

patent pending

guaranteed
preload systems

TH - SH - TSH

Minimum guaranteed preload
80% of bolt yield stress

if fastened as specified by the manufacturer

www.tsftsh.com



Systems to guarantee 80% preload TH, SH and TSH

Bolted joints are essential for engineering applications as diverse as wind turbines, oil rigs, combustion engines, automobiles, cranes, aerospace, nuclear, marine, rail, etc., that must endure the most severe working conditions during its effective lifetime.

These conditions vary constantly, the efforts are not uniform, nor are the temperatures, weather conditions, marine or on land, etc., So that bolts and nuts are designed to withstand the maximum loads that may occur in the application, whether continuous or occasional, regular or extreme situations, during the lifetime of the product in which they are mounted.

These joints are calculated with the load conditions in sophisticated software programs. Components are also tested in laboratories or in testing to failure.

The most commonly used screws are hex heads that are preloaded by applying a torque via pneumatic, hydraulic, electric or manual tools.

During this process, the bolt preloads and stretches, causing it to act like a spring that presses the pieces together, so the torque applied is of vital importance. This torque will cause the preload applied to the screw to be equal to that calculated for the binding, otherwise the joint will not work properly and end up deteriorating or breaking.

When preload is applied with tensioner devices, the bolt or stud is directly stretched to achieve the closing and preloading of the joint. Here raises as a problem the loss of preload when the pressure exerted by the tensioning device ceases, which can exceed 40% of the initially applied, causing the joints to be provided with only 60% or less of the total capacity of the fastening element, being usual stabilizing the preload between 40% and 55% of its total capacity.

Preload losses are mainly caused by the following reasons:

- Plastic or elastic deformation of flanges;
- Permanent plastic or elastic deformation of threads;
- Relaxation between components, flanges, threads, etc.;
- Geometric tolerances from stamping or machining of the binding components, parallelism, perpendicularity, etc.;
- Roughness in machining;
- Elasticity or stiffness of the joint.

