Yamagata Prefecture

SUZUKI MACHINERY CO., LTD.  (Yamagata City)
Small type overlock sewing machine having added value

MICRON MACHINERY CO., LTD.  (Yamagata City)
Grinding Solutions, pursuing for nanometer level roundness

Shinwa Industrial Ltd.  (Shinjo City)
Metal plating technology of Shinkansen for rocket

Watec Co., Ltd.  (Tsuruoka City)
Pioneer of ultrasmall CCD camera

Prefact Shirata Factory Co., Ltd.  (Higashine City)
The world's first linear motion bearing without lubricant

Hi-MECHA CORPORATION  (Yonezawa City)
Establishing the global standard of tantalum capacitor manufacturing equipment

Oriental Carpet Mills, Ltd.  (Higashi-Murayama Gun)
The world’s accepted carpets by traditional technology and its own technology
Small type overlock sewing machine having added value

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Established in 1953
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http://www.suzuki-ss.co.jp
Shigeo Suzuki
President

Ahead of others in the world, it developed the small type overlock sewing machine having the jet-air threading system, automatic thread tension adjustment system and capable of beginners operating easily.

Having top share in the field of small type overlock sewing machine in the world

Basically small type overlock sewing machine was very complicated machine that was requested about 35 points troublesome threading before sewing. For the reason of it, it was a source of headache for home use. Suzuki Machinery developed unique system capable of beginners operating easily, and has top share in the field of small type overlock sewing machine in the world. It has 90% market share of top-class small type overlock sewing machine at over 100,000 yen of retail price in Japan.

Continuous developments of convenient system and effective use of patents

Suzuki Machinery aims at developing the non-inimitable and convenient products. It completed several of the world’s first mechanism continuously such as “Jet-Air Threading System” capable of threading by air pressure, “Auto Tension” (automatic thread tension adjustment system) completing beautiful stitch performance without any adjustment even if the thickness or kind of fabrics changed during the sewing and “Wave Lock” enabling decorative wave stitch. Patents based on these successes are applied to 25 countries in the world. It received the certification of remarkable invention in 1997 (by Director-General of the Science and Technology Agency) and Intellectual Property Performance Award in 2002 (by Commissioner of Japan Patent office).
Grinding Solutions, pursuing for nanometer level roundness

MICRON MACHINERY CO., LTD.
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Established in 1961
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Hiraku Shirata
President

Achieving the high-precision grinding solutions in automotive parts and home appliance industry by centerless grinders and internal grinders that were developed through seeking perfect roundness.

Concept of "Pursuing perfect roundness" and nanometer-level precision

MICRON MACHINERY, a machine tool maker, continues seeking perfect roundness based on the concept of "Pursuing perfect roundness", as a leader in the market by developing state-of-the-art centerless grinders and internal grinders of the processing precision at nanometer level.

Contribution to clean diesel engine

With development of the common rail system, nitrogen oxides (NOx) and particulate matters (such as black smoke) of diesel engine, have reduced dramatically. Micron’s centerless and internal grinding technology is the greatest contributor of processing the parts for the fuel injection system requiring the highest accuracy and the tightest tolerance in geometries. It is highly appreciated not only in the worldwide market, and is exported to overseas including U.S.A.

Common rail system is the system to store high-pressured fuel and supply it uniformly to each injector (fuel injection device to cylinder). It achieves the ideal combustion and low-fuel consumption and anti-pollution of exhaust gas by controlling fuel injection pressure, injection timing and injection period (injection quantity) precisely by electronic control.

Centerless grinder application
Internal grinder application
High-precision and efficiency centerless grinder for fuel injection parts
Metal plating technology of Shinkansen for rocket

Shinwa Industrial Ltd.
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Junko Amano
President

Having the strength of the forming process technology and the welding technology of large 3D structure of sheet in complicate shape, and accepting the research & development of rocket engine nozzle.

"Takumi technique" developed through manufacturing Shinkansen carriages

Former company of Shinwa Industrial was the manufacturer of Shinkansen carriages which was one of 2 small companies left. It was established by young staff after bankruptcy of the former company. 38 years old is the average age of the company. But it perfects the forming process technology by hammering metal sheet one by one and the sheet welding technology of complicate shape to proficient skills. It is proud of its “competitive metal plating process of large 3D structure of sheet”.

Processing technology caught the eyes of space appliances makers

When Shinwa Industrial was established, space appliances makers were looking for a manufacturer of the next generation of rocket engine nozzle. The nozzle is the spherical structure of 3m in height and has to be produced by only one thin metal of 0.5mm to 1mm in width without reinforcement material. Several companies tried it, but no company succeeded. The airspace alliances maker caught the eyes of the company who has experiences in Shinkansen.

Completing trail products by its great forming process and welding technology

Through a trial and error process, it completed the trial products on schedule by its great forming process and the self-developed welding technology after deciding the way of dividing materials and production method by its design know-how of experiences based on the simple drawing from space appliances makers. Its research and development is under progress orderly. It also produces parts of Chinese Shinkansen carriages, and its artisan skills are used of them.
Watec is the synonym for miniature camera in the world. It combined CCD with electronic circuit design and succeeded in developing super miniature camera by special circuit technology of sensibility amplification.

