: Compact and wedge type construction assures stepless slide movement for clamp setting.

* Recommended for use alongwith supporting height plate Type: T3-SHP, T3-SHP offers height adjustment in step of 2/4 mm and T3-SSB offers stepless height adjustment to precisely desired level.

**TYPE:T3 - USB
UNIVERSAL SERRATED BLOCK**

STANDARD DUTY



TYPE	A	B x L	Height Adjustment	
			Minimum	Maximum
T3-USB-001	30	20 x 33	22	50
T3-USB-002	30	36 x 66	40	107
T3-USB-003	30	68 x 131	70	208

HEAVY DUTY

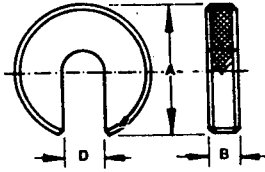
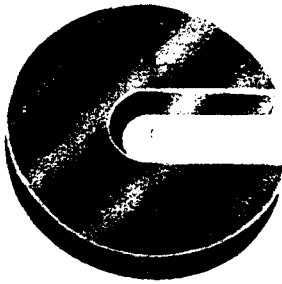
TYPE	A	B x L	Height Adjustment	
			Minimum	Maximum
T3-USB-004	50	20 x 33	22	50
T3-USB-005	50	36 x 66	40	107
T3-USB-006	50	68 x 131	70	208

Material: En-8, hardened and tempered to 24-32 HRC, chemically blackened.

Features: Combination of 3 sizes offers instant height adjustment/work support.

Heavy duty: Higher width of 50mm accords better rigidity to clamp holding system. Also recommended for use alongwith serrated strap clamp type: T1-SSC.

TYPE:T3-CW C-WASHER
IS: 4291-1967

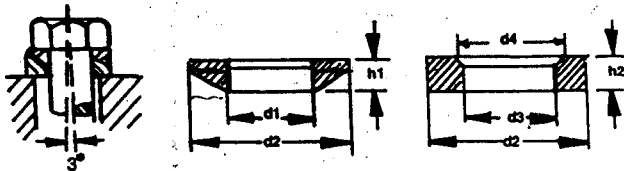
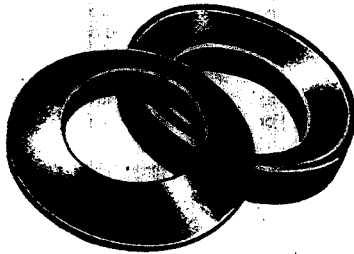


TYPE	ØA x D x B
T3-CW- M8	32 x 8.4 x 8
T3-CW-M10	40 x 10.5 x 10
T3-CW-M12	50 x 13 x 10
T3-CW-M16	63 x 17 x 12
T3-CW-M20	80 x 21 x 12
T3-CW-M24	100 x 25 x 12

Material: Case hardened steel, 40-45 HRC, chemically blackened.

Applications: For use in jigs/fixtures, spacer for easy removal/insertion in clamping system.

TYPE:T3-SWCS - SPHERICAL WASHER WITH CONICAL SEAT
IS: 4297 - 1967

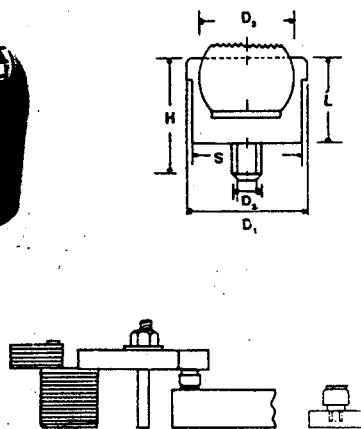
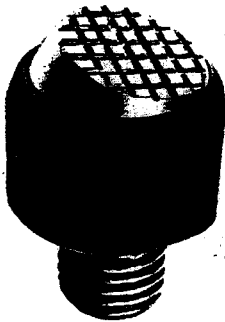


TYPE	Suitable for Screw size	d1	d2	h1	d3	d4	h2
T3-SWCS-8	M8	8.4	17	3.2	10	14.5	3.5
T3-SWCS-10	M10	10.5	21	4.0	12	18.5	4.2
T3-SWCS-12	M12	13	24	4.6	15	20	5.0
T3-SWCS-16	M16	17	30	5.3	19	26	6.2
T3-SWCS-20	M20	21	36	6.3	24	31	7.5
T3-SWCS-24	M24	25	44	8.2	28	37	9.5

Material: Case hardened steel, 40-45 HRC, chemically blackened.

