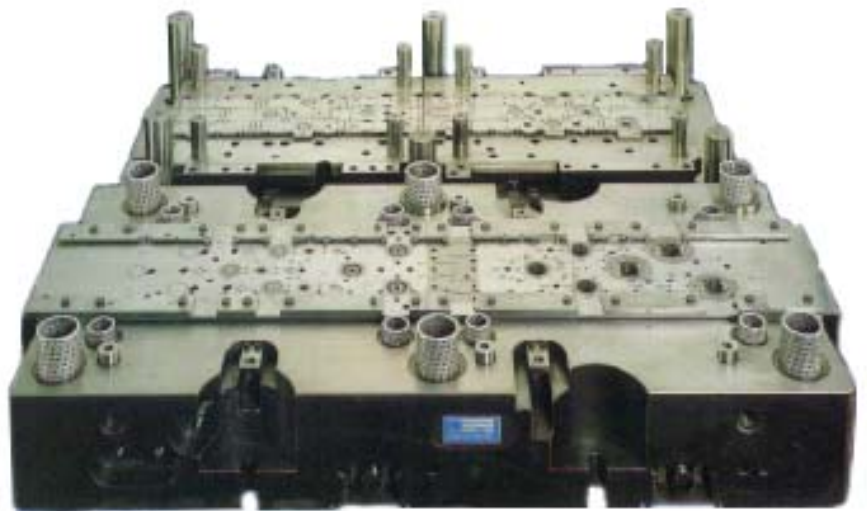
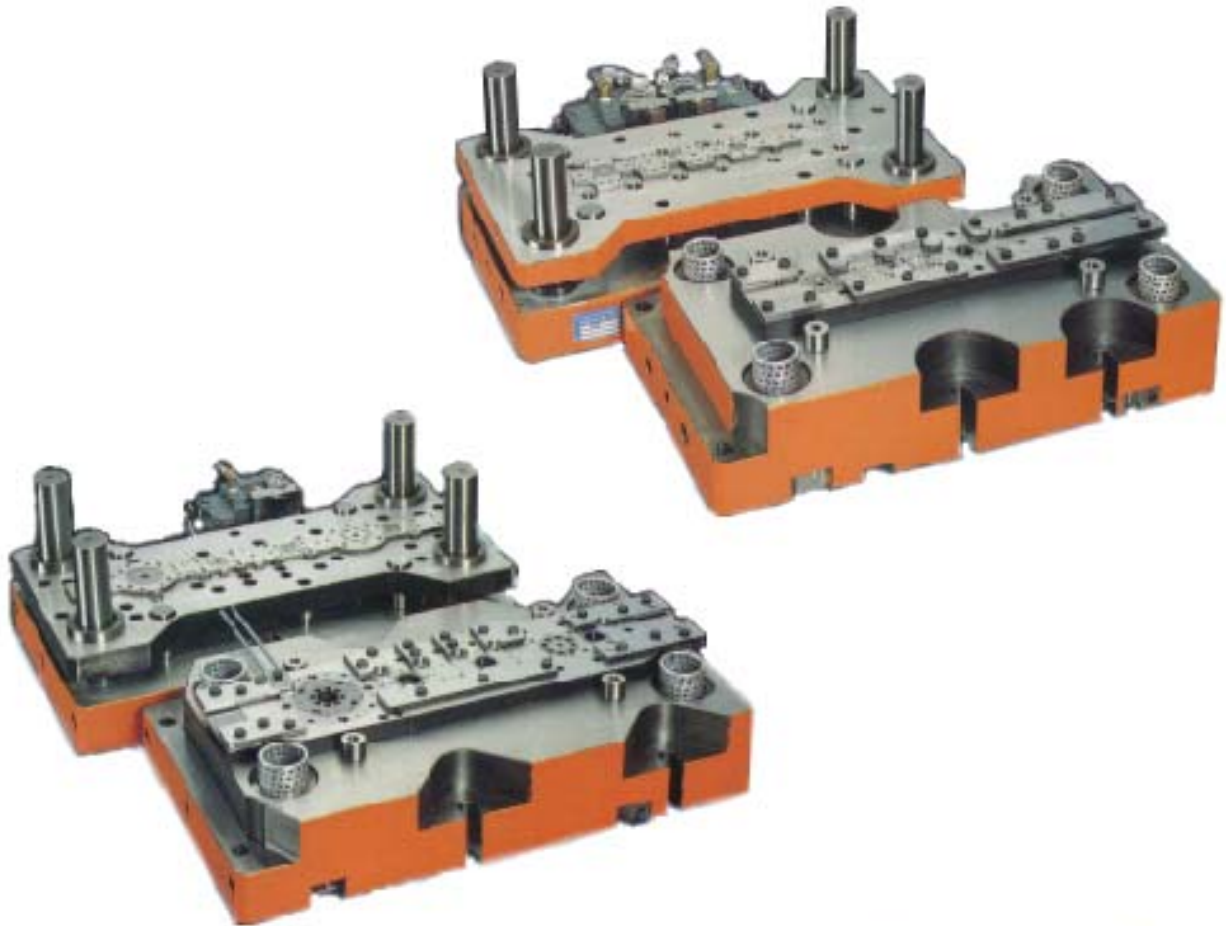


