NISSEI supplies you with technology, not the locking bolt itself

■ Rolling a low cost, anti-loosening bolt "PLBv2" at last! This practical and effective bolt does not rely on friction.

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President, NISSEI

We might think there are no technical improvements left to be made on a bolt, but let's think again: what about the problem of loosening? It is a fact of mechanical life that bolts loosen. Many techniques for keeping bolts tight have appeared. From the point of view of practical usage, cost effectiveness, and the ability to truly prevent loosening, making better bolts is an old but new problem. Nissei invites you to look at their fresh solution, PLBv2. PLBv2 (Perfect Lock Bolt, version 2) relies on double nuts and multiple threads rolled onto a single shaft.

For fasteners such as bolts, loosening is the enemy. The need for periodic tightening and problems arising when bolts need to be replaced or re-used are common. In the battle against loosening, many solutions have been attempted—all, until now, have been mediocre. Relying on friction to prevent bolts from loosening is not good enough. A mechanical solution built into the structure of the bolts is what is needed.

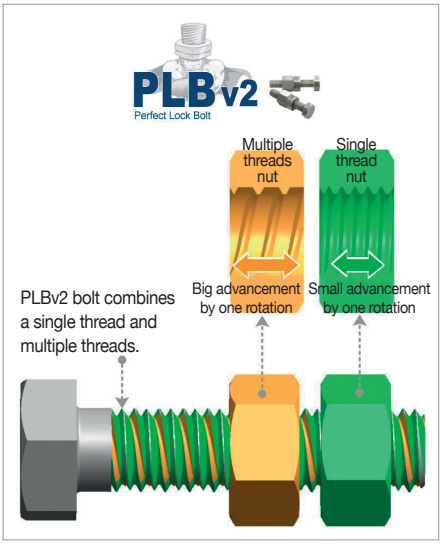
Principle and Features of PLBv2

Here is one mechanical method to protect against loosening. Roll the lead of each bolt with two different threads, then add one nut to follow each thread. Because the lead that the inner nut follows is longer than the one for the outer nut, when vibration inevitably makes the nuts start to rotate loose, the inner nut will be blocked by the outer nut. This is because the lead followed by the outer nut is more closely-packed, and so the outer nut must rotate more slowly. This is mechanical blocking.

Manufacturing method

How to mass produce bolts with two separate and distinct threads? It cannot be done reliably by cutting threads into the bolt shaft, but it can be done with thread rolling. Nissei, an innovative maker of rolling machinery located in Yamanashi Prefecture in Japan, has tackled this problem to produce uniform and reliable bolts that cannot be loosened by normal vibration: PLBv2.

Machines that could make dies capable of rolling a complicated pattern were not readily available when we started our Perfect Lock Bolt project. In 2018, we completed round dies, then in 2019 flat dies, developing new techniques one after the other. We envisioned planetary dies as the means to this end. All in all, it has taken 15 years to reach the level at which our machines can roll two kinds of threads—simultaneously—on one anti-loosening bolt.



PLBv2 bolt combines a single thread and multiple threads. Threading of PLBv2 requires specialty dies made by NISSEI. The dies can be used on an ordinary thread rolling machine. The dies can roll PLBv2 in one action.

Can be rolled with your company's existing equipment

The anti-loosening bolt that Nissei has developed and named PLBv2 has been tested and conforms to international standard ISO16130. For the specified vibration criterion relative residual clamp force of 2000 cycles, other companies' products received a rating of "acceptable loss of clamp force", which in ISO16130 terms means they perform adequately from 40% to, at best, 85% of the time.. PLBv2 is rated ISO16130 "Good self-locking behavior", meaning performance is good 93% of the time.

A major value of PLBv2, above and beyond its anti-loosening properties, is practicality in actual use. By tightening the outer nut, the inner nut is also tightened. Both bolts, one action. With ordinary double nuts, each nut has to be tightened individually. With PLBv2, the inner nut follows the outer nut naturally. It is like having to fasten only one nut instead of two. No PLBv2-specific tools are required, ordinary tools do the job. Ease and practicality in usage are additional advantages of PLBv2.

The process of rolling bolts with thread rolling machines is advantageous to bolt makers. In other, more ordinary processes, after cold forging, heat treatment processing is recommended. The same processes are applied to PLBv2 with the same system. There is no need to buy new systems when you have the license. The threads can be rolled simultaneously on existing thread rolling machines, provided they are equipped with PLBv2-specific dies made by Nissei. "Being able to roll these bolts on machines already in place is a big advantage," says Shuichi Amano, chief engineer/engineering director at Nissei. "It's a competitive cost advantage to get a better bolt from existing equipment."

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