



Premium Patented Fastener Companies

Applying for patent and intellectual property has become increasingly popular on a global scale in the automotive, electronics, software, machinery, and the fastener industry all the way through the whole manufacturing industry. Global fastener companies are adding up their number of product patents. Particularly the Japanese fastener companies roll out new patented products almost every year, and their R&D capabilities and quality are on par with American and European ones. As a fundamental requisite, patented products must have their unique features, but they also need to be understood for their strengths, features, performance, and why they are worth the value before they can turn into bestsellers.

As one of the key supporters for fastener trade and industry development, Fastener World put up a series of featured reports on “patented fastener products” in order to build the bridge for fastener inventors and the global market. Our editors picked up the following patented products from Japan and introduced their ground-breaking design and performance in full detail, through which our readers can have a glimpse of fasteners’ future!

1.

**“Tension Nut”
for Large Nut
Fastening**

Bolt-Engineer Co.

2.

**“Round Lock”,
the Anti-theft
Fastener**

Euroke Techno Parts

3.

**“TIGHTNIK”, Wood
Shrinkage Tracking &
Anti-vibration Washer**

T. Kato



Bolt-Engineer Co., Japan Farewell to Electric or Hydraulic Tools; Large-size Bolt Fastening with Patented “Tension Nut”

by Dean Tseng, Fastener World

Bolt-Engineer is a specialized maker of fastening tools for large-size bolts (M30 and above) with 30 years of history, selling hydraulic torque wrenches, bolt tensioners, electric nut runners and gear wrenches domestically. It has newly-developed and began global sales of the patented “Tension Nut”, the first of its kind in the fastening tools industry that allows users to fasten large bolts without using hydraulic or electric tools. Fastener World magazine interviewed the company’s overseas manager, Mr. H. Saeki on more details of this groundbreaking product.

Trio-structure design, No Electric or Hydraulic Force Required

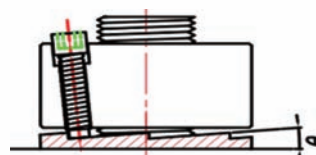
Regarding the design of Tension Nut, the manager explained it is composed of a round nut, a bevel disc, and hexagonal socket screws (tension screws). The bevel disc has some upward slopes at a θ° angle to the loosening direction. The round nut is inserted with multiple tension screws inclined at the same θ° angle. The tension screws are in right angle contact with the bevel disc. With the tension screws inserted to the round nut, the loads are dispersed, and therefore it is possible for users to use low torque to fasten. For M30 bolts, with Tension Nut the required torque will drop from 1260Nm to 35Nm; for M42 this will be from 3600Nm down to 70Nm; for M56 this will be from 8666Nm down to 120Nm. By fastening the tension screws with a hand torque wrench or impact torque wrench (10-260Nm), the target bolt can be fastened at a force range of 55-2000kN, which means no electric force (e.g., hydraulic bolt tensioner) is required and users can correctly manage bolt tension.

Counter-Loosening Functionality

“The inclination of the bevel disc works with the inclined tension screws,” said the manager, “so the loosening of the nut will conversly create more tightening effect. It is not friction but through the increase of axial force that creates counter-loosening functionality.” Any slight displacement of the nut will push up the tension screws on the slopes of the bevel disc and increase the bolt’s axial force, which causes the disc to be pressed against the seating surface and increases the friction on the rough surface of the disc. This is the mechanism that keeps the nut from loosening. On a side note, Tension Nut can couple with the “Counter-loosening Cap” for dust prevention.

The manager said Tension Nut is galling-proof and seizure-proof and can resist high temperature up to 250°C. The company is looking for dealers and recommends this product to large compressor, pressing/forging/extrusion forming/metal forming machine users.

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Euroke Techno Parts (Japan) The Anti-theft Fastener Inventor Takes Its Place in Global Critical Infrastructure Security Market

by Dean Tseng, *Fastener World*

Euroke is an R&D specialist of anti-theft/temper-proof screws, bolt and nuts. Its founding and success revolve around the very core value of Euroke's motto: "A company lives to serve and aid the society". President Mr. Fukuyasu Takenaka started out selling automotive equipment. Here, the Japanese inventor and entrepreneur told *Fastener World Magazine* how he brainstormed his way into the global critical infrastructure market with his innovative screw inventions.