Applications: Due to its self-aligning operations while in use, it is popularly used in all types of clamping systems.

TYPE:T3-SBE- SELF-ALIGNING BALL ELEMENT



TYPE	D1	D2	D3	S	L	H
T3-SBE- 8	13	M8	10	11	13	21
T3-SBE-10	20	M10	16	17	18	28
T3-SBE-12	20	M12	16	17	18	30
T3-SBE-16	30	M16	25	27	27	43
T3-SBE-20	50	M20	40	41	35	55

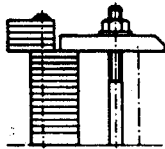
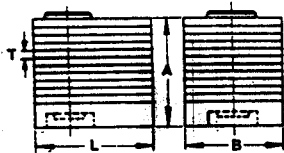
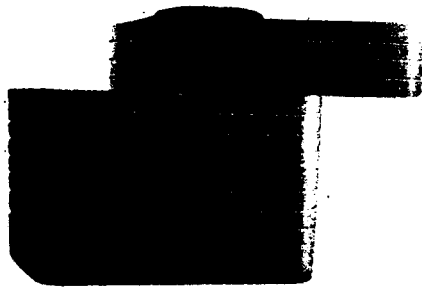
Material: Ball: hardened and tempered steel

Body: Toughened steel, blackened

Features: The self-aligning serrated ball set into socket adjusts to the plane of the working surface while clamping. This assures of work being clamped properly without straining the system.

Applications: Useful for holding rough castings and forged surfaces for machining. Also useful as a clamping element in the jigs / fixtures.

**TYPE:T3-SHP
SUPPORTING HEIGHT PLATES**



TYPE	A	B x L	B x C	T
T3-SHP- 425	25	50 x 60	50 x 20	4
T3-SHP- 450	50	50 x 60	50 x 20	4
T3-SHP- 475	75	50 x 60	50 x 20	4
T3-SHP- 4100	100	50 x 75	50 x 35	4
T3-SHP- 4125	125	50 x 75	50 x 35	4
T3-SHP- 4150	150	50 x 75	50 x 35	4
T3-SHP- 4200	200	50 x 75	50 x 35	4
T3-SHP- 225	25	35 x 50	35 x 25	2
T3-SHP- 250	50	35 x 50	35 x 25	2
T3-SHP- 275	75	35 x 50	35 x 25	2
T3-SHP- 2100	100	50 x 60	50 x 35	2
T3-SHP- 2125	125	50 x 60	50 x 35	2
T3-SHP- 2150	150	50 x 60	50 x 35	2
T3-SHP- W275	75	50 x 75	50 x 50	2
T3-SHP-W2100	100	50 x 75	50 x 50	2
T3-SHP-W2125	125	50 x 75	50 x 50	2
T3-SHP-W2150	150	50 x 75	50 x 50	2

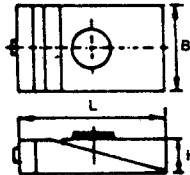
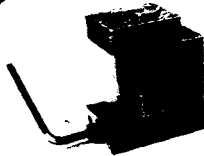
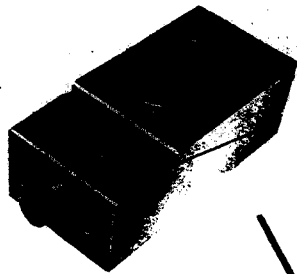
B x L x T — Plate size
B x C — Clamp-rest area

Material: Rolled sheet, flattened and chemically blackened.

Applications: Useful as a support for clamp/work piece.
Features: Desired clamp support height achieved by swinging of top plates in steps of 2mm/4mm.

- Desired precise height adjustment is possible with the help of Smooth Sliding Block Type: T3-SSB.
- Blocks can be stacked one above the other to achieve increased clamp-support height.
- Use of this arrangement saves time and avoids hazardous trials with stray/scrap support pieces.
- For higher sizes base broadened for stability.

