

Xtek

Solutions In Motion

Xtek Crane Wheels



Why Choose Xtek?

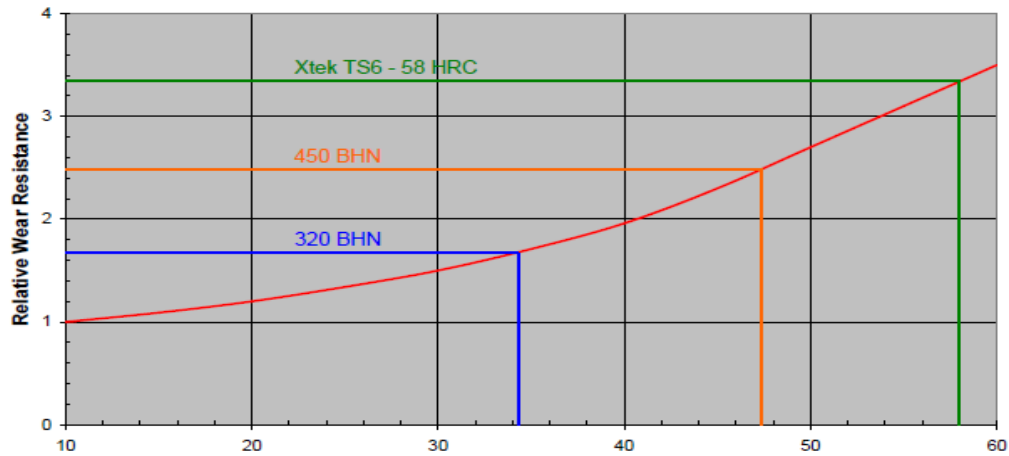
What Makes Xtek Superior?

Reason #1

~ Xtek wheels have Higher Surface Hardness then Mckees Rocks.

Why harden the wheel?

Hardening the wheel surfaces improves the wear resistance of the wheel.



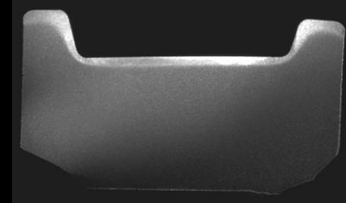
Contour Case Hardening XTEK

- ✓ Controlled Atmosphere Furnace Heating
- ✓ No Oxygen
- ✓ Not a Carburized Process
- ✓ Optimizes High Surface Hardness for Wear With Tread Hardness Depth and Ductile Flange Core
- ✓ Ideal Heavy Loads
- ✓ Ideal for High Cycle Cranes



Xtek

58 – 62 Hrc



Surface Hardness

Flame or Induction Hardened

Common Reference:

Deep Hardened
Differentially Hardened
Super Tough

- ✓ Selective Heating Flame Heating
 - ✓ Or Induction Heating
- ✓ Lowered into Quench While Rotation Continues
- ✓ Wide Variety of Steels
- ✓ Non-uniform case depth
- ✓ Can Develop brittle flanges due to hardness depths
- ✓ Flange Properties Depend on Heating Controls



56 – 60 Hrc



450 – 500 Hbn



Reason #2

~ **Xtek 1055 Material has a more Ductile Core than Mckeess Rocks 1070 Material.**

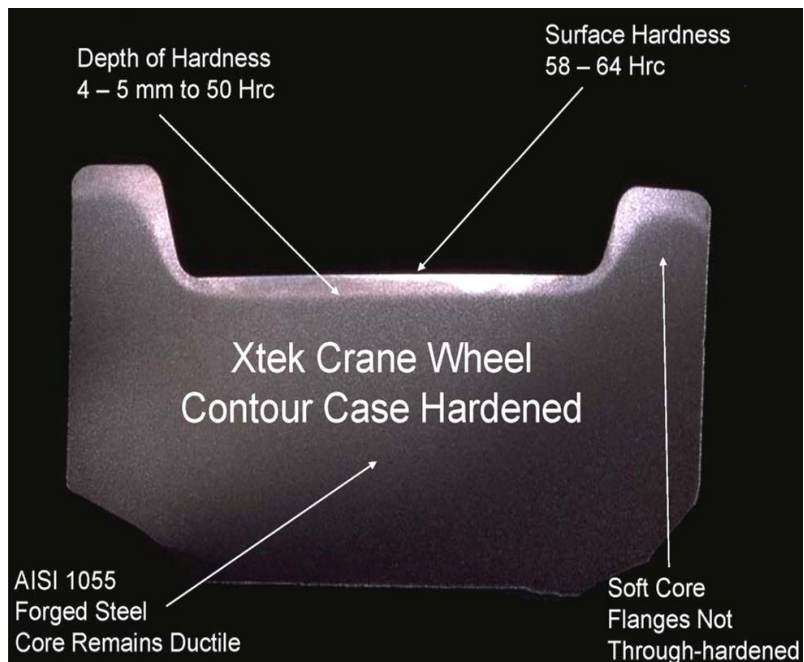
Key Features of Xtek Contour Case Hardened Track Wheels:

MATERIAL – The standard Xtek wheel product is manufactured from **AISI 1055 FORGED steel**. We have developed a specific material standard with regard to the chemistry and forging quality that our material suppliers must meet.

Xtek wheels are hardened using a special process which increases the strength, wear resistance and the service life of the wheels. Our wheels are deep “**CONTOUR CASE HARDENED**”. After the wheels are thermally treated at exact temperatures, they are quenched in specially designed quench equipment and tempered to achieve uniform surface and subsurface hardness.

HARDNESS - There are two very important features of the Xtek hardened wheel.

- First is the surface hardness. The tread and inner flanges are hardened to **58-62 HRC**, while the outer flange and core remain tough and ductile.
- The second is the depth of the hardness (4-5 mm using AISI 1055). It is critical that there is sufficient depth to carry the load and eliminate the potential for subsurface cracking while preserving the ductility in the flanges.



Case Hardening:

- Develops high surface hardness/high strength through heat treatment
 - Resistant to abrasive wear
 - High strength surface resists bending and rolling fatigue
 - Generates compressive residual stress that help resist fatigue fracture
- Leaves core at low hardness – tough & fracture resistant

For special applications, Xtek will employ our metallurgical expertise in utilizing other chemistries (AISI 1070, 4150, 6150, etc.) that yield hardness characteristics specific to the application requirements.

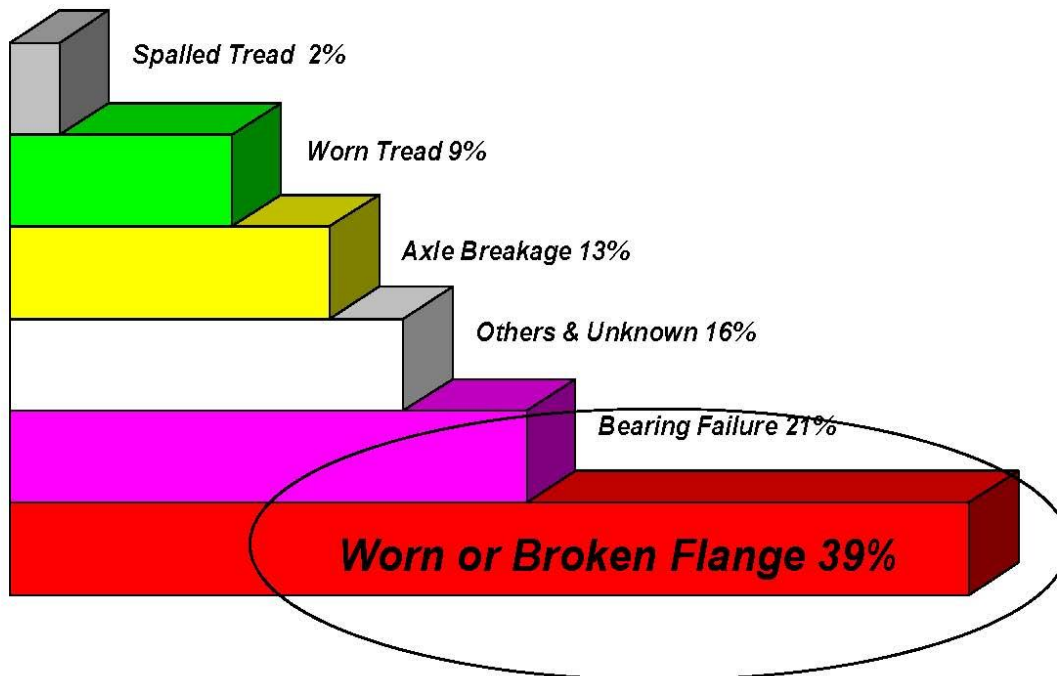
Comment	Material	Depth of Hardening	Core Hardness	Impact Toughness on Core
Primary Material	1055	0.160-0.200"	240-255 Bhn	15-25 ft. lbs
	1070	0.180-0.300"	300-380 Bhn	10-20 ft. lbs
	6150	0.300-0.500"	320-380 Bhn	15-25 ft. lbs

