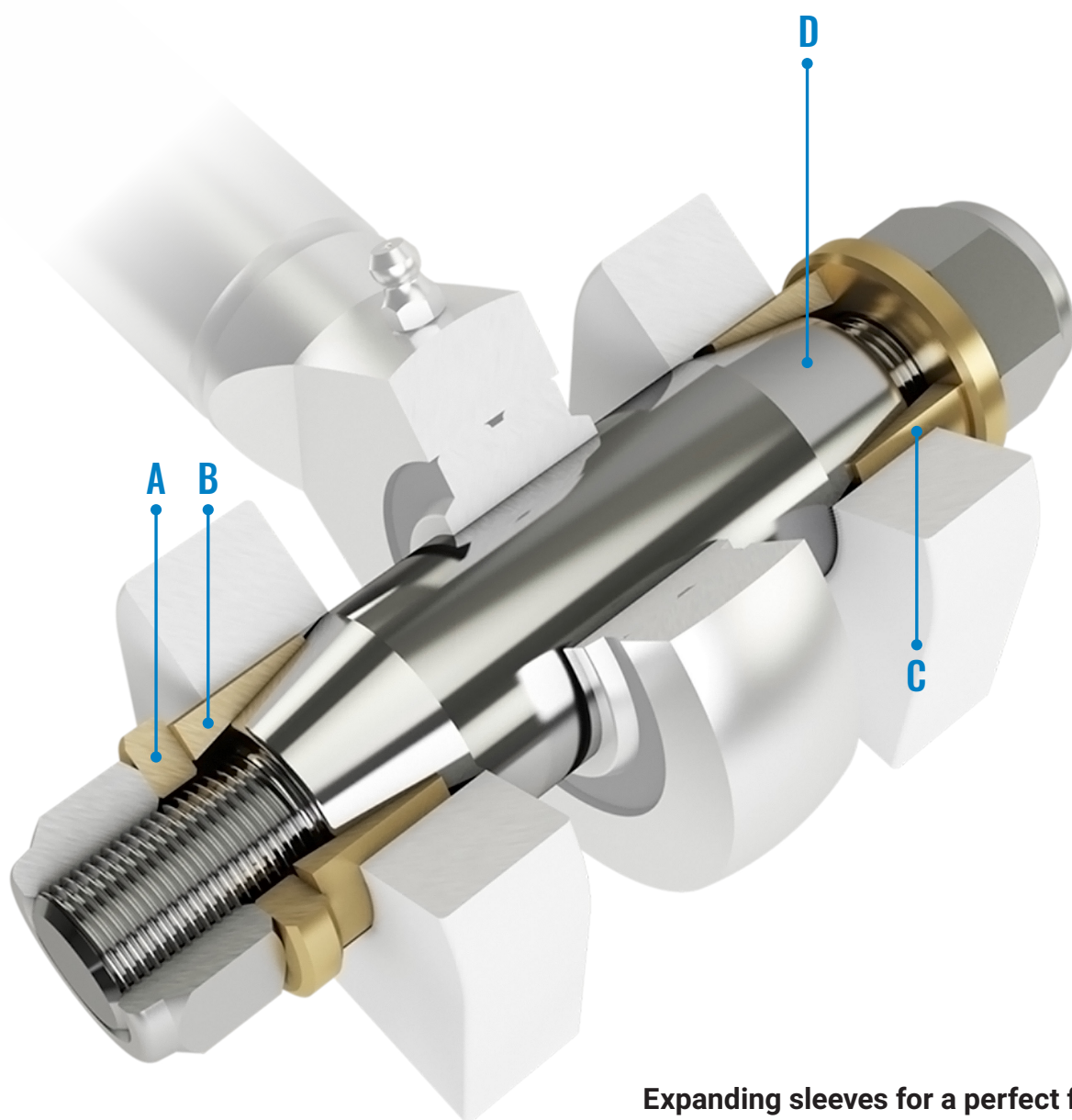


# EXPANDER SYSTEM PIVOT PIN

PREVENT THE FORMATION OF LUG WEAR

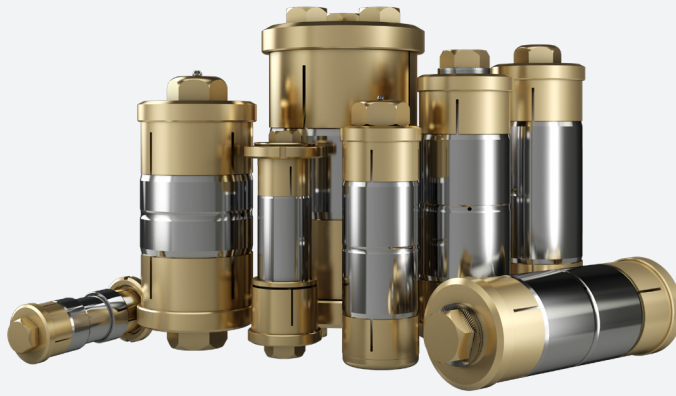


# ON A MISSION TO REDEFINE PERMANENT



## Expanding sleeves for a perfect fit

The Expander System consists of an assembly that includes: an axle tapered at both ends, two expansion sleeves, two tension washers and two fasteners.



## How it works

**A**

Upon tightening the fasteners, the washer presses the slotted expansion sleeve up the tapered ends of the pin.

**B**

The sleeves expand, conform to the lugs and lock the system in place.

**C**

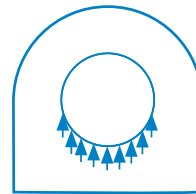
Once retorqued, the system locks from both sides and significantly increases stability.

**D**

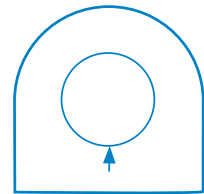
The tapered axle makes it easy to remove and reinstall compared to traditional straight pins.

## Benefits of the Expander System

- Permanent solution to lug wear
- Quick and easy to install and remove
- Increased life expectancy of bushings, bearings and seals
- Increased safety against breakage
- Machine parts that are cheaper and easier to use



**EXPANDER SYSTEM  
FORCE ON LUG**



**TRADITIONAL STRAIGHT  
PIN FORCE ON LUG**

## Pressure distribution is key

The pressure distribution from the pivot pin onto the lug can be described by the Hertz contact formula.

A conventional system only distributes the load onto a very small area, due to the play needed to mount the pin into the lug. The Expander System distributes the pressure over the whole contact area in the direction of the force.

## Winner of the Swedish Innovation Development Award

The Expander System is a recipient of the Swedish Innovation Development Award, in memory of Alfred Nobel. The award was presented by the Swedish Minister of Industry.



The Expander System can also be combined with Nord-Lock washers for vibration-intense applications.

# THE EXPANDER DIFFERENCE

Experts in the design and manufacture of machinery deserve to partner with experts in pivot pin technology. Whatever your machine, industry or application, we will create the perfect pivot pin from the first installation.

## Lower your costs and produce a smarter machine

- No need for additional fastening holes, threads or welding of locking ring on the machine
- No need for fine machining in the lugs as the Expander System makes it possible to use wide tolerances (H9 and Ra <3,2)
- No need for surface preparation
- Tapered axle ends and possibility for oversized lug holes makes axle assembly and removal very easy
- Less axle stress
- Axial stabilizing effect by strong double sided locking
- Up to 5 times longer service life of bushings and bearings compared to a straight pin due to less pivot movement

