

HARDOX®
WEAR PLATE



KAMLESH METAL & ALLOY

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THE BEAST

**SOLE DISTRIBUTOR
IN INDIA FOR
HARDOX PLATES**



www.kamleshmetalalloy.com



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ABOUT US

Kamlesh Metal & Alloy is the **"SOLE DISTRIBUTOR IN INDIA FOR HARDOX & STRENX STEEL PLATES"**

Kamlesh Metal & Alloy has been a professionally managed stockist and supplier of Ferrous and Non-Ferrous Metals. We are capable of providing a vast range of materials, from stock, to suit your needs. From highly specialized non-standard material to off the shelf items, from production to prototype, from low minimums to mill runs. Kamlesh Metal & Alloy has the experience to solve your most difficult requirements.

PAYLOAD AND SERVICE LIFE

Hardox® wear plate cuts down on weight and extends the service life of steel structures in comparison with regular steel. A lighter truck container made of Hardox® steel means an increased load capacity of 10-20% and even more in some applications. Not only does it reduce the number of trucks on our roads, it also saves fuel and reduces emissions. Whatever the application, Hardox® contributes to a stronger, lighter and more sustainable world. And when the product reaches its final expiration date, 100% of it can be recycled into new strong and energy-saving products.

The extreme wear resistance has always been key to the success of Hardox® wear plate. Today it is harder and tougher than ever, and able to withstand heavy impact without permanent deformation or cracking.

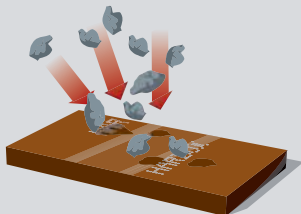
Although primarily intended as a wear plate, the unique combination of hardness and toughness allows it to perform as a load-carrying part in applications such as buckets, dump bodies and containers. With Hardox® steel you can design structures that are wear-resistant, strong and lightweight at the same time.

Hardox® wear plate keeps getting more powerful and versatile. New grades and dimensions are introduced regularly. The traditional Hardox® wear plate has been complemented with tubes and round bars.

If you are a cost-sensitive and performance-oriented steel user, the Hardox® name is all good news! Visit hardox.com for more information about how hard and tough turns into increased payload and longer service life.

HARDNESS AND TOUGHNESS WORKING TOGETHER

Hardness is what gives Hardox® steel its unique wear resistance and structural strength. Hardness minimizes wear since it is difficult for the 'edges' of abrasive material to cut into the material. Hardox® grades deliver high wear resistance during the plate's entire service life. Hardness also means it has excellent yield and tensile strength, properties that keep a structure in shape without being deformed.



Toughness is the other strong point of Hardox® wear plate. When hardness makes it wear resistant and strong, toughness is what makes it possible to bend, form and weld the material without cracking. If a Hardox® wear plate is stressed beyond its yield point and plastically deformed—on purpose in the workshop or when hit by a heavy rock on site—it will resist cracking and if a localized crack should occur it will resist propagation.





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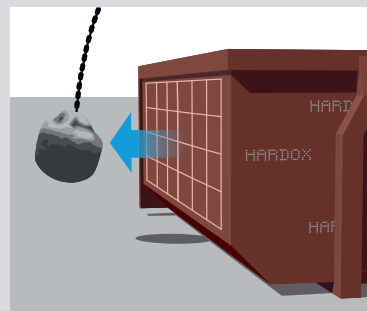
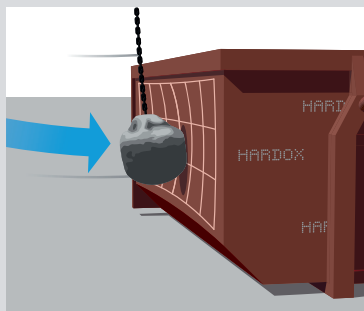
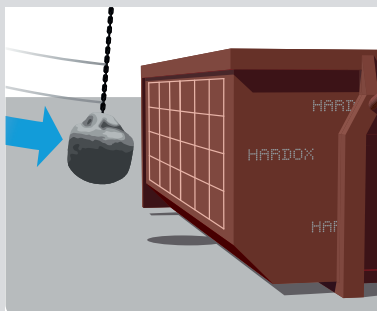
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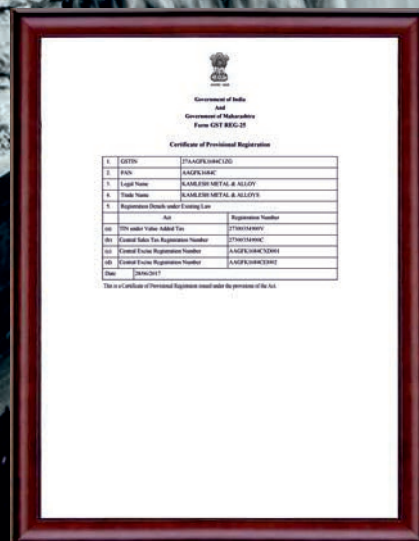
HARDOX® WEAR PLATE AT THE BLINK OF AN EYE

It only takes a fraction of a second to discover the unique performance of Hardox® wear plate. The impact force from large and heavy objects is distributed over the plate, resisting dents and

cracking. The metal absorbs the energy and returns to its original shape in the same way as when a tennis racket hits a ball. That's what impact toughness is all about.



