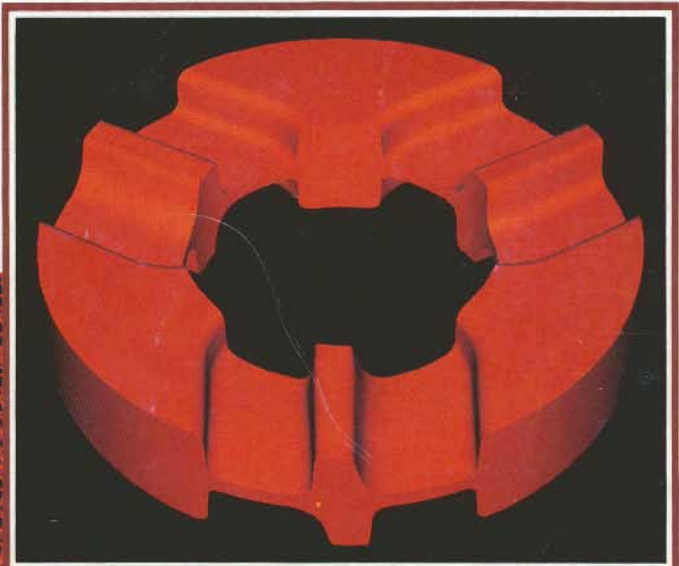


# **PATLOC**<sup>TM</sup> **PATENTED** — *lockwasher*

A high quality product with unique mechanical locking functions for nut and bolt connections



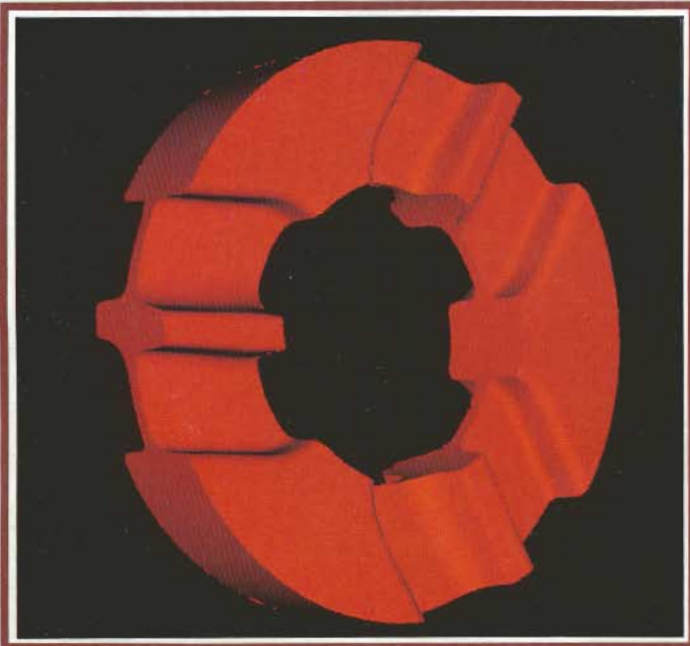
**ND** Norsk Data **TEKNOLOGISK  
INSTITUTT  
KONGSBERG**



- Absolute locking function
- Insensitive to vibration
- Large load-bearing areas
- Malfitting impossible
- Easy to inspect
- Corrosion resistant
- Costsaving

Ingenjör  
**BERTIL BURSTRÖM**  
Össjö-Boarpsvägen 80  
SE-266 91 MUNKÅ-LJUNGBY  
Tel: 0431-43 32 80