KURODA FASTEC[®] SYSTEM



KURODA

What is "FASTEC?"

FASTEC is KURODA'S revolutionary Fastening and Skewing Technology that allows assembly work to be done inside of the die during stamping.

This technology was developed into actual working machinery by KURODA,

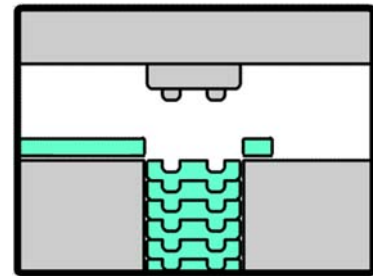
Japan's leading manufacturer of precision machinery. "FASTEC" (Trademark reg.) stands for Fastening, Skewing and Technology .



FASTEC SYSTEM have 3 type of stacking method

FASTEC

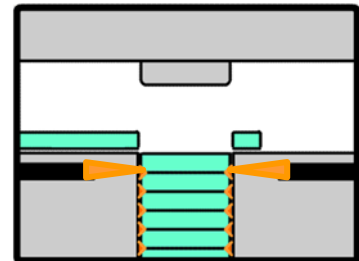
- Concavity stacking
- Sell die



Low cost • Many know-how • Handle to various shape

LASER FASTEC

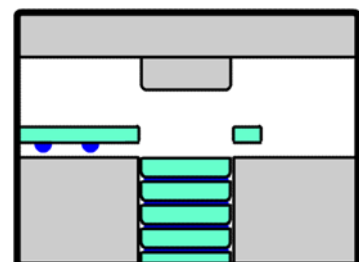
- Spot welding stacking
- Sell product (Core etc.)



Specialized to small product • Strong stacking force from small shape

GLUE FASTEC

- Glue stacking
- Sell product (Core etc.)



New technology • Possible to stack thin material • Realized to usual material

FASTEC[®] SYSTEM

Sell die

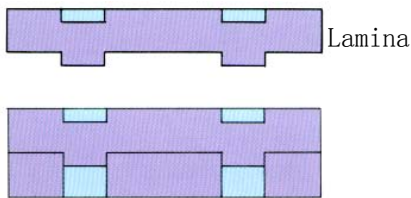
What "FASTEC" dies do ?

FASTEC dies incorporate automatic fastening, rotation, skewing, counterboring and rotational skewing functions to manufacture core laminations efficiently during a continuous press run.

1. Fastening

The die forms convexity and concavity on the lamina.

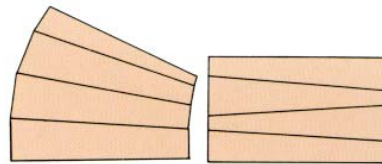
When the convexity are pressed to the concavity in the stamping-out process., the upper and the lower laminas are fastened. When the required number of laminas are fastened, they are separated with a pierced lamina.



2. Rotation

If lamina with slightly different thicknesses are stacked, the shape of the lamina will differ from the design.

To minimize differences caused by the thickness of each lamina, the stamping die stamps out the material while rotating at intervals and then, by stacking the lamina, quality products free from inclination can be produced.



No rotation 180° rotation

3. Skewing

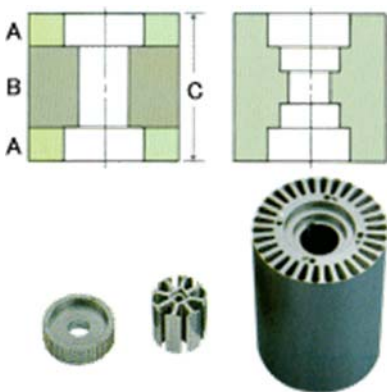
Rotor cores are sometimes skewed to improve the performance of motors. The FASTEC die serves to skew the lamina at any angle when fastening rotor cores.

