ONE STOP SHOP FOR ALL PIN SOLUTIONS

bondura®
technology

Introduce a solution

bondura® technology designs and manufactures pin solutions to customers specifications, based on our patented and DNV GL Type Approved bondura® pin technology.

Using the bondura® design you will ensure a perfect fit every time without expensive engineering and design changes to the equipment.

The bondura® advantage

New equipment

- DNV GL Type Approval
- ABS Product Design Assessment
- guaranteed uptime
- decrease downtime; scheduled and unscheduled
- increase equipment lifecycle
- decrease maintenance/refurbishment cost
- ease installation, inspection and maintenance
- ensures a 360 degrees contact surface with no slack
- ensures a loadbearing surface of 180°
- extremely adaptable
- manufactured to customers specifications
- the best solution for a radial loaded connection at any size
- bondura® Multi Tools - our line of pin pulling tools

Service & Repair

- DNV GL Type Approval
- ABS Product Design Assessment
- eliminate wear & tear
- lifetime expenses of equipment is reduced: operating time of equipment is extended
- quick disassembly
- timesaving installation
- field installation made possible
- repair play and ovality in supports
- extend equipment lifecycle
- ease inspection and service procedures
- no need for heat treatment
- bondura® Multi Tool - our line of pin pulling tools

A history of innovation

1986
The History of bondura® started with a worn out excavator

1989
The Lubrication-free pin was patented

1990
Bolt Norge AS got their first employee

1991
A prototype of an expanding pin was made, and with the permission from a local contractor we got the opportunity to test it on one of his excavators. The design and product showed successful long-term testing results; thus the bondura® pivot pin was born.

1991
Esso Norway and Exxon Group participated in the innovative project of "maintenance free" bondura® pin for use in offshore operations

1991
Bolt Norge got DNV GL Type Approval

1992
bondura® pin-design was patented

1992
Smedvig Offshore (now Seadrill) made sure that the bondura® pin was installed for testing in drilling machinery on their offshore semi submersible rig "West Alpha". This was the first full scale test on an offshore drilling rig. The test was a huge success.

1993
Bolt Norge won a contract with Statoil. This contract ensured that the bondura® product line could be field tested on the Statfjord B platform outside the coast of Norway. The testing was a success.

1993
bondura® was approved and classified by the Norwegian Veritas and Statoil as "Proven Technology"

1995
Bolt Norge merged with Serigstad

2005
Bolt Norge joined the BMS Group

2007
Bolt Norge started its own production

2009
BMS Group changed its name to Ullandhaug Industries

2011
Bolt Norge entered into the US market

2013
Bolt Norge AS changed its name to bondura® technology AS

2013
bondura® technology entered into the Asian market

2014
bondura® technology got ABS PDA

Problems solved

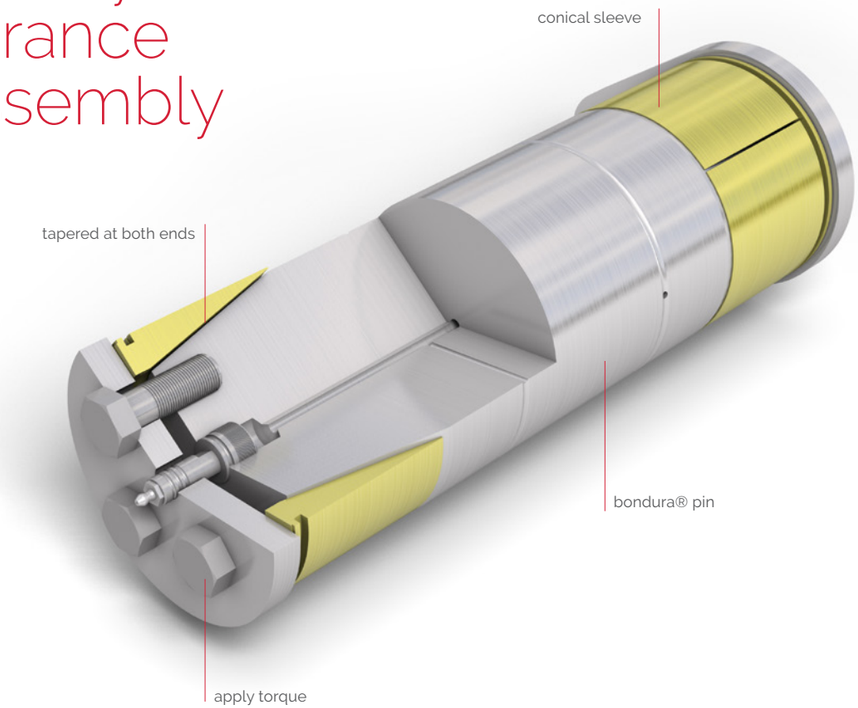
The principle of the bondura® pivot pin is ingenious and simple. The pin itself is tapered at both ends. The cone sleeves with corresponding tapering are assembled and expand on the pin upon tightening with a given torque value. Thus, the bondura® is fixed to the equipment.