## OEM first fit advantages

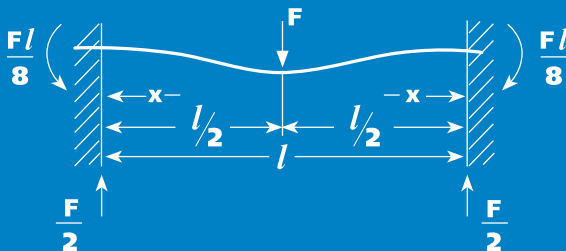
- Increase your customer satisfaction with a permanent solution to lug wear
- Offer your customers the market's best lifetime and total cost solution
- Access technical support from an engineering team that understands your pivot issues
- Safety stock handling
- Access all pivot pin designs, place orders and follow production stages in the web shop
- Order tracking

## MAXIMIZE SAFETY AND MINIMIZE THE RISK OF AXLE BREAKAGE

Replacing a traditional straight pin with an Expander System pivot pin of the same diameter maximizes safety and minimizes the risk of axle breakage. The system's double sided axial locking makes a stronger machine.

### Approx. Expander System Load case: Fixed supports

The axle ends are fixed in the lugs by the expanding sleeves and the load case cuts the axle stress in half.



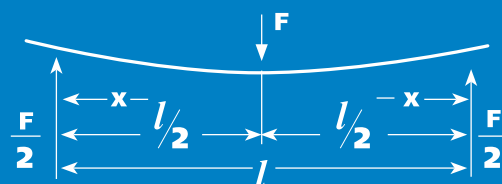
Stress at ends  $\frac{F}{8W_{el}}$  At load

$$\frac{F}{8W_{el}}$$

These are the maximum stresses and are equal and opposite. Stress is zero at  $x = \frac{l}{2}$

### Approx. Traditional straight pin Load case: Simple supports

The axle ends are only supported from the bottom due to the play needed during installation.



$$\frac{F}{4W_{el}}$$

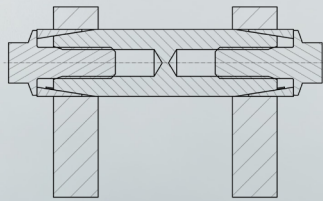
Stress at center. If cross-section is constant, this is the maximum stress.

F = Force,  $W_{el}$  = section modulus (also known as S or Z).

