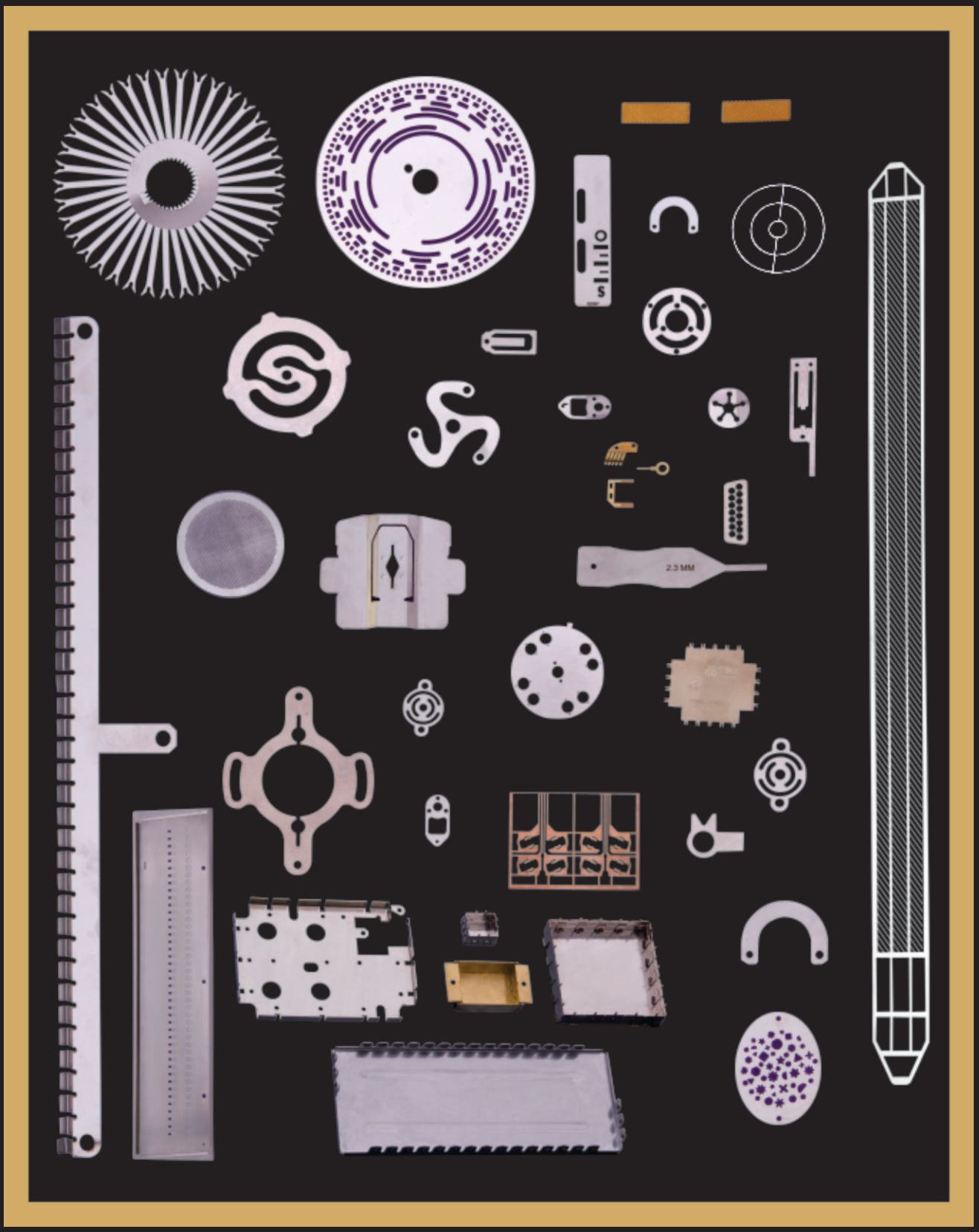
If you can draw it, We can produce it !



TÜV SÜD ISO 9001

KRISTEEL - Shinwa®

AN ISO 9001 : 2015 COMPANY

PHOTO CHEMICAL MACHINING : OUR BUSINESS

Kristeel - Shinwa was established in 1973 in technical collaboration with M/s Shinwa Rule Co. of Japan, pioneering the process technology of Photo Chemical Machining in India. Today we are the most preferred supplier of thin intricate shape of Custom Designed components by Photo Chemical Machining in India.