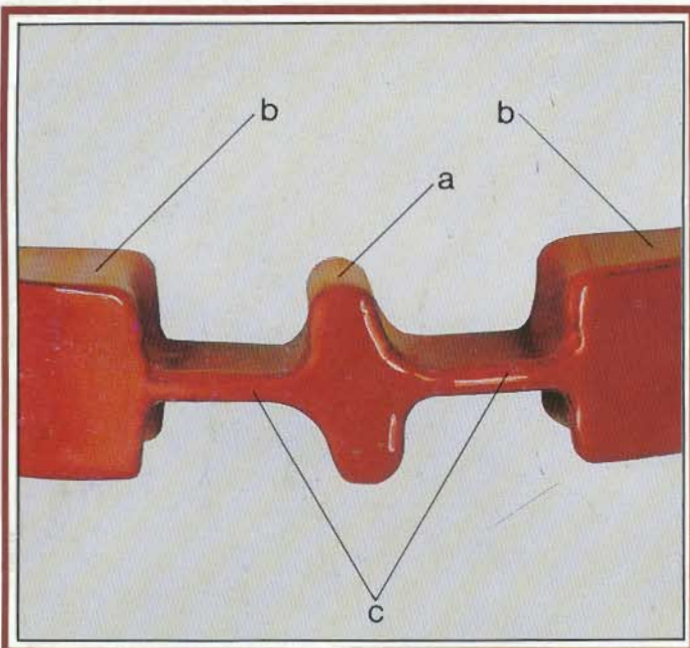


### PATLOC – principle

The PATLOC lockwasher applies a unique spring-and-lever action, giving a superior holding ability in nut/bolt connections.

PATLOC has the basic shape of a conventional washer, but its load-bearing areas are divided by special profiles which provide an absolutely reliable locking function.

The load-bearing areas are still large enough to distribute very high axial forces, even on soft base materials.

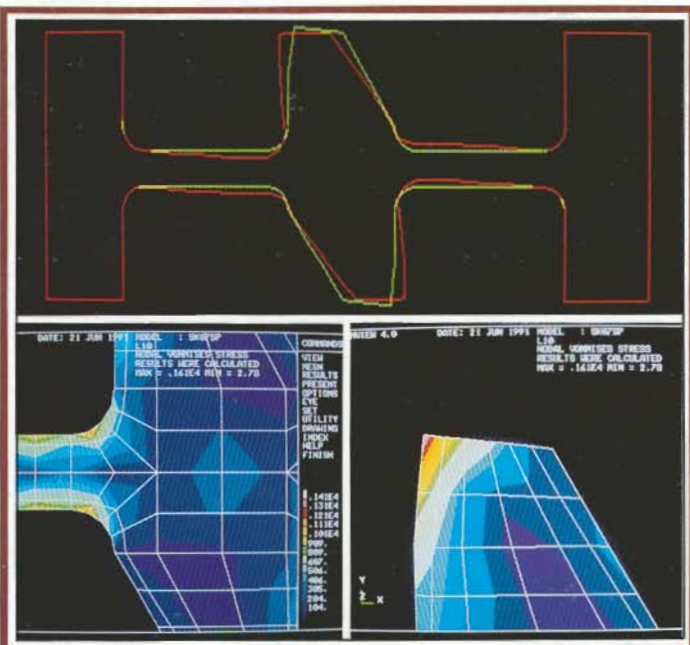


### PATLOC – function

The profile section shows that the vertical bar member (a) has a geometric off-set relative to the load-bearing areas (b).

During tightening the bar will be given a rotational motion about its own centre. This forced displacement causes bending of the horizontal members (c), which thus act like tension springs and strongly press the bar against both the nut/bolt and the base material.

The axial forces introduced in the connection also increase the friction in the nut/bolt threads, and provide tangential counter forces.



### PATLOC – design and calculations

The unique PATLOC design has been developed with the aid of the FEM numerical computation methods.

Parameters such as reaction forces, displacements, stresses and strains have been determined.

