



Facts about Hardfacing Tire Shredder Knives

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Worn tire shredder knives have been reported to be the most frequent and costly causes of downtime. Increasing wear life through the application of hardfacing can mean substantial savings for operators. Knives can be hardfaced in-house for those with proper welding equipment, outsourced to skilled shops or purchased from selected

Original Equipment Manufacturers (OEM). Presented below is a list of *Frequently Asked Questions* (FAQ) regarding hardfacing and its application to shredder knives.



Question. How do shredder knives wear out?

Answer. The actual wear mechanism that takes place is not completely understood. There are probably a number of mechanisms at work. Because of the metal in the tires, it would be logical to think that the mechanism is metallic wear or galling. However, many tires come through the shredder that have sand, dirt or grit embedded in them, this would lead to abrasion as the wear mechanism. Then there is the occasional hammer, rock or other foreign debris. Wear by impact would be the contributing factor in this case. In actuality all three are working at some level perhaps resulting in micro-chipping of the edge. Heat and corrosion may also contribute. OEMs generally supply Quenched and Tempered (Q&T) low alloy steels knives that tend to wear quickly. Restoring the cutting edges with a more wear resistant hardfacing alloy extends knife life.

Question. What is HARDFACING and why should it be considered for this application?

Answer. Hardfacing is an arc welding procedure used to deposit wear resistant alloys on new or worn parts for the purpose of extending longevity. In the case of shredder knives, that longevity can be as much as eight times longer than OEM (Q&T) knives. Longer knife life means less frequent downtimes and increased productivity.

Question. Why do HARDFACED knives out produce OEM (Q&T) knives?

Answer. Hardfacing knives out produce OEM knives because of their alloy content. OEM knives are usually made from a quenched and tempered (Q&T) low alloy steel such as 4340 (~4.2 % alloy) or 4140 (~2.3 % Alloy) and range in hardness from mid 40'sRc to low 50'sRc. The hardfacing alloy, Postalloy® Super-Edge (~17% alloy), contains more elements within the steel that are necessary to combat various wear mechanisms. Its as-welded hardness is 62Rc.

Question. Is the HARDFACING of shredder knives a proven technology?

Answer. Hardfacing itself has been around for centuries. Different applications require different chemistries or alloys to combat different types of wear. Tire Shredder knives have been hardfaced since the time tires were shredded.

Question. What is Postalloy® Super-Edge HARDFACING and how is it applied?

Answer. Hardfacing for shredder knives is almost exclusively done by the MIG process with a cored wire (Postalloy® Super-Edge), DC power supply, wire feeder and Argon based shielding gas. Super-Edge is a small diameter, high carbon, high alloy cored wire specifically designed to hold an edge and deposit an alloy to resist abrasion, metal to metal wear and impact. More accurately, it is a Tool Steel. Preheat and interpass temperatures range from 400°F to 700°F and deposits are cooled slowly to yield an as-welded hardness of 62Rc. Tempering is usually not required.

Question. Can't I just ask for harder knives from the OEM?

Answer. Sure, but it won't buy you much more longevity. Hardness is not a good measuring stick to use to assess wear. It's the metallurgical makeup that counts. If OEM (Q&T) knives were hardened to 62Rc (the same hardness as Super-Edge) they would still not perform as well knives hardfaced with Super-Edge.



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Question. Aren't HARDFACING alloys always cracking?

Answer. It is true that many arc welded deposits do have check relief cracks, but not all. Super-Edge does not have check cracks. Occasionally a crack will develop upon rebuilding, but these are not considered detrimental.



Question. How much better are HARDFACED knives over OEM (Q&T) knives?

Answer. Hardfaced knives are significantly better. It has been reported by Riley Machine, Marion, KY; that in some operations, a set of OEM (Q&T) knives may only last two weeks while his hardfaced knives may last two months. The numbers are so impressive that many of the OEMs are hardfacing new (Q&T) knives and participate in the rebuilding process as well.

Question. How many rebuilds can I expect out of a set of knives?

Answer. That depends on how badly they are worn and the size of the knives. Large knives are worth salvaging and can be rebuilt indefinitely, as long as the bulk hardness does not drop significantly due to the heat of the hardfacing process. Excessive deposit cracking also limits rebuilds. In many cases removing old hardfacing and starting over again is all that it takes to increase the number of rebuilds. Rebuilding smaller knives with excessive wear may not be economically feasible.

Question. How long can I expect a set of HARDFACED knives to last?

Answer. That depends on many things. Passenger tires are easier on the knives than truck tires. Removing the truck tire bead helps increase knife life. Removing debris such as metal parts, sand, and rocks, help increase wear life. Proper welding, pre-heating and post-heating procedures help ensure hard, tough weld deposits, and this usually leads to longer wear life. Short cuts usually produce disastrous results.

Question. Can the base alloy be changed?

Answer. Yes, 4340 and 4140 base material can be changed to a tougher, more wear resistant alloy such as Abrasion Resistant (AR 400, 450, & 500) steels. AR knives are not affected by the heat of hardfacing. They are also easier to weld on because of the lower carbon content. Super-Edge can easily be welded on AR plates, providing proper techniques are maintained.

Question. Do OEM's HARDFACE knives?

Answer. Yes, many will supply new knives with hardfacing and they will hardface worn knives as well. Check with your vendor to be sure their knives are hardfaced with Postalloy® Super-Edge.

Question. What types of HARDFACING weld beads are used?

Answer. Stringer beads, as well as a slight weave bead are preferred for the cutting edge faces. They are generally 1/2" wide but may be wider to support the hard weld metal. The sides can be solid across the thickness direction, or a zigzag stringer pattern can be used. The area around hex hole or shaft hole can also be hardfaced up to 1/2" wide. Some machines allow material to get down between the knives, increasing the operations horsepower requirements. Hardfacing the areas between the shaft hole and cutting edges with circular or weave patterns aides in shredding this material and reduces the overall horsepower needed.

The FAQ's presented here only scratch the surface. Much more can be answered by contacting Postle Industries Inc., Cleveland, OH. or by visiting the website www.postle.com. Hardfacing makes good economic sense. In an age when steel is at a premium and lead times long, hardfacing may be the only way to maintain productivity and profitability.

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