Reason #3

~ **The Ductile Core Increases Flange Strength.**

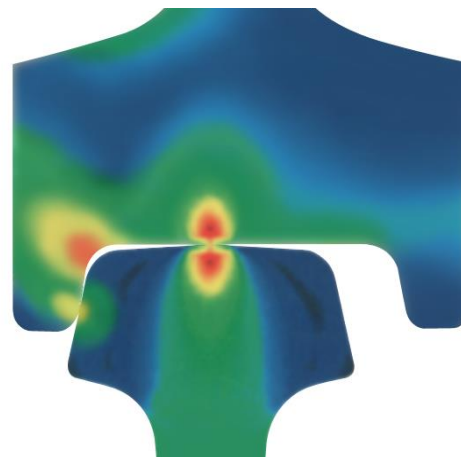
The majority (50%) of wheel assemblies are replaced due to wheel related problems. These problems include tread spalls, excessive tread wear and broken or worn flanges. Flange problems are the leading cause for replacement.

Wheel Assembly Reasons for Replacement **Survey Results From AIST Crane Symposium**



Critical Points of Measure on a track wheel:

- **Wear Resistance**
 - Rolling Friction
 - tread wear
 - Sliding Friction
 - flange wear
- **Fracture Resistance**
 - Core Properties
 - Ductility
- **Loading**
 - Vertical (Tread)



- Horizontal (Flange)

Fracture Resistance is particularly important in the flange area of track wheel. Flange breakage is the leading failure mode on crane wheels.



Preserving the ductile properties of the forged steel material allow for the wheel to bend and not break.



Reason #4

~ Harder Wheels are More Wear Resistant.

Wear Resistance:

“Wear” is the loss of material on contacting surfaces. High friction occurs as the flanges produce a “wiping action” between the wheel flange and rail. This produces abrasive wear as see in the photos below. “Wear” under a sliding action can also produce adhesion. This is called adhesive wear.

Abrasive Wear (Rolling)



Adhesive Wear (Sliding)



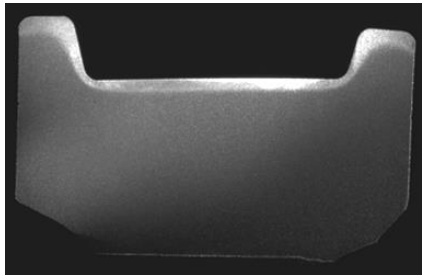
Abrasive and Adhesive wear resistance is very strongly related to hardness. The higher the hardness the more wear resistant the material.

Reason #5

~ Xtek has Better Control of its Process.

The majority of our competition has limited heat treatment facilities. U.S. wheel manufactures (like McKees Rocks) have historically used Penna-Flame Industries to Flame Harden wheels to 500-650 Hb. (See www.pennaflame.com)

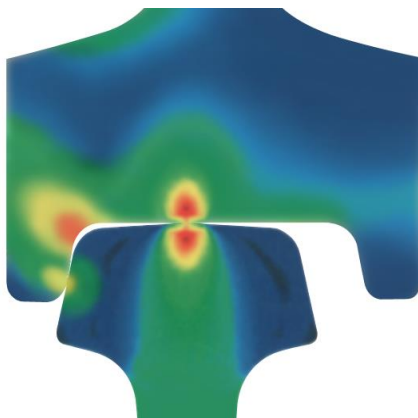
Xtek controls the entire heat treatment process in house. Nothing is sub-contracted to a third party. In addition, the selective quench method developed exclusively by Xtek produces a more consist and controlled depth of hardness. Xtek wheels are heated in a batch furnace to a precise temperature and then selectively quenched to harden only the critical surfaces.