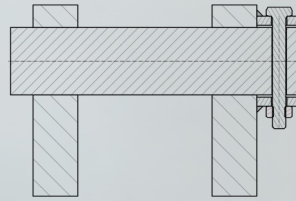


Basic illustration of

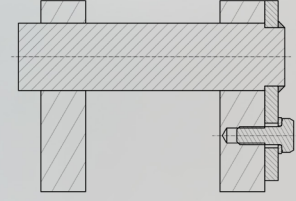
# EXPANDER SYSTEM VERSUS TRADITIONAL STRAIGHT PIN



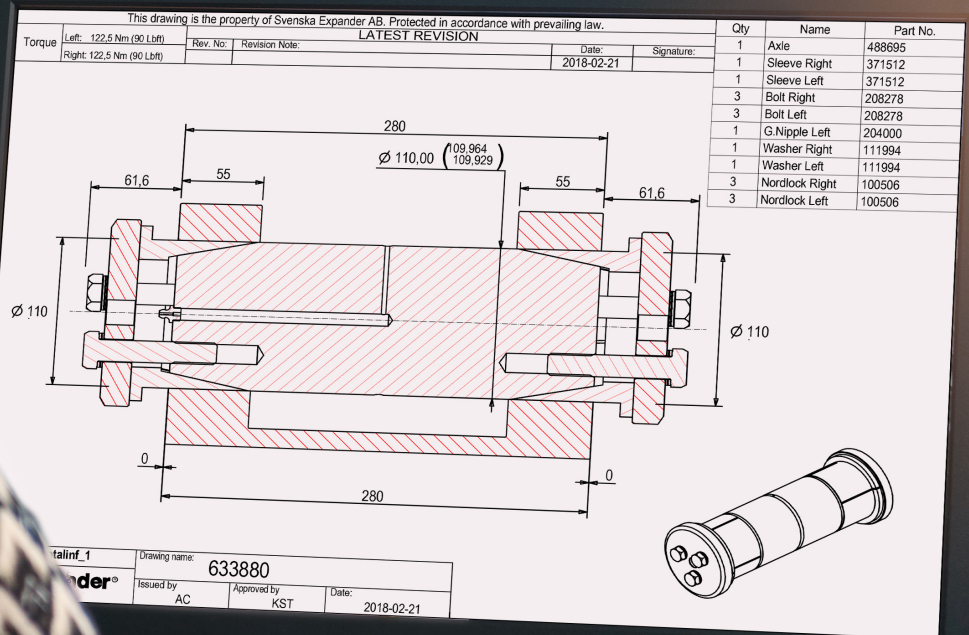
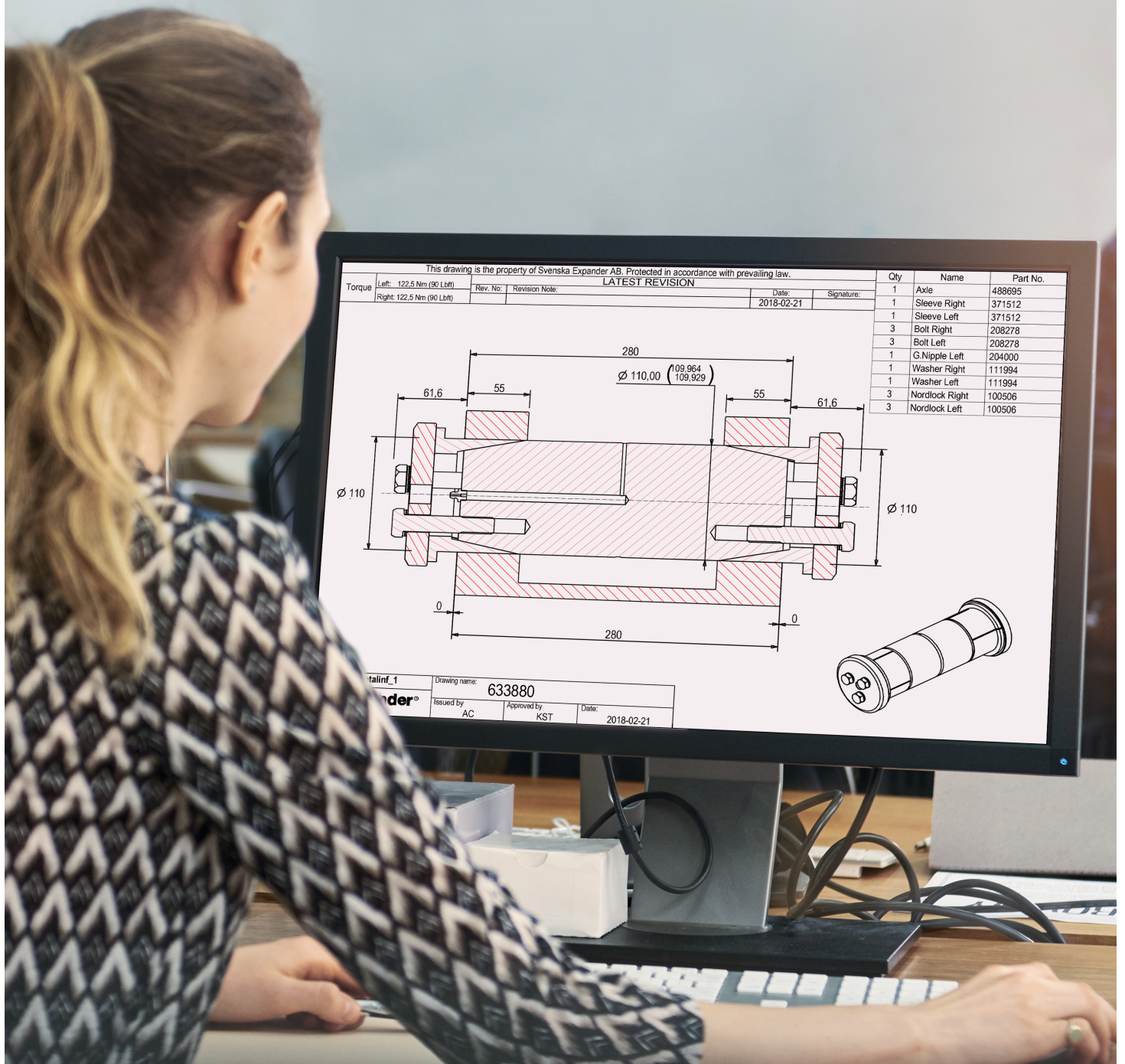
Expander System