You can choose between the mechanically driven skew and the step-motor-driven skew according to your requirements.



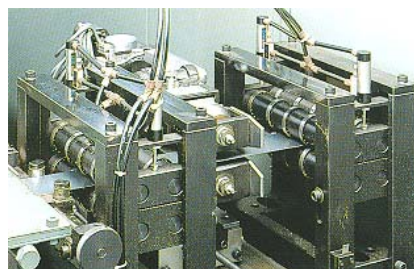
4. Counterbore

The rotor shaft of a motor require a bore with one two steps to accommodate the bearing. The FASTEC system is capable of counterboring by simply presetting the number of lamination of A, B and C.



5. Rotational skewing

The process is a combination of 2. Rotating function and 3. Skewing function. This patented Rotational skewing high technology has been innovated to produce reliable products. All die functions are controlled through the control box.



FASTEC PERIPHERAL DEVICE

STACK HEIGHT CONTROL SYSTEM

The thickness of hoops used for stacking lamina and other parts, tend to vary. This results in an error in the thickness of finished products even if each product is composed of the same number of stacked lamina. The stack height control system consisting of a lamina thickness measuring sensor and a control unit equipped with CPU serves to eliminate this thickness error in finished products to attain the designed thickness independently of the difference in material thickness.

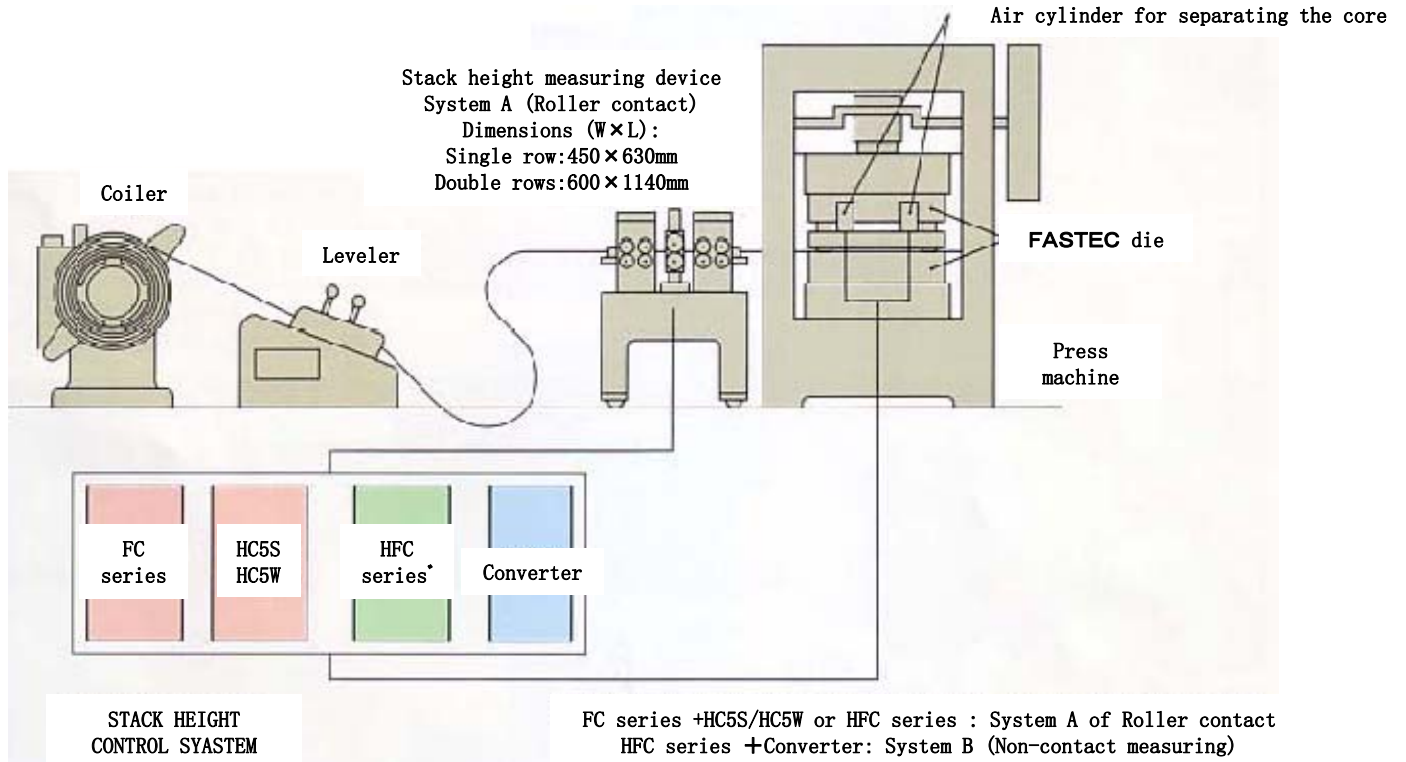
CONTROL BOX

Wide range of parameters for controlling the FASTEC system are available: The FC series are equipped with lamina counting/control functions. The HFC series are equipped with stack height control functions, etc.



The FASTEC system consists of the dies for stamping core laminations and the control box for setting following functions.

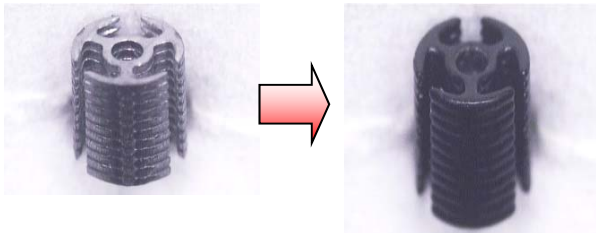
CONSTRUCTION OF FASTEC SYSTEM



Approach of motor core backward operation

INSULATOR PAINTING Purpose: Core insulate by coating

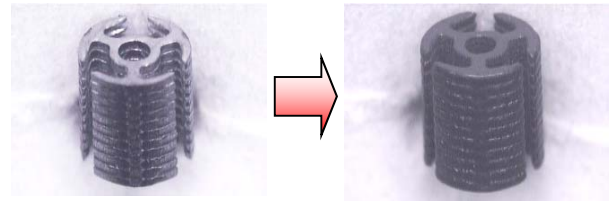
Electro painting



Press item

After coating

Barrel painting



Press item

After coating

The application field of three kinds of lamination method.
(For core shape and steel thickness)

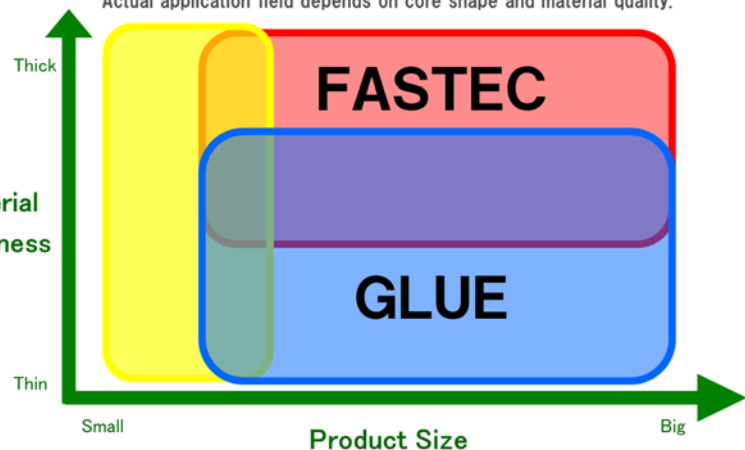
FASTEC: Interlocking Lamination

LASER: Laser Welding Lamination

GLUE: Glue Lamination

Material Thickness

※This is a simple image.
Actual application field depends on core shape and material quality.