**TYPE:T3-SSB SMOOTH SLIDING BLOCK
(FOR FINER HEIGHT ADJUSTMENT)
For use along with supporting height plate type: T3-SHP**



TYPE	SIZE mm. B x H x L	Height Variation: mm	Suitable for use alongwith Type: T3-SHP
T3-SSB-12	35 x 20 x 68	3	225, 250, 275
T3-SSB-22	50 x 25 x 88	5	2100, 2125, 2150
T3-SSB-24	50 x 25 x 88	5	425, 450, 475
T3-SSB-32	50 x 35 x 105	5	W275, W2100, W2100, W2150.
T3-SSB-34	50 x 35 x 105	5	4100, 4125, 4150

Features: Compact and wedge type construction assures stepless side movement for clamp setting.

* Recommended for use alongwith supporting height plate Type: T3-SHP, T3-SHP offers height adjustment in step of 2/4 mm and T3-SSB offers stepless height adjustment to precisely desired level.

**TYPE:T3 - USB
UNIVERSAL SERRATED BLOCK**

STANDARD DUTY

TYPE	A	B x L	Height Adjustment	
			Minimum	Maximum
T3-USB-001	30	20 x 33	22	50
T3-USB-002	30	36 x 66	40	107
T3-USB-003	30	68 x 131	70	208

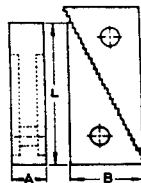
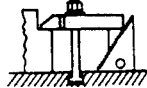
HEAVY DUTY

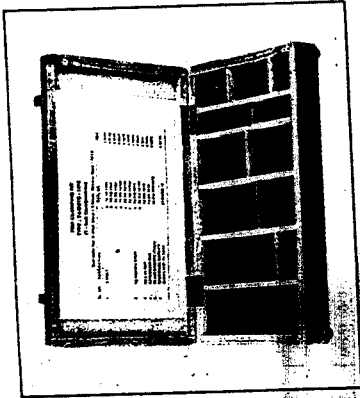
TYPE	A	B x L	Height Adjustment	
			Minimum	Maximum
T3-USB-004	50	20 x 33	22	50
T3-USB-005	50	36 x 66	40	107
T3-USB-006	50	68 x 131	70	208

Material: En-8, hardened and tempered to 24-32 HRC, chemically blackened.

Features: Combination of 3 sizes offers instant height adjustment/work support.

Heavy duty: Higher width of 50mm accords better rigidity to clamp holding system. Also recommended for use alongwith serrated strap clamp type: T1-SSC.





TYPE: T4-CSTB: CLAMPING SET
[T-Bolt Combination]

Contents: T-bolt, hex hi-nut, plain washer (thick), Sph. washer with conical seat, Ext. nut, Clamping stud, wooden box.

TYPE	SUITABLE FOR T-SLOT X SCREW SIZE	T-Bolt Type: T2-TB- QTY: 4 nos. each	Clamping Stud T2-CS 4Nos. each	Hex-Hi-Nut T2-HN- 6nos. each	Extension nut, T2-EN- 4 nos. each	Plain Washer (Thick) T3-PW-DIN- 6 nos. each	Sph. Washer with Conical Seat T3-SWCS- 4 Sets each
T4-CSTB-1010	10xM10	1040,1050,1065,1080,10100,10125	1063,10100	1015	1030	M10	10
T4-CSTB-1212	12xM12	1250,1265,1280,12100,12125,12160	1263,12100	1216	1236	M12	12
T4-CSTB-1412	14xM12	1450,1465,1480,14100,14125,14160	1263,12100	1218	1236	M12	12
T4-CSTB-1616	16xM16	1665,1680,16100,16125,16160,16200	1680,16125	1624	1648	M16	16
T4-CSTB-1816	18xM16	1865,1880,18100,18125,18160,18200	1680,16125	1624	1648	M16	16
T4-CSTB-2020	20xM20	2080,20100,20125,20160,20200,20250	2080,20125	2030	2080	M20	20
T4-CSTB-2220	22xM20	2280,22100,22125,22160,22200,22250	2080,20125	2030	2080	M20	20
T4-CSTB-2424	24xM24	24100,24125,24160,24200,24250,24320	24100,24160	2436	2472	M24	24
T4-CSTB-2824	28xM24	28100,28125,28160,28200,28250,28320	24100,24160	2436	2472	M24	24

Each set is housed in wooden box.

Note: Clamping stud provided to extend height of T-Bolt using Extension nut.

• **BOMBAY**
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