Traditional straight pin with locking ring



Traditional straight pin with flag washer



# NO MORE LUG WEAR — EVER

The Expander System is perfect for repairs. Even if the lugs are badly worn, a repair can be made in the field with minimum downtime. If the lugs are worn, the sleeves simply expand to conform with the wear pattern and lock the system in place without the need for time consuming and expensive welding and line boring — just retorque.

In the Expander web shop you can get information on delivery lead time, order and find examples of the many pivot pin positions we have produced.

Please visit our web shop:  
[nord-lock.com/shop-expander](http://nord-lock.com/shop-expander)

## Aftermarket advantages

- Spare parts can be supplied regardless of the age of the equipment
- Greasing through the axle allows you to change to an automatic lubrication system
- Short lead times
- Access all pivot pin designs, place orders and follow production stages in the web shop
- Order tracking

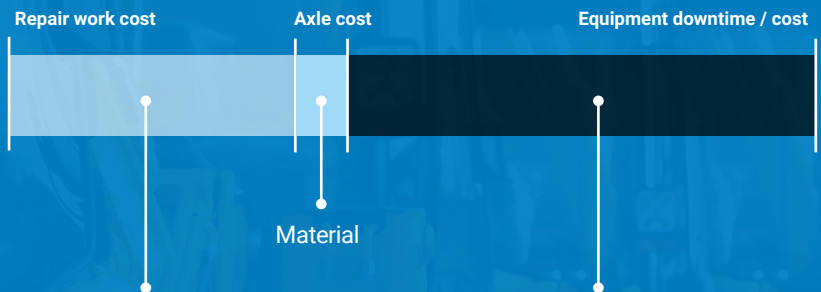






# COST SAVINGS FOR WORKSHOPS AND CUSTOMERS

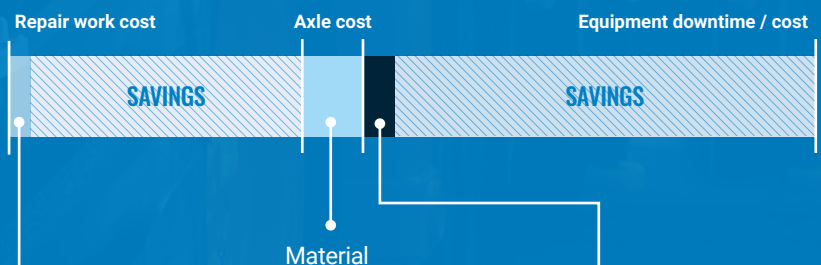
## SOLUTION USING LINE BORING AND TRADITIONAL STRAIGHT PIN



- 1 Remove existing pin
- 2 Mount line bore equipment
- 3 Line bore (make the lug hole round)
- 4 Weld the lug hole
- 5 Line bore (to right tolerance)
- 6 Remove the line bore equipment
- 7 Paint/repair after equipment
- 8 Mount new pin

Time to drive to workshop  
Time to do all the repair steps  
Time to drive to work site  
Cost for replacement machine