In our quest of being a leading Chemical Machining Technology Company, we also collaborated with Metal Etching Technology, U.S.A. the leaders for manufacturing world class chemically etched / laser cut SMT Stencils and with M/s Micro Circuit Engineering Corporation, U.S.A. for manufacturing Hybrid and CD Printing Screens.

Our sole objective is to benefit all industries world wide and in India by this novel technic of photo Chemical Machining, which is the backbone of micro miniaturisation.

The process of Photo Chemical Machining does seems very simple. However, the expertise comes through the years of research & development and hard work of our technical personnel.

The process of Photo Chemical Machining at Kristeel is a statistical controlled process with a sharp focus on process capability index at every stage of manufacturing. Our process reliability is supplemented by the state of art manufacturing set-up with Machines imported from U.S.A., Germany and Italy. The class 10,000 Clean Room Dust Free environment is the backbone of manufacturing zero defect Photo Chemically Machined product at Kristeel.

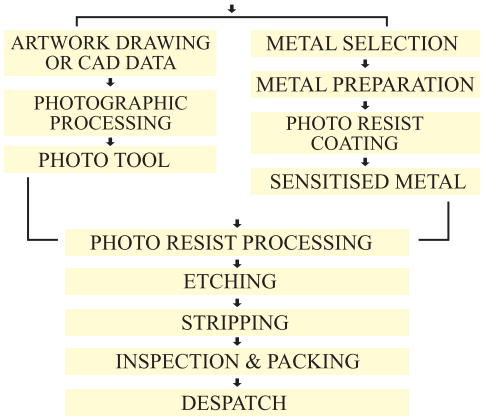
Complete in-house manufacturing facility from designing to finish part at Kristeel speaks of total self reliance. We have all the requisite infrastructure to offer value added secondary operations like Bending, Forming, Tumbling for Surface Finish and Plating (Tin, Silver, Gold, Chrome, Blackodising, etc.

Being a technology company we are now striving towards Six Sigma level of operations in all our manufacturing and business processes. We practice latest management technics like Quality Function Deployment (QFD), Failure Mode Effect Analysis (FMEA), Gauge R & R and Design of Experiments (DOE) at various levels to optimise our process for zero defect.

With our focus on Six Sigma projects, we have successfully executed in-house projects to increase our process capabilities and to enhance productivity throughout the organisation.

It is our endeavour to provide our customer a complete range of reliable technical solutions for their specific requirements.

PCM FLOW CHART



WHAT IS PHOTO CHEMICAL MACHINING?

The image of the part to be manufactured is photographically transferred on to a metal plate. The unwanted Metal is removed by using a chemical etchant,

The finished product is thus produced chemically so that its mechanical characteristics remain unchanged and the part is ready for use without any additional treatment.

The parts produced by photo chemical machining are similar to thin gauge stampings and can be made from sheet or strip of almost any metal or its alloys of any temper right from pre-hardened to dead soft and in thickness from 0.05 mm upwards.

7 MAJOR ADVANTAGES
PCM V/S CONVENTIONAL PROCESSES

Photo Chemical Machining offers many advantages all of which can be translated into cost savings and better product reliability

LOW COST TOOLING :
Other processes require elaborate and expensive machine tools. Tooling for Photo Chemical Machining is done primarily through a series of photographic steps reducing tooling costs yet achieving high accuracy. Tooling cost can be as little as $1/10^{th}$ of that required for other processes, In addition, since there are no cutting tools and therefore no tooling wear (millionth part is identical to the first), maintenance cost of tools is eliminated.

SPEED OF DELIVERY :
Due to the nature of tooling, lead time from design approval to finished parts is cut down to only a few days. So, our process can save you thousands of rupees by delivering the parts much faster than by any other method.

UNLIMITED DESIGN FLEXIBILITY :
Parts whose design is too complex and irregular, and therefore, "impossible or uneconomical" to produce, with standard manufacturing techniques can be produced just as easily, quickly and effectively as simple ones. Thus Photo Chemical Machining provides unlimited design flexibility.

INTEGRITY OF METAL PROPERTIES :
The molecular structure of the metal is not affected by our process. No strains or stresses are induced. Further more, Photo Chemical Machining does not alter the hardness, grain structure or ductility of the metal worked.

