

# HYDROCAM Bolt Tensioners Industrial Tightening Systems



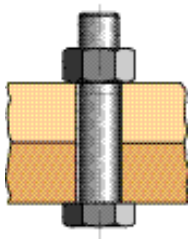
# Introduction

SKF® has worked in the field of bolt-tightening by pre-load tension since the 1940's. At that time, design studies concentrated on the tightening of slewing rings, where the SKF group's subsidiary, RKS, is a leading specialist.

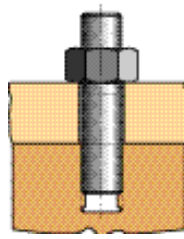
Since the 1940's, SKF Equipements has continuously furthered its bolt-tightening experience in every industrial sector and in many different types of applications.

Today, SKF Equipements offers two descriptive documents on the subject of bolt-tightening: the "Bolt-tightening Handbook", which discusses the technical aspects of bolt-tightening, and this product catalogue: the "HYDROCAM® Bolt-Tensioner - Industrial Tightening Systems" catalogue.

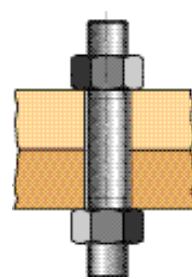
Well aware that good tightening control is extremely important economically, SKF Equipement offers both expertise and service to solve any problems involving the tightening of bolted assemblies.



**Screw and nut**



**Stud with nut on one end**



**Stud with nuts on both ends**

## Just what is a bolted assembly ?

A bolted assembly quite simply means the putting together of at least two parts using one or several bolts. As is shown in the figure above, these bolts can be made up of screws and nuts, studs with nuts on one or both ends, and possibly washers.

In the following document, the word "bolt" includes these three types of screwing components.

Bolted assemblies are the most commonly used connecting systems in mechanics. And although they appear to be quite simple, bolted assemblies do pose several challenges at many levels: design department, assembly workshop, on-site, and maintenance.

Rough dimensioning methods are too often applied at the design stage, which leads to unnecessary oversizing. Such oversizing does not enhance product safety, quite the contrary...

The design and implementation of a bolted assembly requires a very strict methodological approach, for errors can lead to costly and often disastrous failures.

Several studies have shown that incidents encountered on bolted assemblies are most often due to improper design of the assembly (analysis, design, calculation, component choice) or poor implementation (tightening method, tooling, inspection).

Today it is known that of all the various causes of failure (overloading, design flaws, manufacturing defects, and others), the most frequent is improper assembly. Tightening problems, whether insufficient tightening, excessive tightening or heterogenous tightening, alone account for over 30% of all bolted assembly failures.

More specifically, 45% of all fatigue failures are estimated to be due to improper assembly.

Therefore, the importance of the design of the bolted assembly and the means used to tighten it are of utmost importance.

The "Bolt-tightening Handbook" clearly explains that "optimum tightening means a bolt which is not too tight and not too loose" and shows how to achieve the best tightening.

It reviews all the tightening methods and proves that the best tightening control is provided by the Hydrocam hydraulic tensioner.

This "Product Catalogue" describes all the products and services that SKF offers in order to enable you to better manage your bolted assemblies.

Both of these documents provide indispensable information on optimizing the bolted assemblies that you are designing and on choosing the best tightening method for your application. They describe the key aspects, which are:

- Quality
- Accuracy
- Homogeneity
- Ease of use

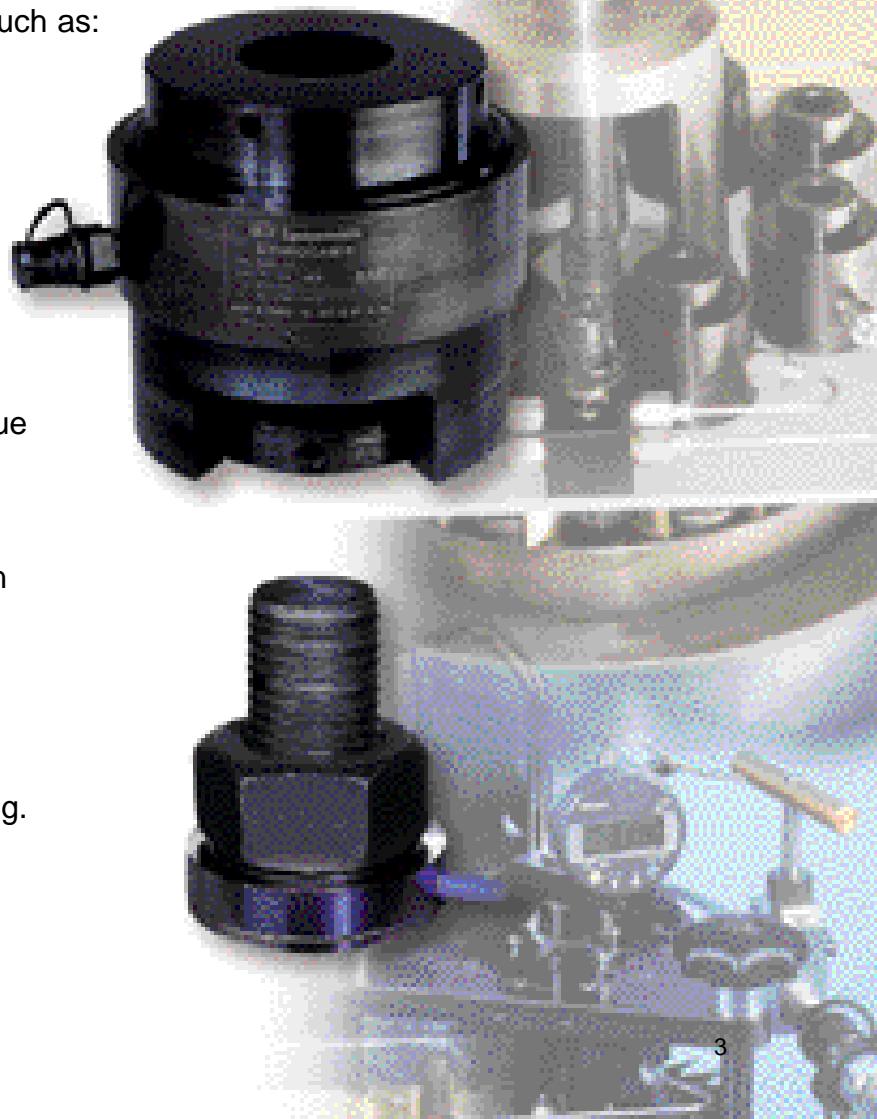
These provide additional advantages such as:

- Reliability and safety
- Optimized dimensions
- Time savings
- Cost reduction in use, control and maintenance.

In addition, this catalogue provides other useful information such as standard bolting dimensions, units conversion, and the conversion of torque into tension load...

As an example - did you know that the SKF hydraulic tensioner can tighten bolts from 5 to 500 mm ?

Please do not hesitate to contact SKF for your needs. You may be surprised by all the services SKF can provide in the field of bolted assembly tightening.



# What makes up the Hydrocam bolt tensioner ?

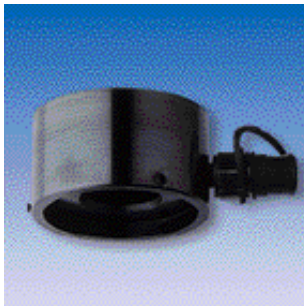
A standard Hydrocam tensioner has a hydraulic body which, using a hydraulic fluid, exerts a strong tension load on the bolt through the brace screwed on that bolt. In some tensioner types (HTC R), the body is screwed directly on the bolt to be tightened. The body also rests on the skirt in order to apply the reaction force on the assembly to be tightened.

Prior to screwing the body-brace-skirt unit on the protruding end of the bolt, a socket has to be placed on the nut of the bolt. This nut can then be "turned down" (screwed until the lower surface of the nut comes into contact with the assembly bearing surface), by a tommy bar, while the tensioner applies the tension load.



