

HARDOX®
WEAR PLATE

HARDOX®
IN REAL LIFE

KELLY ATTACHMENTS / USA

KELLY ATTACHMENTS RELIES ON HARDOX® ROUND BARS

**Quick couplers
made for heavy duty**

When Kelly Attachments replaced 4140 bars with Hardox® round bars in its quick couplers, production times went down and performance went up. The combination of hardness and toughness makes Hardox® round bars both wear resistant and machinable.

An inspired moment for quick couplers

When Jack Kelly needed a quick coupler for the company's line of excavator buckets, he scanned the market and found it had nothing to offer that lived up to his standards. He simply had to develop one of his own design. One that made it easy to change buckets and other attachments and to still be able to cope with the toughest jobs. Long-lasting performance has always been a hallmark of Kelly Attachments' products. The quick coupler had to perform at the same high level.

Stepping up in pin performance

Kelly Attachments had previously used pins in 4140 steel in its other products. These pins were turned to the right dimension and then heat treated to reach sufficient hardness. Experience had shown that this was far from an ideal solution, for several reasons.

The 4140 pins had to be shipped away for heat treatment. This was quite costly and had a turn-around time of about three weeks. The heat treatment itself often caused the

4140 pins to warp and grow slightly, causing problems when assembling the products. Maintaining the correct diameter is important to avoid play in the holes, which would cause additional wear. Another disadvantage with the 4140 steel was the poor welding properties.

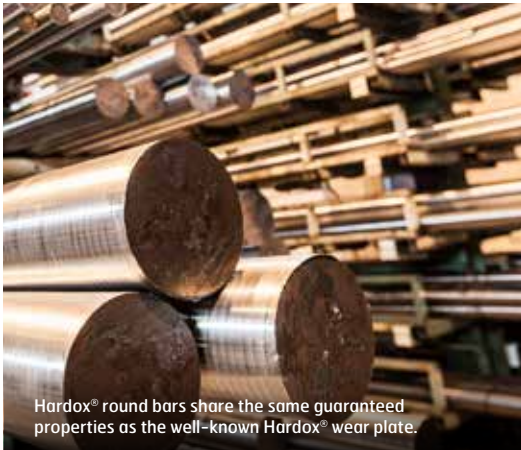
The external heat treatment also required a large batch of pins to be produced before shipping. This didn't give any flexibility in the production. Together with the other issues, the new quick coupler needed a better solution for the pin material.

Jack Kelly didn't have to look far to find it.

"I have used Hardox® wear plate for a long time and I know that it's way better than anything else I have tried. The plates are straight and the wear resistance has no competition. Since the plates worked fine, trying Hardox® round bars made sense. And it proved to be a good choice," says Jack Kelly.



When the going gets tough, Hardox® wear plate proves its worth.



Hardox® round bars share the same guaranteed properties as the well-known Hardox® wear plate.

The all-round round bar

Hardox® round bars are ideal for a wide range of applications that benefit from the steel's hardness, strength, toughness and fatigue resistance. They are used, for example, in sieving buckets, agriculture machinery, mining, material handling equipment and machine components.

Hardox® round bars come in diameters between 40 and 100 mm (1.575-3.937 in.) and lengths up to 5000 mm (196.85 in.). AR 500 development round bars are available in diameters of 20-160 mm (0.786-6.298 in.). The dimensional tolerances for diameter and roundness are very tight and consistent, ensuring efficient and repeatable production.

The low carbon equivalent in Hardox® round bars gives the material high weldability compared to other steels such as 4140 or 42CrMo4V steel. Welding can be performed without pre-heating.

Hardox® round bars save time and last longer

Hardox® round bars are delivered heat-treated and ready to use. The hardness of Hardox® 400 round bar is typically 400 HBW. It's also hard from the surface to the core. Even though it's a hard material, the low-carbon, homogeneous microstructure makes it machinable with regular workshop equipment.

The quick coupler from Kelly Attachments uses five pins, four fixed and one that is removed when changing attachment. The pins are turned to the right diameter in a CNC lathe.

"With Hardox® I can take the bar, put it in the lathe, take it out and it's a finished part with a fine surface. I don't have to do anything with it, just put on some rust protection. It's a hard material and that is what we are looking for. Still, our machines can handle it fine, we just have to turn over the tool inserts more often. That's no big deal compared to the wear performance we get with the Hardox® round bars," says Jack.

Proven performance

Kelly Attachments has so far made well over 1,000 quick couplers that are all Hardox®. The pins are Hardox® round bar and the body of the quick coupler is made of Hardox® wear plate. The couplers have been on the market for about three years without any need for pins to be replaced, or with any other problems for that matter. It goes to show that design as well as manufacturing processes and

choice of material more than fulfil the customers' demands.

Buckets from Kelly Attachments also use Hardox® wear plate for the side cutters and for the lip with teeth that are machined from one single piece of Hardox®. The solid teeth give excellent breakout force when working in hard ground.



Quick couplers from Kelly Attachments rely on Hardox® round bars for toughness and long service life.

Kelly Attachments in Texas, USA, was started in 2000 by Jack Kelly. The company designs and manufactures quick couplers, breakers, buckets and compaction wheels. Since 2017, Kelly Attachments has been a member of Hardox® In My Body, SSAB's quality program for companies that use Hardox® wear plate in products that are approved by SSAB in terms of design, welding and manufacturing processes.

PROPERTIES	HARDOX® 400 ROUND BAR	AR 500 DEVELOPMENT BAR
Hardness (HBW)	370-430	500
Yield strength (MPa)	1000	1200
Toughness Charpy V (J)	65 at -40°C (-40°F)	27 at -20°C (-4°F)
Tensile strength (MPa)	1350	1700
Carbon equivalent (CET)	0.37	0.51

A complete data sheet for Hardox® 400 round bar can be downloaded at www.hardox.com

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