TOOLING MODIFICATION :
A change in design means no more than a change in the drawing and film. Design changes are easily made at low cost, saving great losses due to obsoleted tooling as in other processes.

NO BURRS :
Since blanking is achieved "chemically" rather than mechanically, all finished parts are completely burr-free and as flat as the parent metal from which they are manufactured.

PROTOTYPE AND SHORT RUNS :
Due to low tooling cost, design of parts which will eventually be produced by conventional stampings can be produced at a very low cost. This makes Photo Chemical Machining the most suitable method for prototype production and short runs.

DESIGN GUIDE

At Kristeel, R & D is a continuos effort. Through the effort of our team, we have evolved some design guidelines to assist our clients to produce accurate and reliable components. When you are designing for or specifying photo etched or chemically milled parts, there are certain guidelines which will help expedite the job. Kristeel-Shinwa presents this design guide as a general introduction to help you supply prints which take the etching process into consideration. It is suggested that, if you have any question that your specifications are not in accordance with any part of this guide, you can contact our customer support Engineer for specific advice.
Due to the nature of etching process and its under cut edges of resist pattern on surface, all dimensions tolerances and configurations are a function of the thickness of stock being etched as well as the material and to a lesser extent, the process variables.

TAB POSITIONING

Necessity of providing Tabs for the Component:

- To prevent components becoming detached from the main sheet and being lost in the etching machine sump.
- To prevent complex components getting entangled while stripping off the Photo Resist.
- Tabs are often drawn across the etch Bands. These are in triangular shape & apex pointing towards the components. After etching, the Apex should be etched to a width of one thickness, so that the Components can easily be broken out from the retaining sheet. Figure 1 shows both Internal & external tabs (only for illustration) Our process can provide either of the two Internal or External Tabs:-

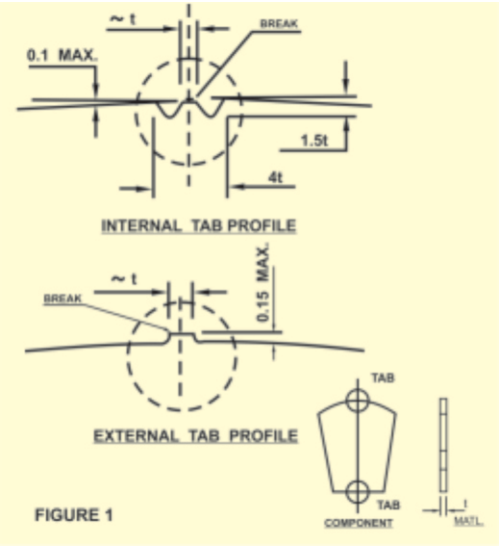


FIGURE 1

DIMENSIONS

For dimensions such as slots in metal corners there are a few guidelines for designers which express practical limitations. The most common rules are as follows:

Relationship of hole diameter to metal thickness:
The diameter of a hole cannot be less than the metal thickness.

Relationship of Inside Corner Radius to Metal Thickness

The smallest corner of radius is approximately equal to the thickness of the metal i.e. for metal thickness of 0.05 mm, corner radius would be 0.05 mm.

Relationship of Outside Corner Radius to Metal Thickness

Outside corners tend to etch more sharply than inside. Therefore a radius of less than metal thickness is obtainable. As a general rule outside radius is considered to be at least 75% of the metal thickness T.

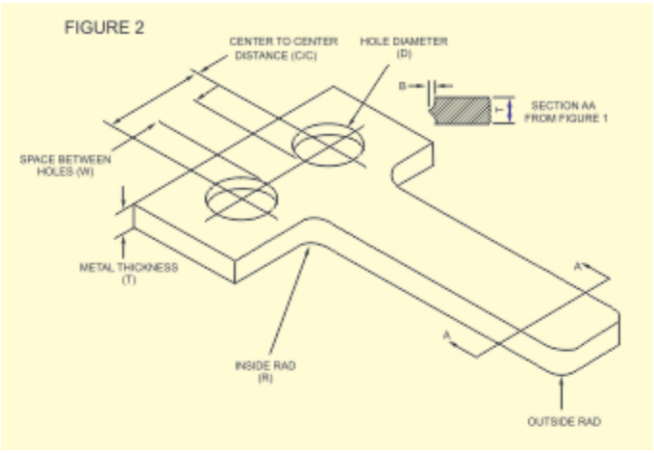
Relationship of Line Width to Metal Thickness

The width of metal between the holes is not a problem in photo-fabrication but when this space is the remaining surface area in a large field of slots / holes then there are limitations as to how small the metal width between the holes can be.

