Okayama Prefecture

Kaaz Corporation  (Okayama City)
Manufacture of gear box for grass mowers based high-precision low-cost processing and powder metallurgy technologies

Nakashima Propeller Co., Ltd.  (Okayama City)
World-leading ship propeller manufacturer

Takaya Corporation  (Ibara City)
Enjoys the top market share in the world in printed-wiring board testing systems

Meidai Corporation  (Kurashiki City)
First commercialization of Tetra-axial® weaving machine “Tetras®” in the world

Syoei Co., Ltd.  (Mimasaka City)
Holds 60% global market share in cams for ship engines

Yasda Precision Tools K.K. (Asakuchi Gun)
World-leading ultra-precision machining center
The company has refurbished its manufacturing and assembling method for gear boxes used in grass mowers and realized cost reduction and high-quality products by adopting new technology, new materials and a new production process. The company has secured the world’s top market share of 40%.

**High quality and low cost**

The company has been promoting “development of in-house products” under the slogan of “creation of original Kaaz” and thoroughly implementing its basic policy of producing “high-quality yet low-cost” products. Company’s grass mowers are without peer in their lightness in weight, low vibration, and low noise. The company has also developed powder metallurgical gears and precision casting parts that can be molded without machining in cooperation with a specialized company, resulting in a drastic cutback on production processes and achievement of laborsaving.

**80% of the products are bound for overseas markets**

80% of the company’s products are sold in overseas markets. The company sells “Gear Box,” the core component of grass mowers, to its competitors abroad. The product has captured the world’s largest market share of 40%.

**More than 100 kinds of products**

Besides grass mowers, the company manufactures more than 100 kinds of products bearing the “Kaaz” brand name, including a high-value-added self-propelled lawn mower mounted with HST (hydraulic step less transmission), a blower that collects fallen leaves by utilizing wind blasts, and a shaker that drops olive berries by shaking olive trees. They are all well received not only in Japan but also in overseas markets.
The company produces custom-made ship propellers meeting diversified needs of customers by combining its artisan skill of producing molds from sand without using prototypes and of detecting 1-100\textsuperscript{th} millimeter of anomalies by simply touching propellers in the finishing process, and digital technology.

### 30\% global market share for ship propellers

The company has so far produced about 1 million units of propellers with diameters ranging from 18 centimeters to 10 meters. The company is the top manufacturer of ship propellers with its domestic market share standing at 70\% and its global market share at 30\%.

### Union between three-dimensional processing technology and the craftsmen’s finishing operation

Nakashima Propeller Co. offers a full range of propellers from small to large and is capable of providing a full set of services ranging from design to production and technology support. It is also capable of delivering high-quality products on short notice. In order to produce a large propeller, firstly, it is necessary to sculpt a sand mold, cast copper alloy in it to produce a metal cast, and then process it with high-performance NC machine tools. In addition, the edges of the propeller have to be ground to an accuracy of 1-100\textsuperscript{th} millimeter by hand. Since the propeller is about 13-sq.-meter large and has a helicoidal surface, it is said to be difficult to determine anomalies even with modern computers. But the company’s veteran craftsman can handle it with his fingers.

### Challenging new business fields by making use of technology potential

By taking advantage of these technology potentials, the company has been aggressively challenging new business fields, such as development of artificial joints, medical-operation support robots, development of system software, and three-dimensional modeling system. In 2005, the company received the first “Award of Japan for Crafting”.

Craftsmen’s skill to determine anomalies as small as 0.01 mm

Propeller for large vessel
The company led the world in the manufacture of Flying probe test systems for printed-circuit boards used in electric equipment. The company holds the largest global market share of 60%.

**Shift from textile business to the semiconductor area**

In response to changes in the post-war industrial and employment structures in Japan, the company has diversified its business field from the textile industry to the electronics industry. It has expanded its business by merging with a major semiconductor manufacturer in the field of the semiconductor post-processing business and entered the semiconductor business by capital participations in local electronic component makers.

**Global market share of 60%**

The so-called Fixtureless tester, pioneered by the company employing high speed independently moving probes for detection of manufacturing defects on printed circuit board, has been well received by electronic equipment manufacturers and EMS/CM plants around the world. The company has captured the largest global market share of 60% and established itself as the “leader in board testers.” The company is also engaged in the assembling business for mobile phones and other information & communication equipment, as well as developments of control system for IC tags.