Xtek Wheel uniform case depth



McKees Rocks – Non-uniform case depth



Because the intersection of the wheel flange and tread is a high stress area (as can be seen in the FEA), it is important to minimize the heat affected zone in this region. The ductile x-section behind the flange/tread intersection is greatest on the Xtek wheel (as seen above) which yields a stronger flange.

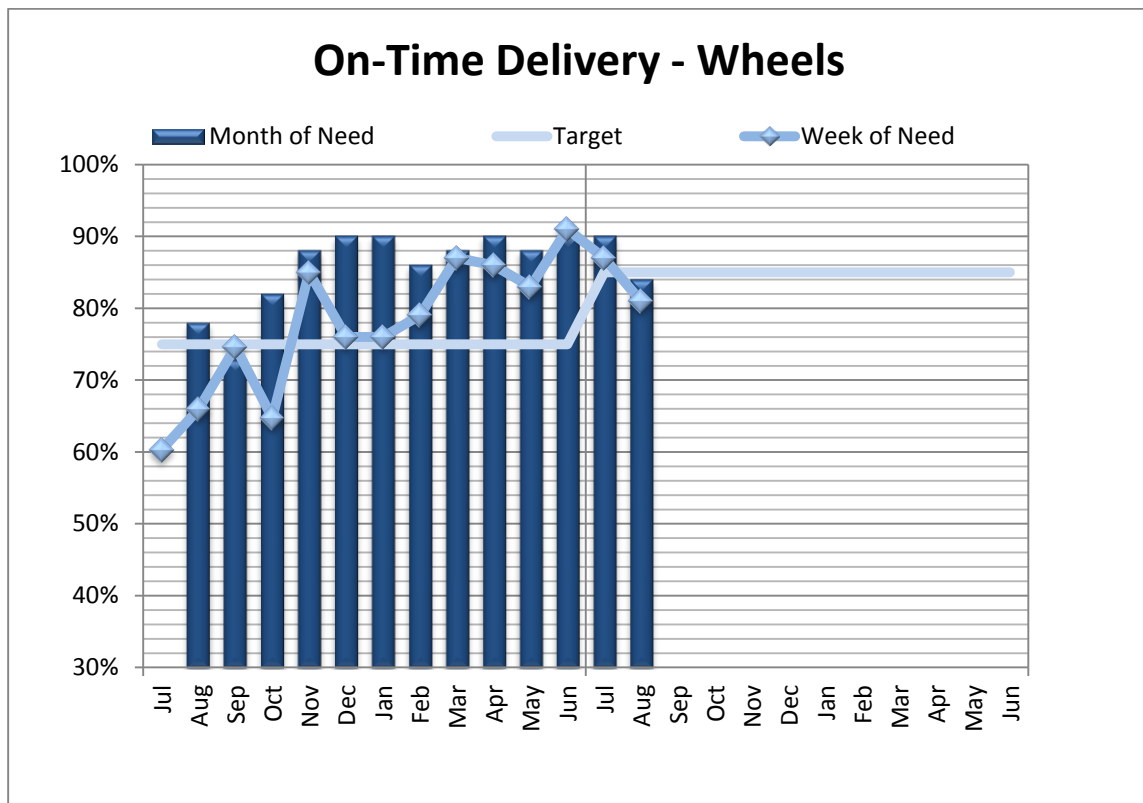
Xtek is unique in the track wheel industry, and the only manufacturer of track wheels using the TSP method.

Xtek's process produces a higher hardness and more uniform case depth.

Reason #6

~ Xtek has Integrity in achieving on-time delivery.

The wheel product group at Xtek has been steadily improving its on time delivery performance over the past year. Currently 85%-90% of all wheels manufactured at Xtek are shipped on time. Most of these wheels have a “standard” delivery of 10-12 weeks. Our goal is to become the highest rated wheel manufacturer in customer satisfaction and product loyalty. Xtek is a name customers have come to depend on.



We truly hope you will consider placing your next track wheel order with Xtek!