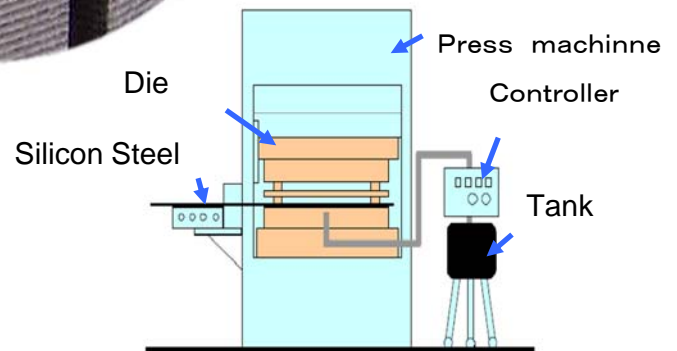
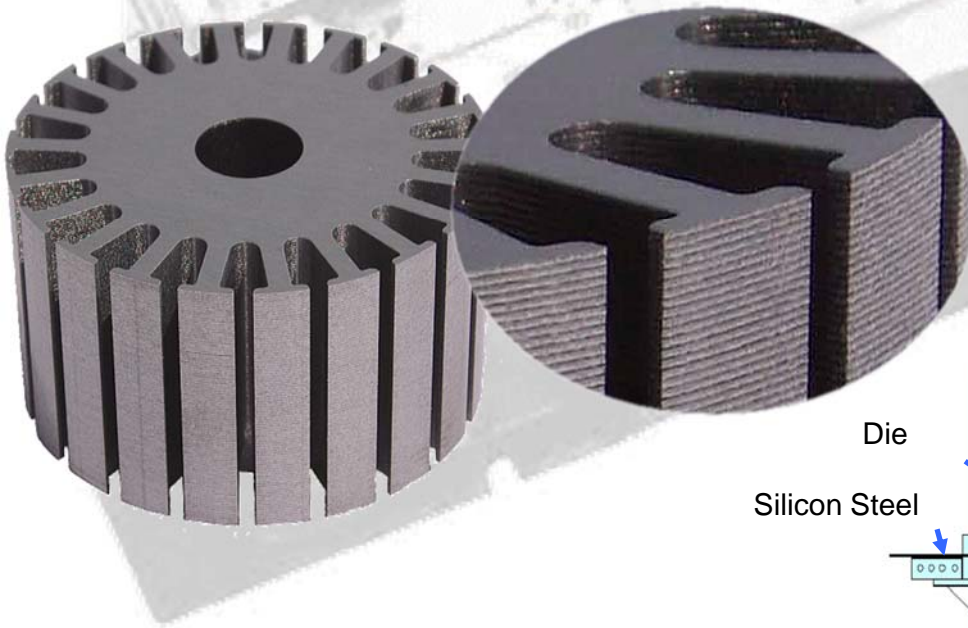
Innovative In-die Motor Core Manufacturing System

Glue FASTEC[®] SYSTEM

Sell product (core etc.)

2009 Japan Excellent Manufacturing Technology Award

2009 Super Manufacturing Automotive Parts Award



Significant Energy Efficiency Gain:
Gluing creates insulation and reduces iron loss

Better Alignment:
Lack of mechanical stress ensures high stacking accuracy

Higher Rigidity:
Gluing leads to higher rigidity and decreases vibration during rotation

Low Noise:
Flat and even fastening of steel sheets reduces wind noise



Decrease CO₂

Glue FASTEC core is a product that can save energy and protect environment

Glue FASTEC SYSTEM

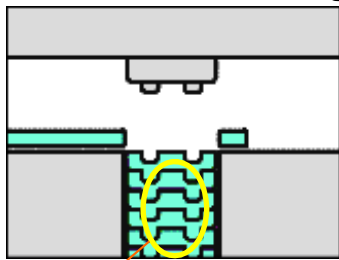
Significant Energy Efficiency Gain ! !

Kuroda has developed a new process in which we use glue to fix steel sheets together in a die. Glue creates insulation and reduces iron loss. Glue FASTEC System provides high-efficiency, high-quality and precision motor cores .

Problem of Conventional Core Manufacturing

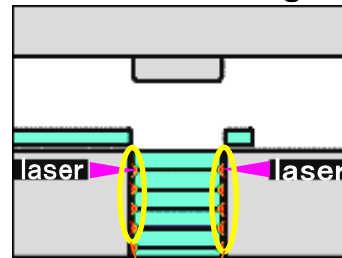
Conventional core manufacturing (mechanical fastening and laser fastening) leads to low motor efficiency by short circuit between silicon steel.

Mechanical Fastening



Short circuits

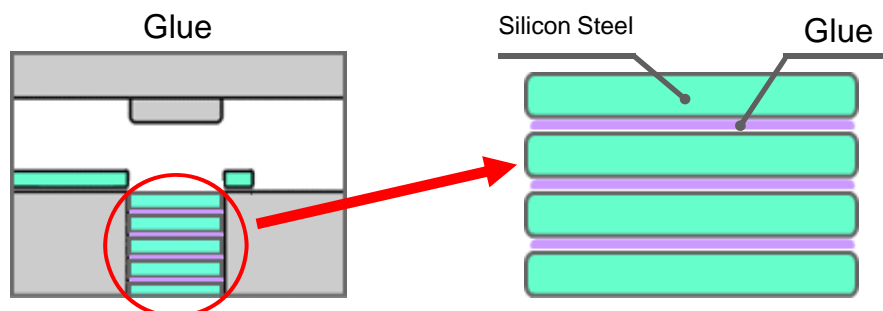
Laser Fastening



Short circuits

Glue FASTEC System

Glue creates insulation, prevents short circuits and thus reduces eddy current.