## SOLUTION USING EXPANDER SYSTEM



- 1 Remove existing pin
- 2 Mount Expander System

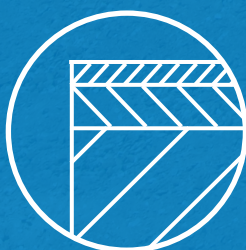
Time to retorque



# A PIVOT PIN FOR ANY CHALLENGE

## The widest product range in the industry

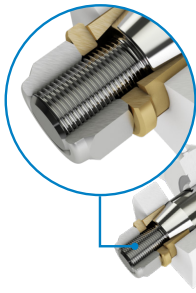
Expander System provides advanced, cost-effective pivot pin solutions that prevent lug wear — once and for all. We have the widest product range in the industry that has been installed in more than 10,000 machines. The Expander System software enables quick and easy customization of designs for new applications. Our production sites ensure swift, reliable delivery worldwide.



## CUSTOM SOLUTIONS

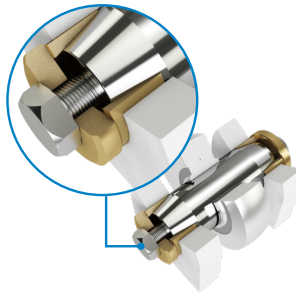
Custom Expander System pivot pins are specifically adapted to suit your needs, including materials, hardening treatments, surface coatings and tolerances. Our products are always produced using the highest quality materials and we perform rigorous testing to ensure they meet your expectations for fast installation and removal.





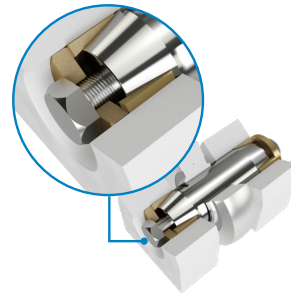
### NUT AND WASHER

For applications with no obstacles around the pivot joint



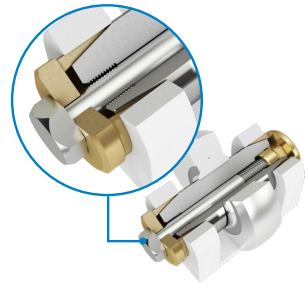
### BOLT FASTENER WITH WASHER

For applications with no obstacles and pivot joint diameters  $\geq 38$  mm



### BOLT FASTENER WITH RECESSED WASHER

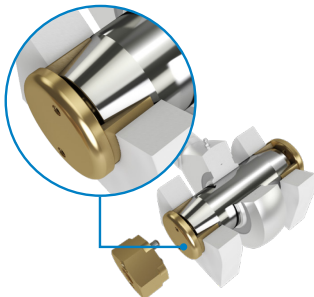
For applications with moving obstacles and a large lug width



### THROUGH BOLT DESIGN

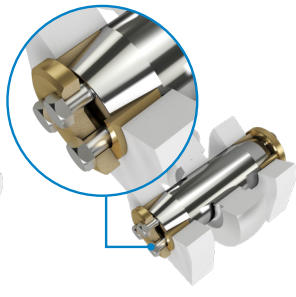
For applications with space constraints on one side

| Axle variant                         | External thread               | Internal thread               | Internal thread               | Through bolt                                |
|--------------------------------------|-------------------------------|-------------------------------|-------------------------------|---|
| Fastener Side 1/Side 2               | Hex nut/Hex nut               | Hex head bolt /Hex head bolt  | Hex head bolt /Hex head bolt  | Hex head through bolt /Flush mount fastener |
| Obstacles outside lugs Side 1/Side 2 | No obstacle/No obstacle       | No obstacle/No obstacle       | Moving obstacle /No obstacle  | No obstacle /Fixed obstacle                 |
| Greasing of pivot                    | External or Internal greasing | External or Internal greasing | External or Internal greasing | External or Internal greasing               |
| Standard pin Ø-range                 | Ø 15 mm–100 mm                | Ø 38 mm–160 mm                | Ø 38 mm–160 mm                | Ø 25 mm–160 mm                              |
| Pin length                           | < 2000 mm                     | < 2000 mm                     | < 2000 mm                     | < 500 mm                                    |
| Special                              | Upon request                  | Upon request                  | Upon request                  | Upon request                                |