Burglar-proof Fastener

Many years ago a stroll in a hardware store led Fukuyasu to find out that common special screws are often displayed on racks along with removal tools, which already makes the purpose of anti-theft pointless. He came up with an idea to invent a screw called "JCC Lock" with a hexagonal socket head that can allow for a hexagonal wrench to fasten it. After fastening, the socket is to be sealed with a perfectly sized metal part. The screw will be removable only when the buyer intends to do so by means of Euroke's self-developed special tool. The tool utilizes the markings on the screw head and is available only for select stores. Unlike its counterparts, if a burglar were to vandalize and remove this screw, it will take tremendous time and make sounds and thus keeps burglar from wanting to try. JCC Lock is indefinitely sealed after fastening and therefore is suited for vehicle plate theft prevention, and for securing liquid preservation caps among other terrorist countermeasures.

Anti-theft Fastener

Contrary to the one-time-only JCC Lock which is not reusable after removal, "Round Lock", another invention by Fukuyasu, is reusable. Its screw head is made round with 3 notches to make it difficult to remove with common wrenches. The head shape is particularly customizable to each specific type of infrastructure demand and can only be removed with infrastructure-designated tools. This feature has gained Euroke access to the world's infrastructure market where anti-theft design is highly regarded. Round Lock has naturally become the top choice for national security and has been adopted by Japan's nuclear power plants, Haneda International airport, Tokyo subway, embassies, Olympic facilities, and Qatar's international airport, as well as solar panels in the U.S. and Africa. Its material composition can be changed to adapt to different weather types around the world.

Anti-loosening Accessory

Fukuyasu created "Line Cap" for mounting onto a hexagonal bolt where bridge or railroad constructors can check with naked eyes if the red lines on the Cap are in alignment. It is designed to help constructors retighten bolts and saves them trouble of re-drawing marks, greatly eliminating the cost for loosening check.

Euroke Vision

As Fukuyasu told in the interview, Euroke is planning to set up new factories in Japan and abroad in response to the growing demand. "Fasteners are used in all sorts of fields. For the sake of preventing malicious fastener removal, our goal is to develop one-of-a-kind fasteners contributing to world safety."

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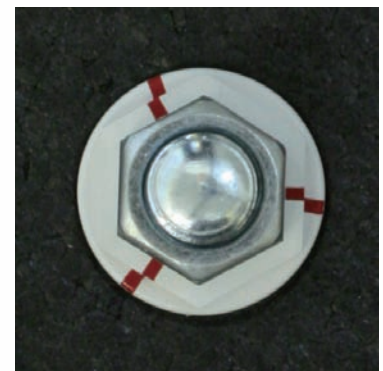
JCC Lock



Round Lock



Line Cap





T. Kato The World's First "Wood Shrinkage Tracking" & Anti-vibration Washer

by Dean Tseng, Fastener World

T. Kato started off as an R&D department of Kato Hardware. In 1988 it was established as a company manufacturing self-developed construction materials like "T-Balance" table adjusters and "Relevel" foundation washers. One of its featured products is "TIGHTNIK", a first-of-its-kind anti-vibration washer used in over 15,000 Japanese buildings every year.

"Magic Ring" + "Disc Springs"

Ultimate Solution to Loosening Due to Wood Shrinkage

In timber framing, the connecting portion of woods are reinforced by hardware. However, wood and metals have different properties and therefore "wood shrinkage" driven by seasonal changes causes bolts to loosen. This had been an unsolvable problem until President Toshiyuki Kato came up with an idea to use unconventional hardware on wood fastening, which led to the creation of TIGHTNIK. It consists of a plastic cover, 4 disc springs, a tamper-proof spring, a magic spring and an outer washer. The springs are designed to track and adapt to wood shrinkage. As the wood shrinks, the springs push the tapering "magic ring" towards the outer washer. During this process, the magic ring decreases its diameter and keeps gripping the bolt. Working like a wedge, the magic ring prevents the outer washer from returning and thus maintains tightening of the wood. This innovative structure enables the magic ring to fasten the bolt tightly.