The bondura® eliminates play and repair ovality that might have occurred caused by wear and tear and general pounding. When new equipment is being manufactured, assembly play can be built in which will be absorbed by tightening the bondura® assembly.

This will result in easier assembly of equipment and an extremely solid connection, avoiding future play.

Disassembly of the bondura® is very simple as the pin is loose when the cone sleeves are removed.
We have developed a removal tool to make the job even easier; the bondura® Multi Tool is available for both rental and purchase.

Assembly Endurance Disassembly



Our engineering department will provide assistance early in the project phase, so that we can design and make the best possible solution for product functionality. Not only from an OEM`s point of view, but also with regard to the equipment lifecycle, service intervals etc.

Safety, functionality and quality are always top priority for us. We can help to develop and assist with pin solutions for overhaul and upgrade of equipment, and redesign from conventional cylindrical pin to bondura® solution.

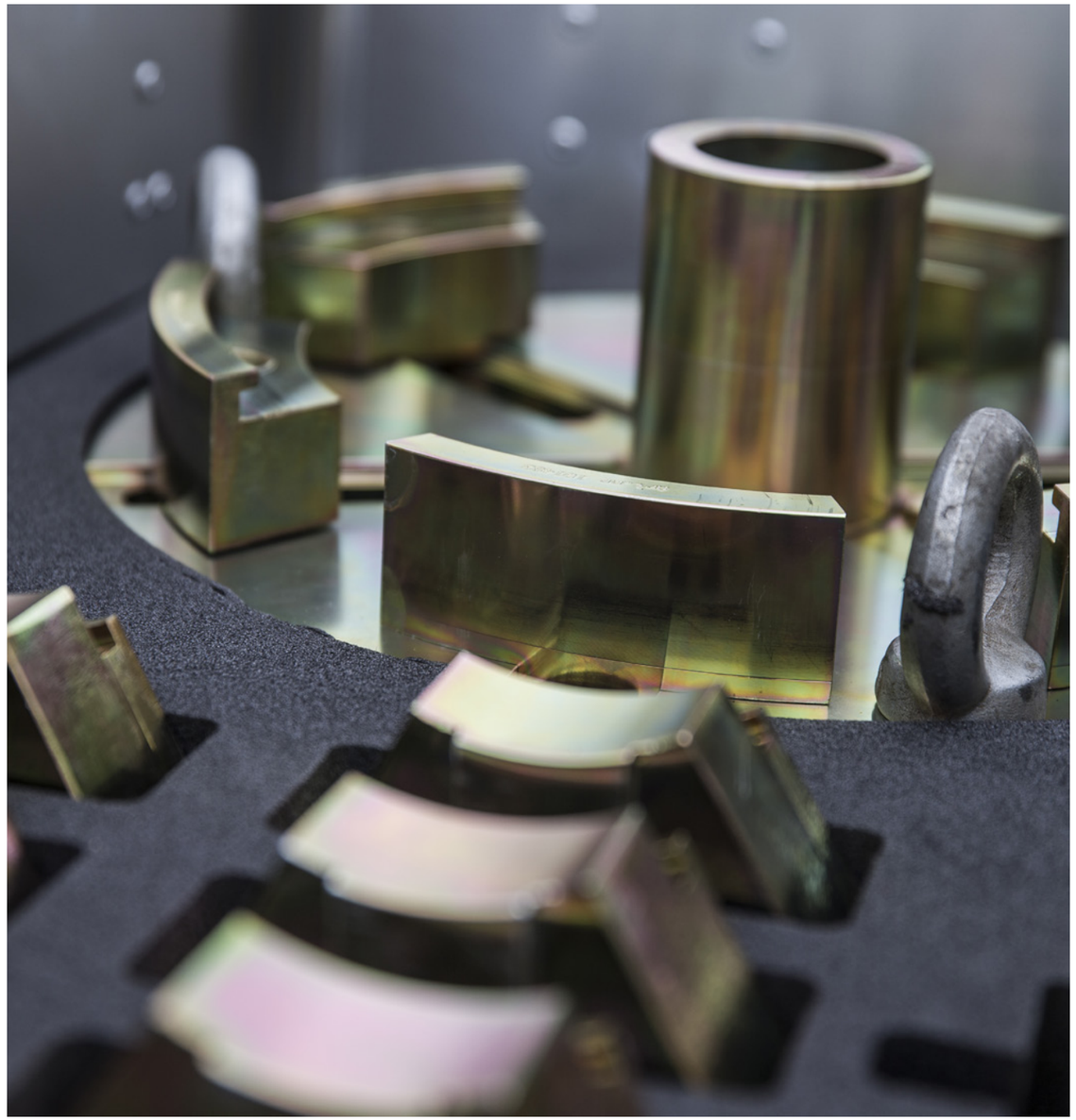
This gives the customer a good saving - in terms of that one does not need to make design changes to the equipment itself. The customer will get a significant improvement in product quality along with increased life cycle of the equipment.