Relationship of Bevel to Metal Thickness

An etchant attacks the material laterally as well as vertically. Assuming that the material is being etched equally from two sides, it can be easily seen that a bevel is produced. As a general rule, when etching from two sides, the bevel is Approximately 10% of metal thickness as shown in figure

FIGURE 2



Etched Dimensions

Because of the many parameters involved in determining etching Tolerance, it is not practical to give a definite rule, which will cover all circumstances. Some of the more common variables, which will affect the etching tolerance are type and thickness of metal, size of production run and number of critical dimensions per piece. For purpose of establishing some general rule of thumb, a tolerance chart of metal thickness indicating the etched dimensions that are achievable for the said raw material thickness is mentioned below:-

THICKNESS (MM) MATERIAL	0.05	0.15	0.25	0.50
	DIMENSIONAL TOLERANCE ACHIEVABLE (MM)			
Copper & it's Alloys	± 0.01	± 0.015	± 0.025	± 0.05
Nickel	± 0.01	± 0.015	± 0.025	± 0.05
Steel Alloys	± 0.01	± 0.015	± 0.025	± 0.05
Stainless Steel	± 0.01	± 0.023	± 0.038	± 0.075

FREQUENTLY ASKED QUESTIONS (F.A.Q):

- **Ques.** What is the maximum component thickness that can be etched?
  Ans. 0.8 mm.
- **Ques.** Which material can be etched?
  Ans. Ferrous and Non-Ferrous Material.
- **Ques.** Will the Hardness, Finish, Mechanical / Chemical properties of the material change after chemical etching?
  Ans. No

SURFACE MOUNT TECHNOLOGY

CHEM - ETCH & LASER CUT STENCILS USP's OF SMT STENCILS

- Manufactured in technical collaboration with M/s Metal Etching Technology, U.S.A.
- Competency to manufacture Fine Pitch Aperture.
- Tolerance on Etched Aperture is +/- 1 Mil.
- Stencils stretched on frames using imported Polyester mesh.
- Stretching & Mounting on imported Pneumatic Stretching Machine.
- Complete fabricated stencil delivered in 4 working days from receipt of approved SMT layout.
- Our Production, Marketing and Design Department are trained overseas to give you complete solution for SMT Stencils.
- Stringent Statistical Quality Control Norms.
- Manufacture of Glue Stencils for printing adhesives for Double Sided Boards an alternative to Dispensing.
- Manufacture of Micro Stencils for Printing and rework.

PRE-REQUISITES TO MANUFACTURE SMT STENCILS

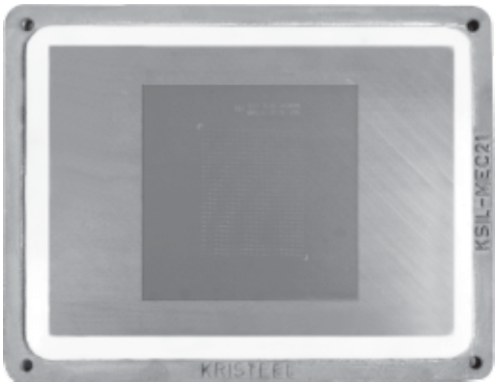
Inputs such as any of the following:

- Gerber data of the Solder Paste Layer along with aperture list
- Bare PCB
- Screen Printer Model

INDUSTRIAL APPLICATIONS

- TELECOMMUNICATION
- DEFENCE
- UNINTERRUPTED POWER SUPPLY (UPS)
- SMT CONTRACT MANUFACTURING HOUSE
- AUTOMOBILES
- OFFICE AUTOMATION
- COMPUTER PERIPHERALS
- CONSUMER ELECTRONICS
- MEDICAL
- ENERGY METERS
- AERONAUTICS

THICK FILM SCREENS



HYBRID MICRO CIRCUIT SOLAR SCREENS USP'S OF THICK FILM SCREENS

- Manufactured in technical collaboration with M/s. Micro Circuit Engineering Corporation U.S.A.
- Consumables, stainless steel mesh, emulsion etc. are imported from overseas suppliers.
- Mesh stretching on imported pneumatic stretching machine.
- Complete thick film screen can be delivered in 4 working days.
- Our Production, Marketing and Design Department are trained overseas to give you complete solution for Thick Film Screens.
- Stringent Statistical Quality Control Norms.
- Expertise in supplying "Imaged, 'Precoated', 'Mesh only' screens and Frames.
- Uniform coating thickness.
- Range of Emulsions for various applications.
- Long print life of screen.
- Screen for fine line resolution printing.
- Custom made frames.