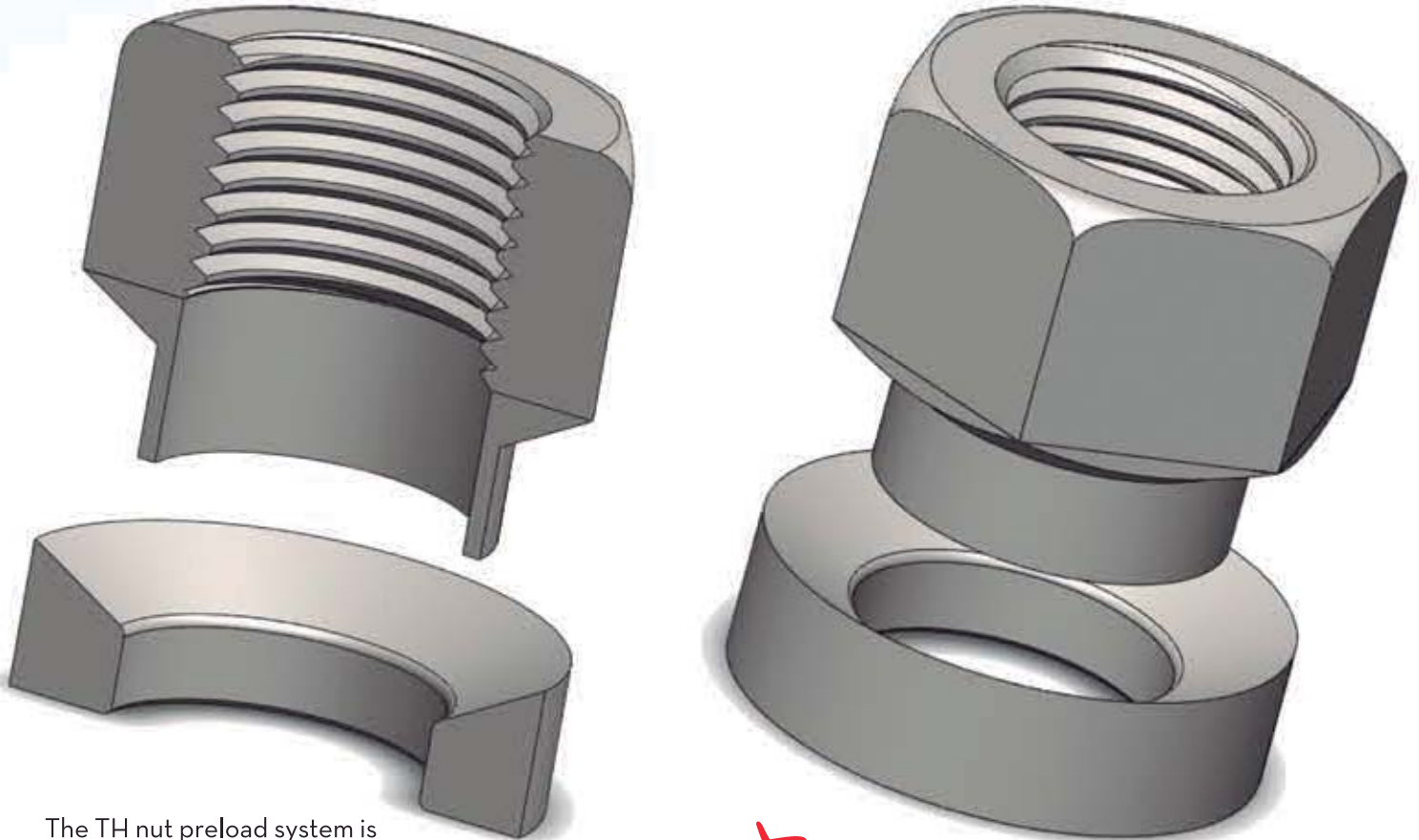


System to guarantee 80% preload TH nut Less than 5% dispersion

TSF has designed, developed and patented the TH nut system with the following objectives:

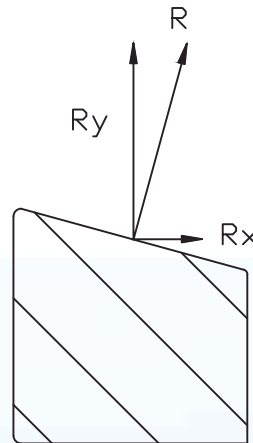
- Provide joints with high requirements in preload;
- Provide joints with both requirements of preload and untightening;
- Provide joints with low demand in preload and high requirement in untightening;
- Control of stress applied to the joints of soft components maintaining high preloads on bolt, stud or similar.

These objectives are achieved through pilot nut and washer interrelated with a variable contact angle for its different applications.

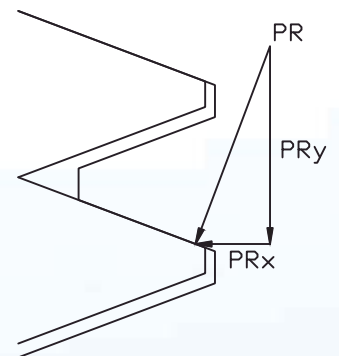


The TH nut preload system is specially designed to fit in standard and commercial tensioners. No special tools or pulling systems required.