After engineering the design, we will provide our customer with 3D models and assembly drawings.

bondura® Multi Tool

In order to simplify the removal of conical sleeves and pins we have developed a tool: bondura® Multi Tool. This tool is available for bondura® pivot pins with diameters ranging from Ø44.4 to Ø500 mm.

The bondura® Multi Tool can either be purchased or rented.



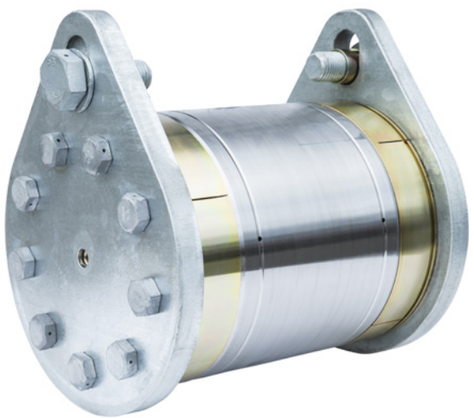
Custom made

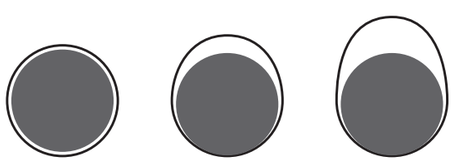
bondura® technology is constantly developing new solutions to suit special designs and requirements. We have pins for eccentric adjustment, centering two holes, play in flange couplings and bondura® that can take axial force.

Play and ovality

The bondura® pivot pin technology makes it possible to use a large degree of assembly tolerance. When the bondura® pivot pin is assembled the tolerance is close to 0, which is the same as a press fit. The result is a contact surface of 360° and a load surface in the support of 180°.

If the ovality in the support is more than 2 mm larger than the pin diameter, an oversized conical sleeve may be used. In principle it is possible to expand on large amounts of ovality, but in order to reduce the number of times tightening, the ovality should be no more than 1.0 mm. If there is more, the hole should be grinded to be as round as possible. All types of oversized conical sleeves may be supplied for all bondura® types.

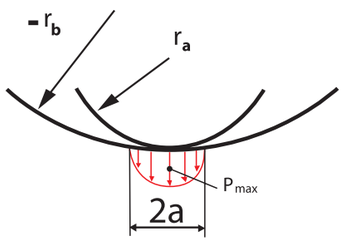




This figure shows how the ovality occur

The theory behind

The contact surface between pin and support will be reduced significantly by increasing the level of tolerance between pin and support.



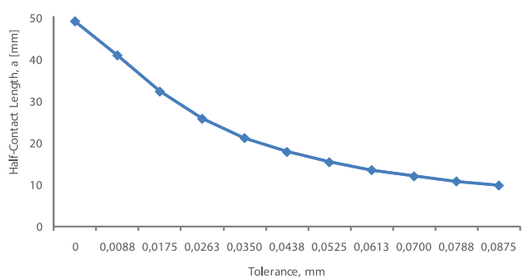
This figure shows the relationship between tolerances and contact surface

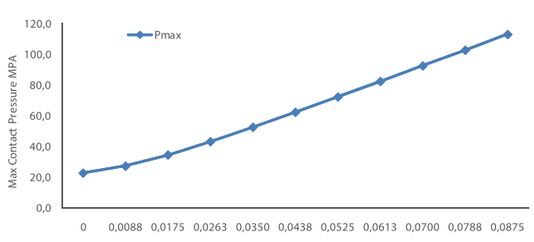
The ever present contact surface can be derived by the projected contact length (a) in the Hertz contact formula:

$$a = \sqrt{\frac{2F}{\pi L}\frac{\left(\frac{1-\nu_a^2}{E_a}+\frac{1-\nu_b^2}{E_b}\right)}{\frac{1}{2}\left(\frac{1}{r_a}-\frac{1}{r_b}\right)}}$$

L	Support Width (mm)	*v (nu)*	Transverse Contration (posion numbers)
F	Load (FSyl/2) , (N)	*ra*	Radii bolt (mm)
E (Ea = Eb)	Elasticity Module	*rb*	Radii hole (mm)

An increase of assembly tolerance from 0.04 mm to 0.1 mm will reduce the contact surface between pin and support by 78%, and thereby increase contact stress by 4 times!