PRE - REQUISITES TO MANUFACTURE THICK FILM SCREENS

Inputs such as any of the following:

- Drawing
- Photo Film

INDUSTRIAL APPLICATIONS

- SOLAR CELLS
- HYBRIDS
- RESISTORS
- CAPACITORS
- DEFENCE
- COMMERCIAL PRINTING

COMPACT DISC PRINTING SCREENS

USP's OF CD PRINTING SCREENS

- Manufactured in technical collaboration with M/s. Micro Circuit Engineering Corporation, U.S.A.
- Screens supplied in following formats:-

Frame Only :- Screen frames supplied for your in-house mesh stretching process.

Mesh Only :- The World's finest high tension / low elongation monofilament polyester meshes appropriately tensioned and adhered to our / your screen frames.

Presensitized : Our precision Mesh Only screens uniformly coated to the desired stencil thickness with one of our advanced Photopolymer or Dual - Curing screen emulsion systems, ready for imaging in your own in-house exposure system.

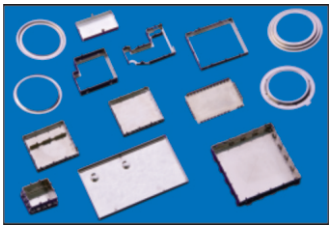
Imaged : Our PRESENTSITIZED emulsion screens exposed with your supplied artwork to ensure precise image reproduction and through curing of the emulsion for excellent print definition and maximum stencil durability

INDUSTRIAL APPLICATIONS

- MUSIC
- ENTERTAINMENT
- SOFTWARE
  EDUCATIONAL

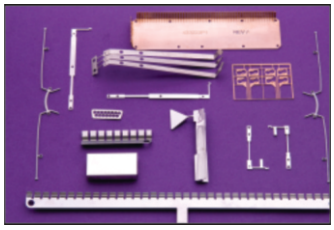
INDUSTRIAL APPLICATIONS

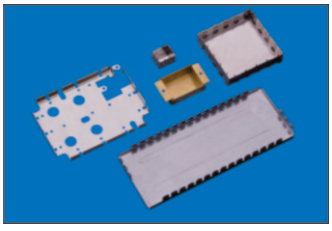
Potential applications of Photo Chemically Machined products are practically found in most of the industries to name a few:



DEFENCE APPLICATION
Cathode Ring, Getter Ring, Assembling Ring, Grids & Kovar Lids, Plating Masks Shielding Cover and Fence, Photo engraved, Separators, Fine mesh, Pin Hole

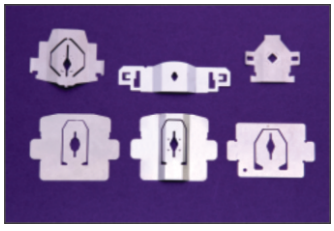
TELE COMMUNICATION
Contact strips and covers, VCO Covers, EMI & RF Shields, Microwave Antenna parts & Strip lines.





RF & EMI SHIELDING
Standard & Custom made Shielding as per design & specification

COMPUTER PERIPHERALS
Ribbon Mask for Dot Matrix & High Speed Printers, Ribbon Guide, Ribbon Feed Tooth, Washers, Earthing Plates, Solenoid Spacers, Circlips, Stopper and Leaf Armature, Paper Cutter.



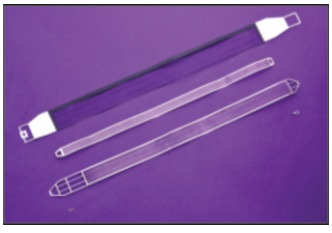
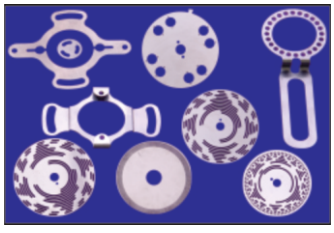
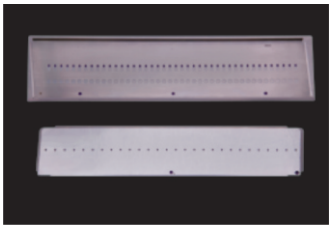


PHOTO COPIER PARTS
Application in Photo Copier machine with or without Graphite Coating & Coro wire.