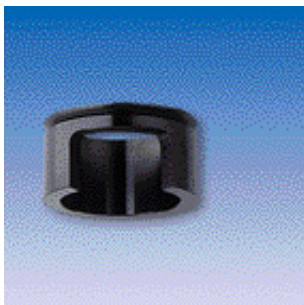
## Brace

The brace is screwed on the protruding end of the bolt, above the nut. It supplies the tension load exerted by the hydraulic body on the bolt.



## Hydraulic body

Using the fluid under pressure, the hydraulic body creates the tension load on the brace by pushing on the skirt.



## Skirt

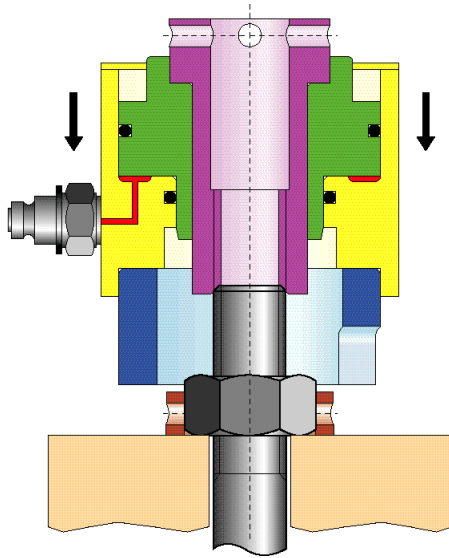
The skirt is placed around the nut on the assembly to be tightened. It transmits the compression force to the assembly by reaction to the tension load applied on the bolt by the hydraulic body.



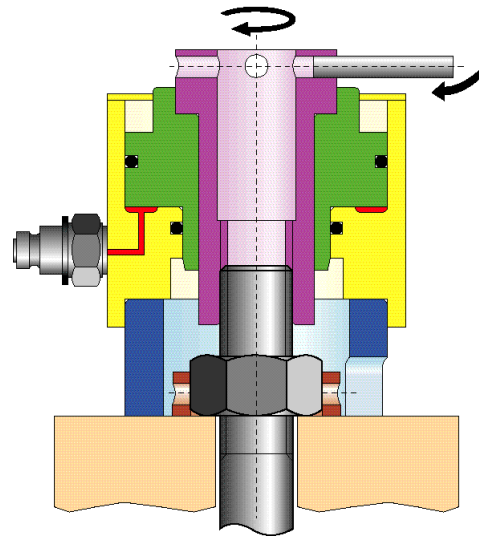
## Socket for standard nut (optional)

In the case of assemblies with standard nuts, a socket is placed around the nut to effortlessly bring the nut into contact with the assembly. For this purpose, the outer surface of the socket is drilled with radial axis holes to hold the push rods. Turning down occurs while the tension load is applied by the hydraulic body.

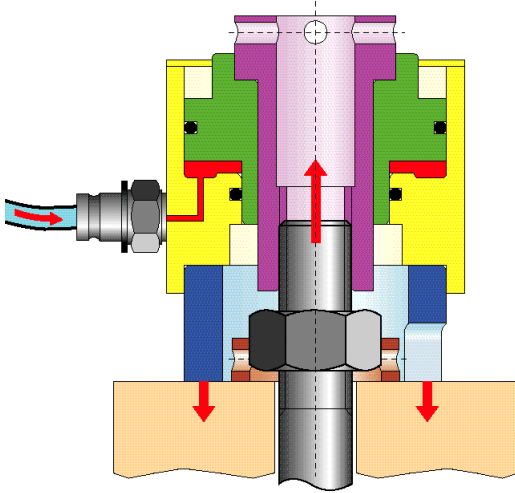
# How a Hydrocam tensioner works



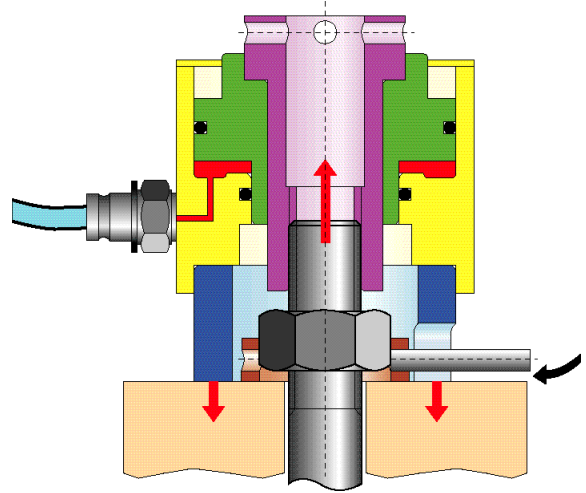
1 - The turn-down socket is placed over the nut and the hydraulic tensioner grasps the bolt.