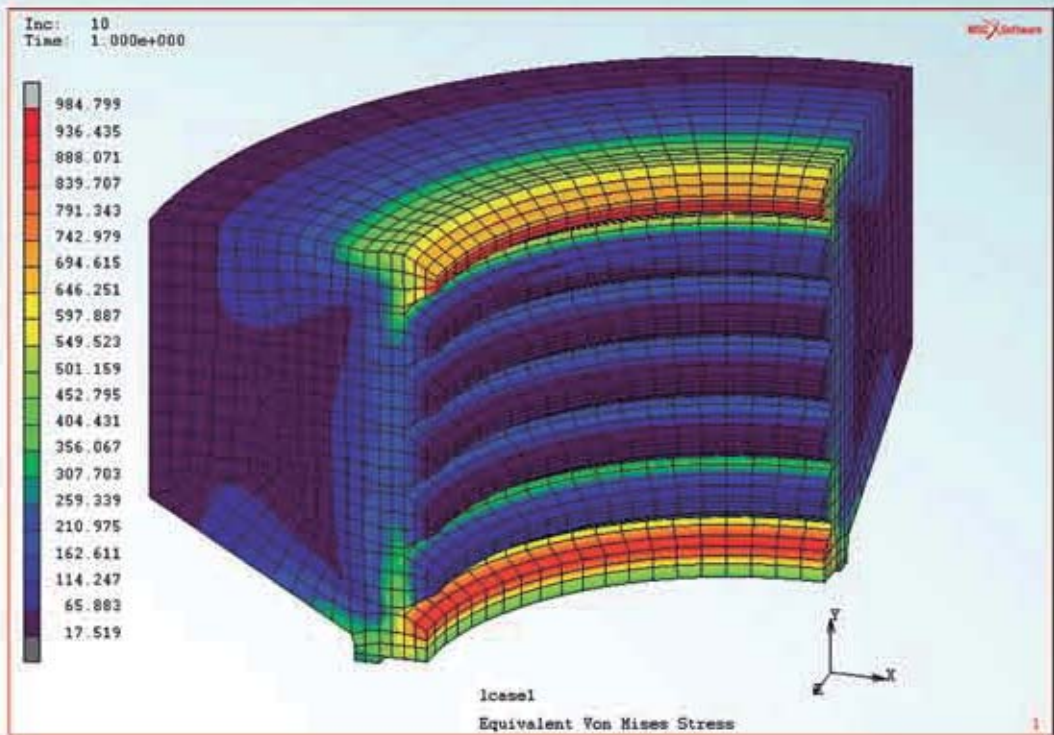
patent pending



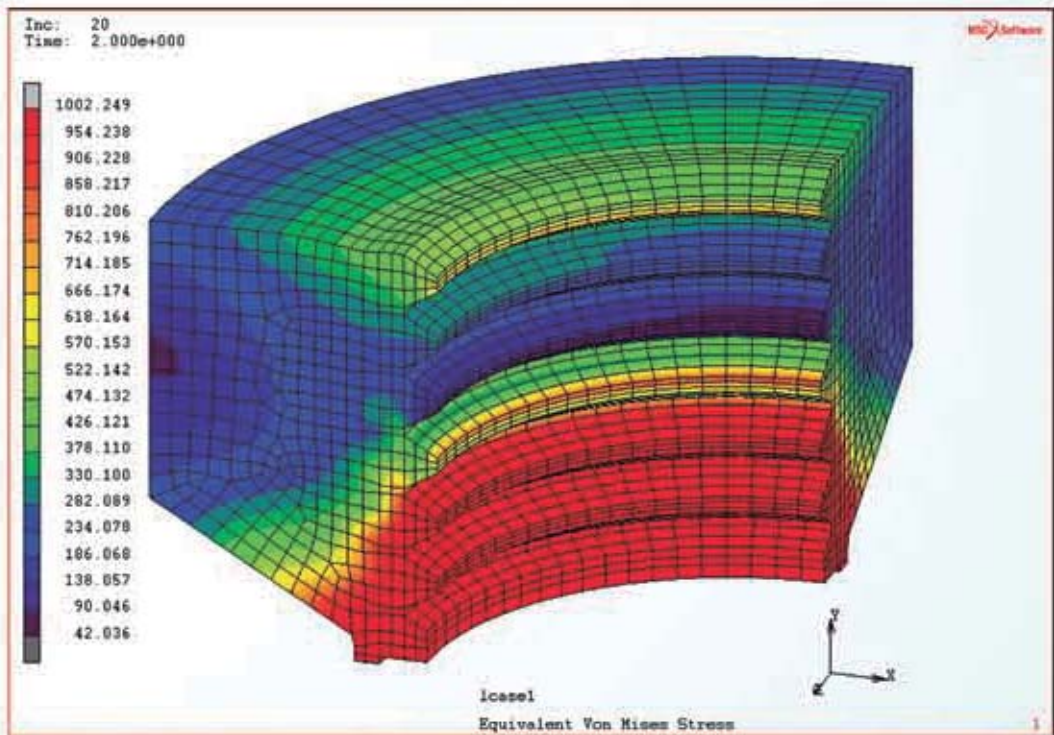
Decomposition of preload reaction in normal and axial stresses at TH washer.