LASER FASTEC®

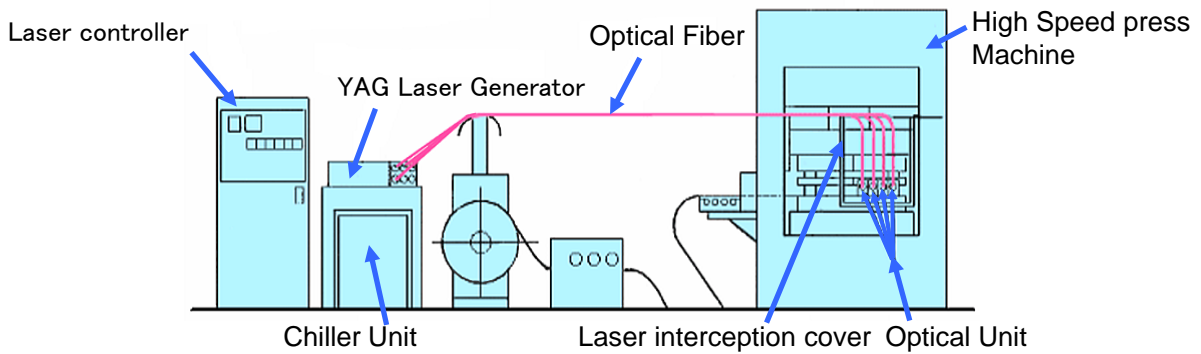
Sell product (core etc.)

High-precision small sized motor core



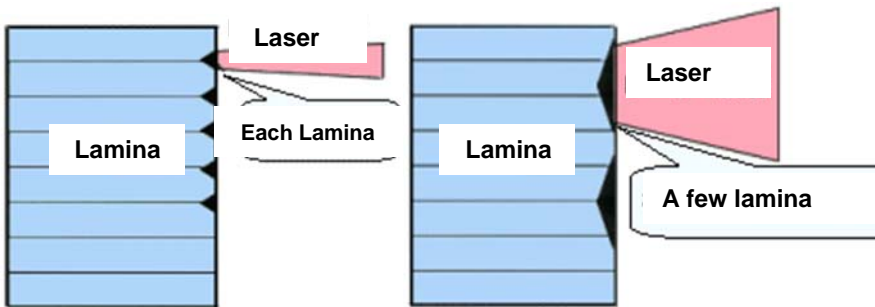
LASER FASTEC TECHNOLOGY is the one which is developed for mass-production of high-precision small sized motor core by YAG laser in stacking lamination. The regulation of product shape has a tendency not to be influenced and the small sized lamination core which can not be made so far can be mass-produced with stable strength and quality.

CONSTRUCTION OF LASER FASTEC



Automatic Stacking by YAG LASER WELDING

Each lamination can be pointed and welded from the side. There is some case that a few lamina can pointed and welded at the same time taking into account of efficiency.



The amount of energy and the focus point can be controlled depending on the thickness, shape, and material of product.