Proven technology

bondura® is a patented product, and has been classified as “Proven Technology” within the offshore-, construction- and general industry since 1994.

bondura® technology has got DNV GL Type Approval, ABS Product Design Assessment and is certified according to ISO 9001.

Range of use

Drilling

bondura® is certified according to API 8C- and FEM-regulations (Federation Europeenne de la Manutention), and is approved to replace existing pins in offshore equipment. Examples of positions where bondura® is being used are clevis, dolly, topdrive, compensation systems, piperack cranes and other pipe handling equipment.

Lifting

bondura® is certified according to requirements of NS 5514 / FEM (Federation Europeenne de la Manutention) and Rules of Certification of Hoisting Appliances. The product is approved to replace existing pins in cranes and hoisting equipment. Examples of positions where bondura® is being used are section joints, cylinders and boom.

Industry

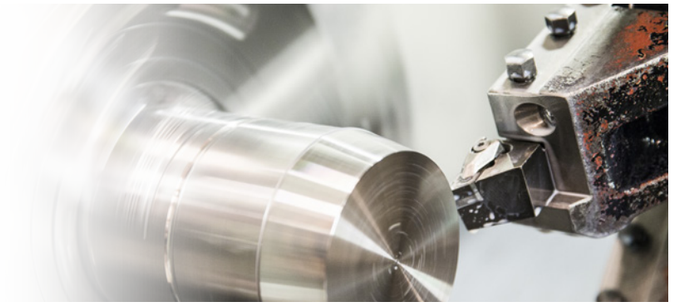
bondura® is approved to replace existing pins in construction machinery. The product is being used by equipment manufacturers, distributors and end users within the construction, mining and general industry. Examples of positions for bondura® are king, boom, cylinders and bucket.

Other areas

The bondura® is also used in the following areas:

- Artificial lift operations
- Wave power generator
- Wave power pump
- Alignment of stators in power plants
- Wind power structures
- Amusement park equipment

References



Our drilling rig Stena Don DNV id 21728 is equipped with a complete drilling package and cranes delivered by Hydralift/NOV. Equipment was delivered and installed during building process in 1999/2000 and have been in daily use since then. A lot of our equipment is fitted with bondura® pins in the bearing points.

During the years in operation we have had to overhaul a few crane cylinders due to internal leakages etc. The bondura® pins makes the replacement of cylinders faster and a lot easier to do compared to use of standard pins. We are using the bondura® Multi Tool for removal of pins and this makes it all a lot easier. We have not experienced that the pins have been hard to pull and this is very time saving for us.

We are very pleased with the bondura® pins and our experience with the pins is very good. We are continually replacing pins with bondura® as this gives us less maintenance and more production time. Down time caused by pin failures and extensive play have been reduced to a minimum on equipment equipped with bondura® pins.

At the end it is all about production time and lowering the operating cost, bondura® is one factor that has reduced our maintenance cost.

Geir Johnny Eide
Technical Superintendent Stena Don

"...The bondura® pins makes the replacement of cylinders faster and a lot easier"

We trialed these expandable tapered pins on pivot arms back in 2003 as this was historically a hinged point that would wear out in a few years and require frequent weld and machining repairs to maintain arm encoder synchronization and tool reliability.

When they were last inspected in 2008, we found that since the installation of the bondura®, we found the pins to be as tight as the day they left the shop in 2003. Since then I have tried to push this product into other areas of our equipment and we have just taken delivery of new PRS5R hoist carriage and arm sets for the exchange program with these pins installed between the carriage and arm connection points (effectively meaning that the hoist carriage should never have to be removed due to pivot wear/bore wear alone).

Dean Young
Program Manager - Top Drive & Pipehandling
Major Spares & Equipment Exchange
Transocean

"...we found that since the installation of the bondura®, we found the pins to be as tight as the day they left the shop"

ONE STOP SHOP FOR ALL PIN SOLUTIONS

bondura® is an established system that simplifies design work by achieving a uniform pin design, thus avoiding the need to employ varying pin solutions, as well as complicated housing and securing components.

Certifications

IADC MEMBER

DNV·GL

ABS FOUNDED 1862

IQNet

Achilles JQS empowered by Achilles Qualified ID 28847

bondura®
technology

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