Various delivery histories creating reliability

It succeeded in the development of CCD (charge coupled device) having 1/4 as the ratio with the conventional one, 1/8 as the weight ratio and 1/20 as price ratio by the technologies of electronic circuit design and special circuit of sensibility amplification. The special amplification circuit enabled shooting only by lighting of incense stick even in dead darkness. The reliability of the special technology is certified by its deliveries to 60 countries including Space Shuttle, Louver Museum, World Swimming Competition and National Astronomical Observatory. It has top share as world brand for small monitoring camera and is still developing smaller ones.

Amazing direction to buyers

Watec was established as a venture company having 6 engineers. To make difference from the products of major electronic appliance maker, with miniaturization as theme, it focused on foreign market. In an overseas fair, it demonstrated the train, which has its CCD camera and runs in the miniature of ultra-precise towns, and played the video. Buyers were astonished at the production of clear pictures with such a small camera. It succeeded in appealing its own technology and creating demands.

Imitation

It expands the application areas to industrial and medical parts. But counterfeits having exact same serial number and log happen to be marketed before its new products by copying the trial products at fairs.

By its continuous technology development, it succeeded in developing the camera which has the size of caramel box and is capable of shooting from the hole of 2mm.
Developed the world's first bearing without lubricant by using new material of rice bran. Used even in Subaru Telescope of Hawaii Observatory of National Astronomical Observatory under severe condition.

**Ceramics of new RB material from rice bran**

To put added-value on agriculture, then Professor Hokkirigawa of Yamagata University developed the carbon material (RB ceramics) by removing oil of and molding rice brain which are available in large quantities in Tohoku area of the rice-producing region. RB ceramics is light and solid, and has the features of excellent durability and low coefficient of friction. As application product, both the professor and the company jointly developed the runner with low coefficient of friction (blade touching ice) which was used by Japan bobsled team at Nagano Olympic.

**Developed the linear motion bearing using RB ceramics by industry-university joint research**

Shirata Factory developed the world's first linear motion bearing without lubricant together with Professor Hokkirigawa based on the judgment that RB ceramics is the appropriate material for bearings of its main products. The bearing has the slippery, noiseless and less-wearing and fuss-free features. It is used for the bearing guide rail of the producing machines of semiconductor and liquid crystal etc. In addition to that, it is introduced to the machines for the production of foods and medicines since no lubricant is used.

**Oil-less linear motion bearing for infrared rays analysis equipment of "Subaru Telescope"**

In 2001, the oil-less linear motion bearing using RB ceramics was selected for the movable part of infrared rays analysis equipment of "Subaru Telescope" at Hawaii Observatory of National Astronomical Observatory. "Subaru Telescope" requires the high precision at not greater than one micron under the severe condition of cooling down to -200 centigrade degrees. The conventional bearing has the problems in adjustments since its lubricant set in under the low temperature. But the problem was solved completely by the oil-less bearing.
Hi-MECHA's tantalum capacitor manufacturing equipment is the Global standard. Their equipments produce 75% of tantalum capacitor in the world.

### Producing the manufacturing equipments of parts necessary for the circuits of PC and communication devices

Hi-MECHA, which is the development and producing company of the manufacturing equipment of electronics parts and various FA facilities, has focused on the producing equipments of tantalum capacitor as potential for growth. Their manufacturing equipment of tantalum capacitor, which was developed in 1993, was recognized in the industry and has been used widely as global standard. Their equipment produces 75% of production of tantalum capacitor in the world and has become the major product to the company.

### Learning "technology and management" of major companies as partner instead of subcontractor

Since the start of the business, Hi-MECHA has been aiming at self-driven management as the partner of major companies instead of subcontractor. They learned and developed the advanced technology in house. Thanks to the effort, they have grown to an equipment manufacturer of top brand in tantalum capacitor industry. Hi-MECHA also puts strong effort on the personnel training.

### Introducing the technology to the field of Semiconductor and Energy device

Recently, Hi-MECHA is studying the possibility to enter into Semiconductor and Energy device areas by their advanced technology. Especially, they are developing the equipments of lithium-ion secondary battery and large size capacitor, hoping to secure the clean energy for the global environment improvement.

| Pellet Welding machine for tantalum capacitor | Leadframe assembly machine for tantalum capacitor | Forming-taping machine for tantalum capacitor |
The world’s accepted carpets by traditional technology and its own technology

Producing high-qualified carpets by the traditional handweaving technology which expresses Japanese sense of beauty and its only chemical glazing and washing technology. Deliveries to the Imperial Palace and Vatican.

Starting business in the historical town of fibers and textile

Early in Showa, Oriental Carpet started business by introducing the handweaving technology in Yamanobe-cho in Yamagata of Tohoku area which has the history of fiber and textile. Maximizing the use of delicate sense to "beauty" of Japanese, it has produced handweaving carpets by expressing elegant color patterns. The beauty was selected by Bank of Japan in the prewar days and in captain's room of battleship Yamato in wartime.

"Japanese carpets"- succession of its own technology by traditional handweaving works

Even now, it uses the traditional handworks in all processes from design of carpets to manufacturing. Its high handweaving technology of craftsmen and its own chemical glazing-washing technology (mercerizing) give "luster like porcelain" and "touch like fur" to weaved carpets. It achieved the intensified quality control by the integrated processes having specialty in all processes of materials, design, dyeing and weaving.

The world's accepted completeness

The beauty and high completeness are certified by the deliveries to famous structures such as the Imperial Palace, Imperial Hotel, Vatican and embassies.