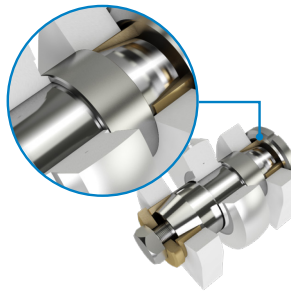
### FLAT HEAD FASTENER

For applications with moving obstacles and a narrow lug width



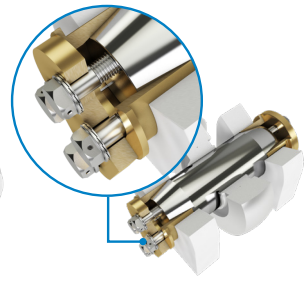
### MULTI-BOLT ARRANGEMENT

For heavy-duty applications and large diameters



### STEPPED PIN WITH AXIAL LOCKING

With axial locking for hitch pin applications

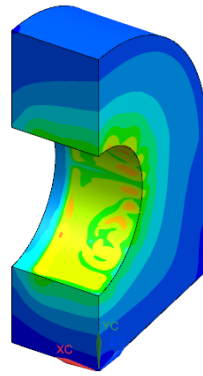


### OFFSHORE

For offshore applications; DNV 2-22/ OS E-101 and API 8C/ISO 13535 norms

| Axle variant                         | Internal thread   | Multi-bolt internal thread               | Internal thread                            | Internal thread               |
|--------------------------------------|---|--|--|-------------------------------|
| Fastener Side 1/Side 2               | Flush mount fastener + mounting tool/Flush mount fastener + mounting tool | Multi-hex head bolt /Multi-hex head bolt | Hex head bolt /Hex head bolt + spanner nut | Hex head bolt /Hex head bolt  |
| Obstacles outside lugs Side 1/Side 2 | Moving obstacle /Moving obstacle  | No obstacle/No obstacle                  | No obstacle/No obstacle                    | No obstacle/No obstacle       |
| Greasing of pivot                    | External or Internal greasing   | External or Internal greasing            | External or Internal greasing              | External or Internal greasing |
| Standard pin Ø-range                 | Ø 40 mm–160 mm  | Ø 70 mm–400 mm                           | Ø 38 mm–160 mm                             | Ø 20 mm–400 mm                |
| Pin length                           | < 2000 mm   | < 2000 mm                                | < 1000 mm                                  | < 2000 mm                     |
| Special                              | Upon request  | Upon request                             | Upon request                               | Upon request                  |

# MORE POWER BEHIND YOUR PRODUCTIVITY



From structural strength calculations to the dimensioning and production of your complete pivot pin axle – our personalized service will accompany you throughout the pivot pin creation process. With your pivot pin project in safe hands, you can dedicate more time to other areas of the machine building process.

## Heavy machinery and Expander System – the perfect match

Certificates and approvals:

- DNV
- TÜV
- ISO:9001
- ISO:14001

We can deliver certificates and testing according to your needs. For example, 3.1 material certificates or Ultrasonic, Magnetic particle and Charpy testing.

## Field tested and certified

The patented Expander System has been endurance tested for over 50,000 hours without failure and over 1 million Expander System pivot pins have been installed in more than 60,000 types of applications.

Our know-how ensures each pivot pin system performs as expected from the moment it is installed until the end of its intended life cycle, giving you more machine uptime and lower maintenance costs.



## Traceability

All Expander System pivot pins are marked with a lot number traceable to steel quality and manufacturing order. It is possible to mark the axles with your brand to let your customers know that you take pride in the details.



## The industry's first full Lifetime Warranty

We are the only manufacturer in the industry with a 10-year or 10,000-hour warranty.