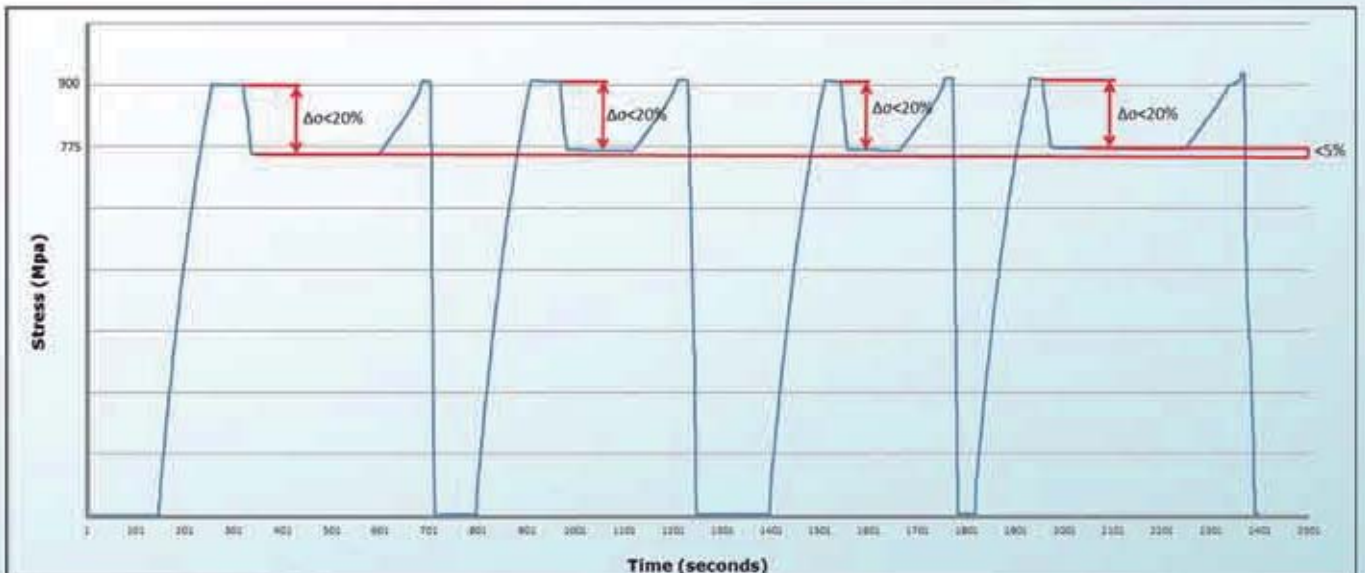
Decomposition of preload in normal and axial stresses at stud thread.



Stress in TH nut at stud preload.



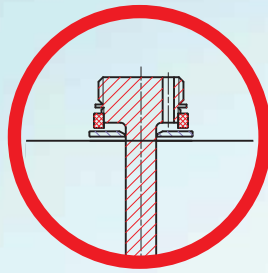
Stress in TH nut at working preloaded system



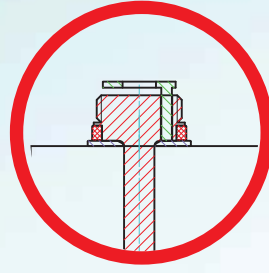
Mechanical behavior of TH, SH and TSH Systems