ENCODER PARTS
Standard and Customized Metal Pulse Encoder Disc Flex Mount Parts manufactured in imported Flat Stainless Steel with critical bending.



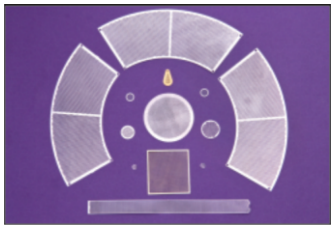


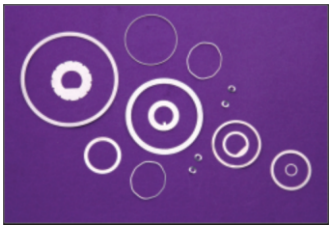
RIBBON SHIELDS: Application in High speed Line printers.

RELAY & ELECTRICAL SWITCH CONTACTS, FUSE ELEMENTS
Lead Frames, Wiper Contacts for Potentiometer & LPG Auto Kit, Insert Bobbin, Heating Elements, Laminations, Armature Springs, Links, Relay Washer, Contactors for Hearing Aids. HRC Fuse elements manufactured using ETP Copper and Silver, Lever Strips,lock lever, Release for Lever Switches, Indicator, and Spring for Fuse Shields & Covers, Bulk Head Plates, Shielding Strips, Battery Contact.

COMPRESSORS
Reed Valve, Discharge & Suction Valve, Flapper Valve oil return Check Valve using a Special Alloy Steel, Pressure Plates, Diaphragm.

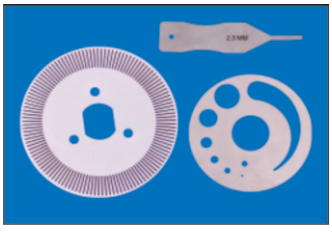
Filters, Strainers/ Selves
Stainers & Filters manufactured in special Alloy Steel, Fine Mesh, used for Juicer, Medical & Defence Industry.





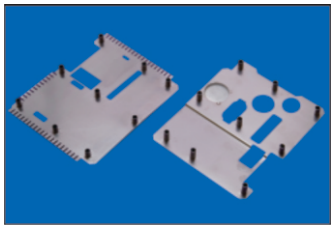
WASHERS & SHIMS FOR AERONAUTICS
Spacers, Tab Washers & Critical custom made Washers.

GOBOS, DECORATIVES, ARTICFACTS & TEXTURING
Over 100,000 range of standard designs of Gobos to suit all Events, Occasions, Festivals, Seasons, Windows, Entertainment, Films, Studios, Sports etc. We also undertake Customised Gobo. Decorative Panels, Idols, Book Marks, Certificates, Name Plates. Range of Textures for Roller:- Leather, Paper, Rexene Industry Wooden Laminates and Mould Texturing.



MEDICAL INDUSTRIAL APPLICATION
Interrupters for Blood / Gas analyzers, Aperture Plates, Specimen Holder Plates & Diaphragm for Leaf Cutting used in Microscope Surgical Blades for Ophthalmic purpose
Blade Slit Mehanism

BLANK, BEND, PRESS PARTS
Critical Bended part for application in Defence, Electronic, Medical, Automobile & Aerospace Industries.



FACTORY

CORPORATE OFFICE

OUR PRESTIGIOUS CLIENTS

SIEMENS · LARSEN & TOUBRO · RANGSONS ELECTRONICS · Lipi Data System Ltd. · Crompton Greaves · MINDA · SAMTEC · BHARAT ELECTRONICS · KAYNES TECHNOLOGY · ONIDA · SGS Tekniks Electronic Manufacturing Services · moserbaer Photo Voltaic · MICO Bosch Group · Kübler · eInfochips · TATA POWER · HAL · pricol · TVS ELECTRONICS · इसरो isro · AREVA · WIPRO Applying Thought · ABB

Decades of Engineering Excellence

TÜV SÜD ISO 9001

KRISTEEL - Shinwa®

AN ISO 9001 : 2015 COMPANY

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