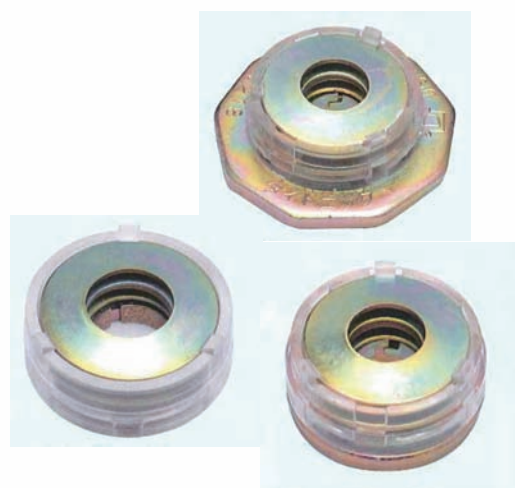
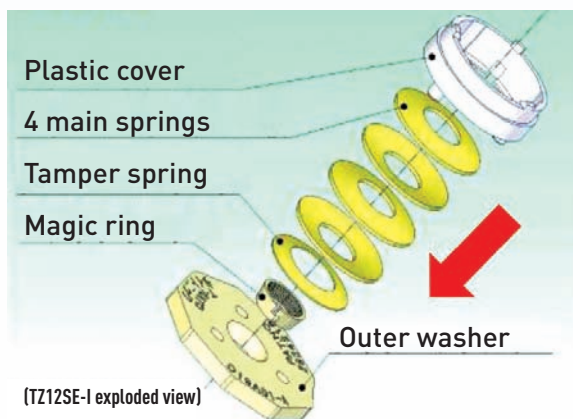
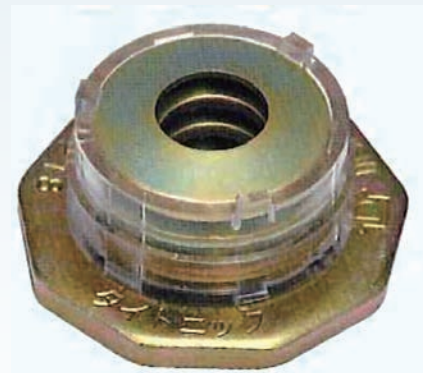
The Stronger the Vibration, the Tighter It Fastens

Distinctly different from average washers that adopt coil springs, TIGHTNIK uses disc washers which have a larger spring constant than that of coil springs, and thus it can minimize the appearance of gaps. When an earthquake strikes, the disc springs turn all the force of vibration into one that pushes the magic ring to the outer washer and prevents it from returning. This mechanism ensures TIGHTNIK's vibration resistance does not deteriorate in the face of a force as huge as an earthquake.

The president added, "We use the term 'disc springs' to refer to washers that are tapered into a shape of disc. They have a distinctive advantage over coil springs because they can bear substantial loads within a very small space. TIGHTNIK has a compact height of only 4mm to 6mm with the ability to track wood shrinkage, but a coil spring washer would need two to three times the height to harness the function of tracking." Furthermore, TIGHTNIK, suited for exterior wall fastening, is treated with galvanized electroplating on its metal portion for anti-corrosion, and its resin portion is made of polycarbonate for impact resistance.

Aimed for Diverse Application

TIGHTNIK is the world's first anti-vibration washer patented in the U.S., China, Hong Kong, Taiwan, and South Korea. It has passed axial force tests and NAS 3350 vibration tests. "We supply it domestically to the fastening of warehouse palate racks, wooden playground facility, solar panel racks, roads and bridges. Its application will be limitless when we apply weather-resistance heat treatment to it," said the president, "We have the creativity and R&D capabilities to revolutionize the niche market. We will aim at broadening the use of TIGHTNIK beyond the building industry."



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