LASER FASTEC CORE



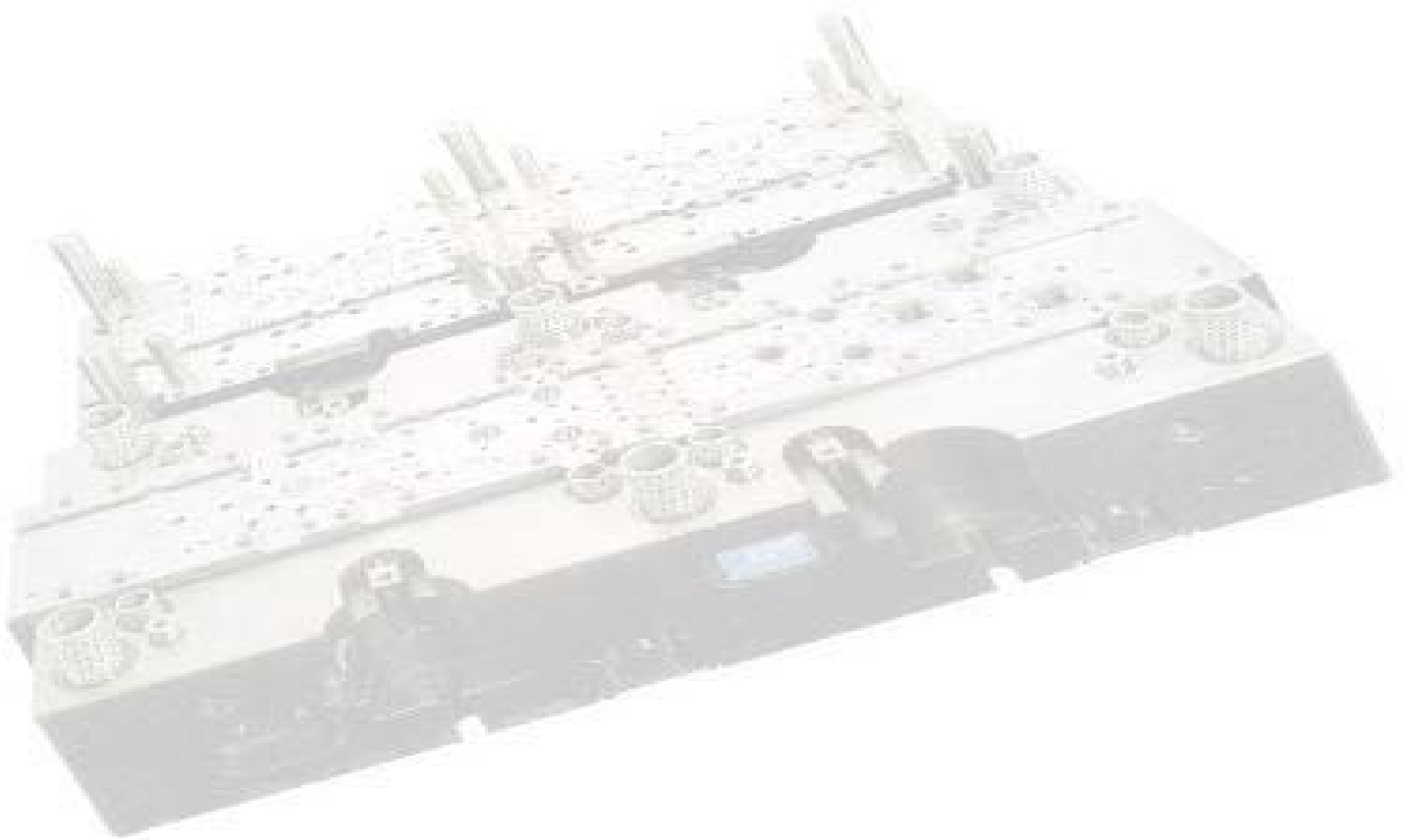
- Micro-Motor Core**
- For vibration motor
- For digital camera
- For VTR camera
- For printer

(Scale : 1mm)



- Spindle motor core**
- For HDD

(Scale : 1mm)



KURODA PRECISION INDUSTRIES LTD

HEAD OFFICE

Kawasaki Tech Center,
580-16 Horikawa-cho, SHIMOHIRAMA, SAIWAI-KU, KAWASAKI
KANAGAWA, 212-8560, JAPAN

TEL :81-44-555-3924

FAX: 81-44-555-5825

NAGOYA BRANCH

2-243, KAMIYASHIRO,MEITOU-KU,NAGOYA,
AICHI, 465-0025,JAPAN

TEL: 052-771-4211

FAX: 052-772-6722

E-mail: ps_j@kuroda-precision.co.jp

<http://http://www.kuroda-precision.co.jp>

MALAYSIA:

KURODA PRECISION INDUSTRIES (M) SDN.BHD.

Block C & D, Lot 3, Solok Waja 3, Bukit Raja Industrial Park, 41050, Klang,
Selangor, Malaysia.

TEL 60-3-33413790 (Hunting Line) FAX 60-3-33413736

CHINA:

KURODA PRECISION INDUSTRIES PINGHU CO.,LTD

NO.256 Chengbei Road. Danghu Town Pinghu City. Zhejiang. P.R. China.P.C:314200

TEL 86-573-85010786 , 86-573-85010790

FAX 86-573-85014123