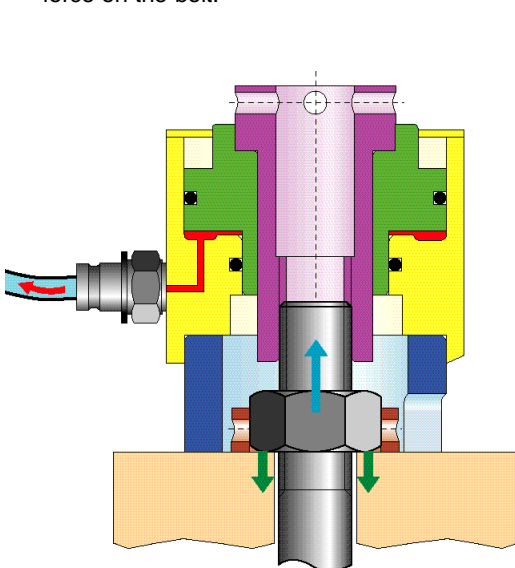
2 - The brace/retraction unit is screwed onto the protruding end of the bolt.



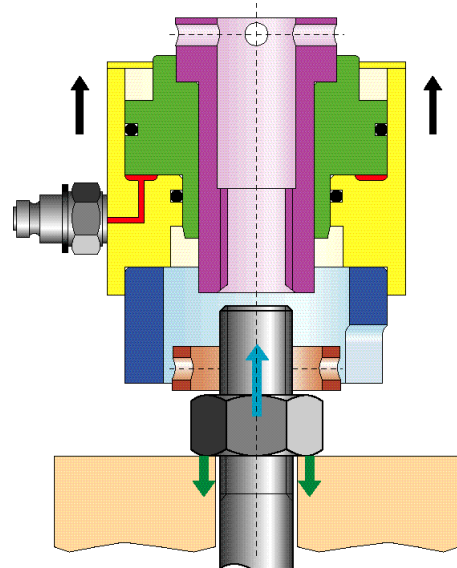
3 - After the hydraulic connections, the tensioner is pressurized and applies the required tractive force on the bolt.



4 - While the pressure is maintained, the nut is turned down without loading, using the socket and the tommy bar.



5 - Their pressure is released and the piston is pushed back. The tightening load is now exerted through bolt tension.



6 - The tensioner and the socket can be removed.

# Summary Table: Standard Tensioner

This table summarizes the main features of each tensioner, in order to help you select the standard tensioner for your operational requirements.



**HTA**



**HTS**



**HTS N**

<b>Tightens several diameters <sup>(1)</sup></b>	Yes	Yes	Yes
<b>Diameters of the bolts tightened</b>	Small and large	Small and very small	Small
<b>Space occupied by the tensioner</b>	Normal	Small	Little
<b>Tightening load</b>	High	High	Average
<b>Stroke arresting device</b>	Optional	Optional	Optional
<b>Automatic return</b>	No	Optional	Optional
<b>Cost index <sup>(2)</sup></b>	100 (base)	140	160
<b>Special Feature</b>	Adaptable	Very small bolt diameters	The same tensioner can tighten several diameters
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<sup>(1)</sup> by changing the brace

<sup>(2)</sup> indicative, also takes into account the loads applied

# Characteristics



**HTS 2**



**HTC R**



**HTH R**

Yes	No	Yes
Small and average	Small and large	Large and very large
Very little	Compact	Very little
High	Very high	Very high
Optional	Yes	Yes
Optional	Yes	Yes
200	180	250
Fits in very narrow spaces	Compact and powerful	Takes up very little space and very powerful
40 - 41	42 - 43	44 - 45

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