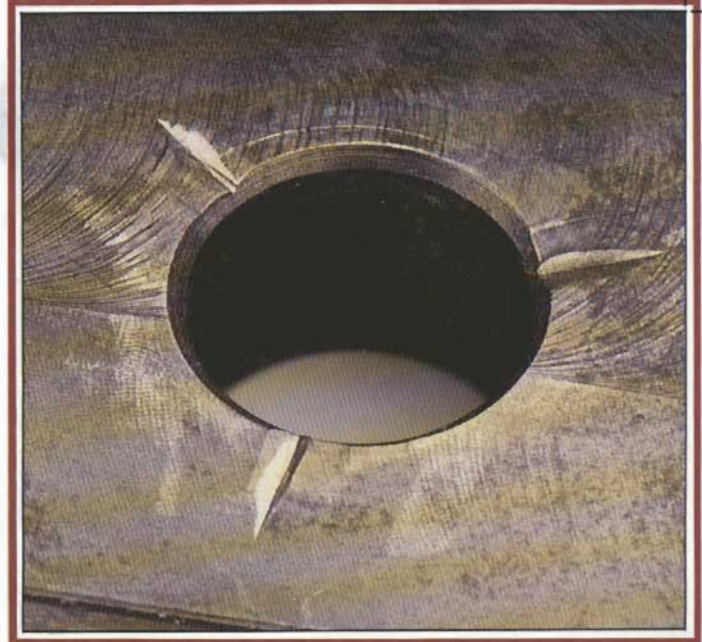
The results of these theoretical calculations, taking into account properties such as non-linear material behaviour and incremental loading, have further been verified during extensive testing.

FEM – Finite Element Method.



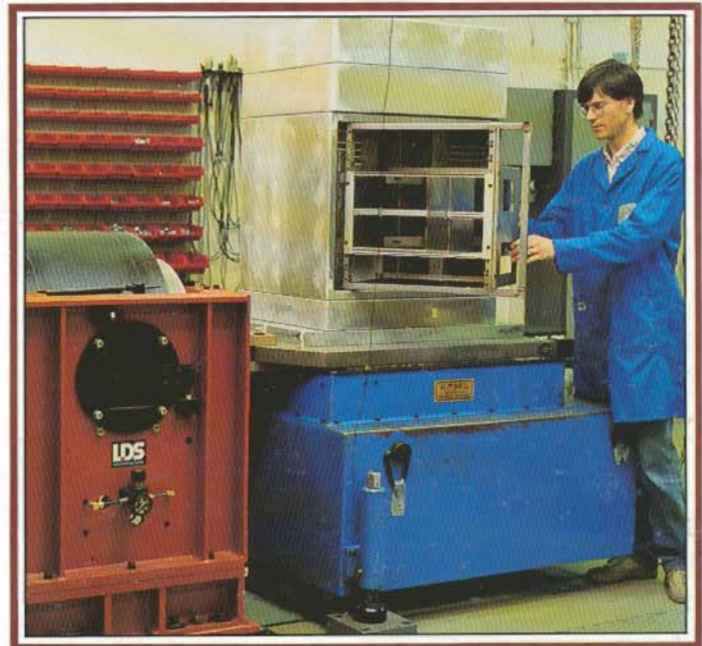
### Static tests of PATLOC prove:

- Low forces/moments required to attain full locking functions (ca. 50 %).
- High torque moment required for loosening.
- Rotation of the vertical bar member during disassembling causes material flow. PATLOC should therefore be regarded as disposable after use, in the same way as a one time seal.
- The photo shows base material after removing PATLOC. Equivalent marks appear under the nut/bolt head.



### Extensive vibration-testing of PATLOC proves:

- Insensitive to sustained vibration.
- Measurements of torque moment when disassembling the PATLOC nut/bolt connection after vibration testing, show that no relaxation has occurred.
- Strain gauge measurements and metallurgical investigations show no evidence of structural degradations.
- Effective locking against all types of nut/bolt and base materials, including against hardened steel.
- All testing of PATLOC has been carried out by Norsk Forsvarsteknologi a.s, Kongsberg.



### PATLOC – Material and surface treatment:

Special alloyed steel, hardened and tempered to high strength. The combination of a well balanced steel chemistry, a favourable grain orientation and a very low level of non-metallic inclusions, insure optimum strength versus ductility properties.

The most advanced surface treatment of PATLOC comprises a zinc phosphate coating with a top layer of fluoropolymere (PTFE). This coating has been extensively tested by diverse environmental test methods with very satisfactory results. The coating is now used frequently in the chemical industry, and for offshore and automotive applications.

For less demanding purposes, other surface-treatments are available. See price list.





# PATLOC™ – a unique product developed and produced with the help of advanced technology

**PATENTED**



## PATLOC™ – offers optimum locking functions for innumerable applications



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