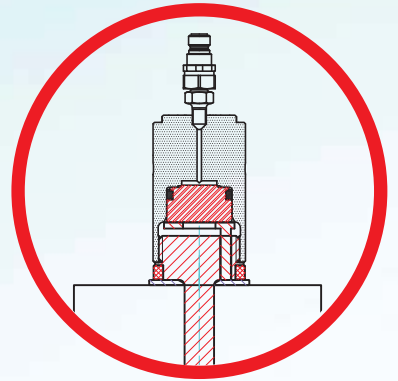
System to guarantee 80% preload TSH Less than 5% dispersion



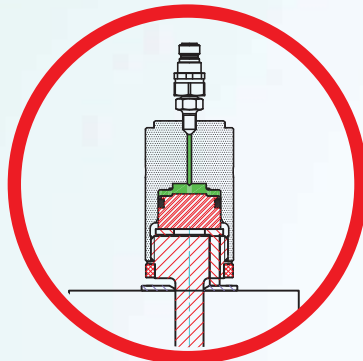
1 The base washer, lock bushing and TSH4 are introduced in the assembly.



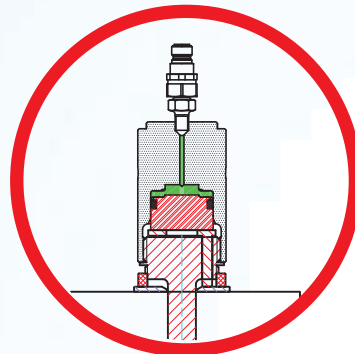
2 Strength transmitters are introduced through the TSH4 head



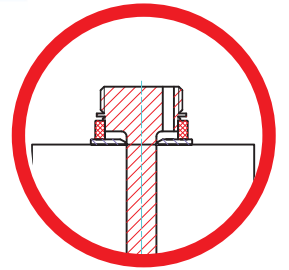
3 Assemble the puller on the TSH4 head



4 Preload is applied through the hydraulic puller and the TSH4 elongates



5 Adjust the lock bushing between the TSH4 head and the base washer to lock the elongation obtained and maintain the preload



6 Disassemble the puller and strength transmitters from the TSH4

guaranteed preload systems

patent pending

- Reduced number of fixation elements with respect to torque control.
 - Quick reaching of preload.
 - Low dispersion.
 - High stability of the preload.
 - Low load distribution factor for the fixation element. Lower fatigue range.
 - Achieving preload by the use of pressure tables.
 - Insensitivity to bending moments.
 - No twisting of the fixation element.
 - Ease of assembly and disassembly.
 - Simultaneous Assembly of fixation elements. Elimination of elastic interaction of close elements.
 - Same assembly protocol for all metric sizes.
 - Benefits of elongation, without the disadvantages of friction.
 - Ease of verification of preload sustention.
- It enables maintenance actions, if necessary, based on accurate preload readings.
- Multiple reuse of the element. Ease preload reset by assembly process repetition.
 - Insensitive to the type of fixation thread or its lead due to lack of friction in the tightening process.
- Potential increment of the preload capacity.

UNIVERSAL PRELOAD SYSTEM

Preloading system that achieves the preload on main stud through torque tightening procedure of smaller satellite studs.



ENGINEERING

CALCULATION AND DEVELOPMENT

Calculation and development of bolted joints for automotive, aeolian, construction, equipment, etc. For the calculation of the unions, the engineering of TSF has a powerful simulation tool using finite elements. The program used is the prestigious MSC.MARC.

The customer is offered the solution with our design and geometry and the certification of such unions in government agencies.

PATENTS AND INNOVATIONS

TSF has among its field of engineering a series of patents of its own:

- **TH, SH and TSH.** Solution to ensure high preloads with high accuracy.
- Screw and nut TSF. Tamper-proof screw and nut also has the feature of removable and indestructible.
- Shear pin. Combined variable diameter bolt cap for applications that must withstand shear.
- System for wind turbine blades separated into sectors. The solution is to divide the blade into two parts and unite them by introducing a special fasteners. In this way, facilitates the manufacture, transport, assembly and disassembly.
- Looseproof fastener. System of screw, nut and washers specially design to avoid unfastening with vibrations.

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