**Commitment to domestic production**

While many Japanese corporations are shifting their production bases abroad, Takaya Corp. has been maintaining its policy of focusing on domestic production by utilizing its technological innovation and creativity.
The company has developed a weaving technology to weave two yarns obliquely to a warp-and-weft fabric. Fabrics woven in this manner have strong tear and torsional strength are expected to be used in a wide range of fields.

**Accumulated technology to produce tough fabrics through Webbing slings production**

The company started as a manufacturer of fabrics for handbags etc. and tablecloths in 1963. The company developed new products in the field of Webbing slings, or belts for heavy-duty lifting, in 1974 and thereafter expanded its businesses by enhancing its technical capabilities.

**Development of Tetras® automatic loom; first in the world**

Tetras® fabrics are those that have two yarns woven obliquely to a warp-and-weft fabric. They have strong dimensional stability in all directions and their tear strength is twice as strong as ordinary fabrics. Triaxial woven fabrics in which two yarns are woven obliquely to a weft had been available. The company has successfully commercialized tetra fabrics for the first time in the world. The company hit on the idea of developing the technology from hand-knit rattan chairs. After developing a test model, the company came up with Tetras® automatic looms in 1989 and began marketing them recently.

**Put to practical use in sporting goods and speakers**

Tetras® fabrics have been used in tennis rackets and shafts of golf clubs produced by major sporting-goods manufacturers. Recently, they have come to be used in speaker cones (diaphragms). Since Tetras® fabric has strong torsional strength, golfers using the clubs can enhance direction and carry. Speakers using tetras fabric are also well received, as they produce clear-cut sounds. The technology is expected to have wide application not only in textile-related fields but also in a wide range of other fields, including automobile, aerospace, medical services, and construction.
Syoei’s cams are highly valued because of the company’s strict selection of materials, sophisticated heat treatment, and high-precision machining capabilities. The company has jointly developed a 5-axis NC special machine tool incorporating its grinding know-how.

**Cams for ship engines that require “collective strength” of machine parts production**

Cams for ship engines require a high level of dimensional accuracy, strength, durability and surface smoothness. The company meets all these requirements.

The company was initially producing host bulb engine parts but sequentially expanded its business into production of cams, piston pins, and rollers.

- Cam and chain gear fit in the axis

**Important points: High precision and durability**

Since cams for ship engines transmit strong power for a long period of time (more than 20 years), they must have exact accuracy of dimensions and long-term durability. Backed by its long years of cam production, the company has established a strict standard for selection of materials, sophisticated heat treatment technology, cutting technology, and surface grinding technology. These technologies have resulted in the patented “Large Cam and its Production Method and Forging Metal Mold.” The company has developed a special machine tool incorporating its grinding know-how jointly with a manufacturer. Its smoothness is Ra=0.2, or almost equal to a mirror surface.

**Wins great respect from ship engine manufacturers and enjoys 60% global market share**

Asia, including Japan, South Korea, and China, is one of the leading shipbuilding centers in the world, launching more than 80% of the ships built. Syoei holds a 60% global share of the cam market. The company is no longer a subcontracting supplier of cams. It is now highly trusted as an essential partner. President Tsujii attributes the source of trust to the company’s “workership” and stresses it is one of the strong points of Japan.
Carrying on the tradition of advanced developmental technology and sophisticated techniques of skilled workers, Yasda has developed ultra-precision machining center with a machining accuracy of 0.1 μm. The company has established the international reputation: “If you seek accuracy, it’s Yasda.”

**Developed Japan’s first “model machining center”**

The company started business specializing in boring machining of automobile cylinders in 1929. Later, the company shifted its business focus to horning machines and boring and milling machines, and developed Japan’s first “model machining center” in 1966. At present, the company produces various machining centers.

**Wins great respect from leading manufacturers in the world**

Yasda’s high-precision machining centers and CNC jig boring machines are highly valued in the fields requiring extremely high accuracy such as ultra-precision die machining and parts machining, including automobile engines for space development and formula cars, communication equipment like mobile phones, optical equipment like cameras, and high polymer chemical products like plastics. Leading manufacturers in the world have a great respect for the high reliability of the company’s products.

**Striving for “technology,” not for “size”**

Under the management philosophy of “Striving for the best, not the biggest,” the company is always striving to produce the best products. In order to materialize its original and advanced philosophy of development, the company has been handing down many advanced techniques, technologies, and know-how that it has accumulated over 70-odd years, among them high-precision machining techniques and human skill to build precision into products. It is this Yasda spirit, or commitment to precision, that has produced well-regarded, high-precision machining centers.