CERTIFICATION AND APPROVAL





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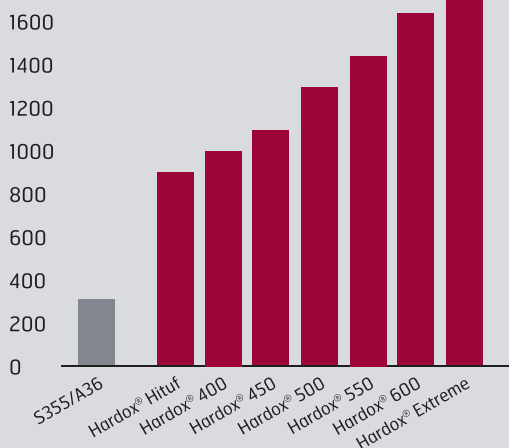
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STRENGTH, HARDNESS AND GUARANTEED TOUGHNESS

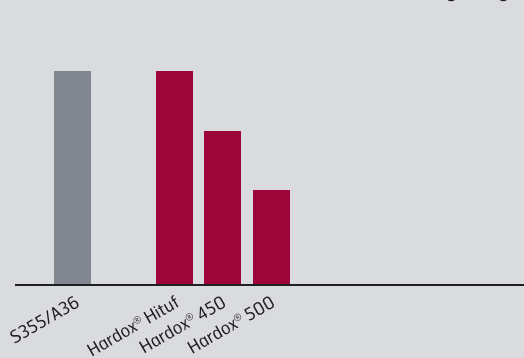
Yield strength (MPa)

Hardness HBW



Charpy V approx. min 27 J

-60 °C
-40 °C
-20 °C
0 °C
+20 °C



The toughness values for Hardox® HiTuf, 450 and 500 are guaranteed minimum values at -40°C, -20°C and 0°C respectively. Compared to a standard S355 steel, Hardox® HiTuf for example has about a three times higher resistance to permanent deformation (hardness) and an equal resistance to cracking (toughness).

FIGHTING WEAR AND WEIGHT

Mild steel
S355/A36
80 mm

Hardox® 400
38 mm

Hardox® 450
28 mm

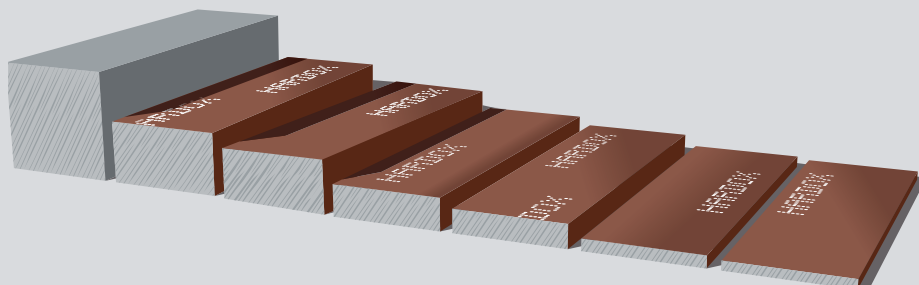
Hardox® 500
18 mm

Hardox® 550
14 mm

Hardox® 600
10 mm

Hardox® Extreme
7 mm

What hardness is right for you? Probably a combination of grades, fighting different wear conditions. A tipper body might have one Hardox® grade in the base and another on the sides in order to provide even service life for the entire body. When calculating relative service life with SSAB's WearCalc software as shown in the illustration, Hardox® Extreme will last more than 10 times longer than mild steel in similar wear conditions.



HARDNESS COMPARISON OF SOME HARDOX® GRADES*

| Brinell HBW 10 mm 29.4 kN | Vickers 98 N | Rockwell HRC | Approximate tensile strength MPa | Approximate corresponding grade |
|------------------------------|--------------|--------------|--|------------------------------------|
| 400 | 401 | 40 | 1245 | Hardox® 400 |
| 450 | 458 | 44.5 | 1412 | Hardox® 450 |
| 500 | 514 | 49 | 1580 | Hardox® 500 |
| 600 | 627 | 55 | 1940 | Hardox® 600 |

* Tested by SSAB on standard production samples. The data is for guidance only, not as a basis for design and acceptance testing.



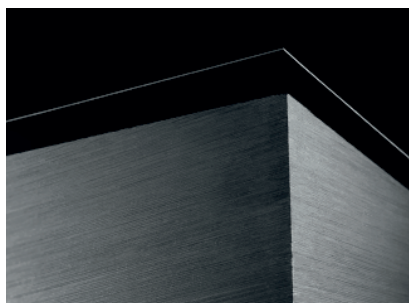


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HIGH VERSATILITY

The variety of dimensions makes Hardox® wear plate suitable for a wide range of designs and products. The outstanding qualities of the flat Hardox® wear plate grades are also available in the form of tubes and round bars. The tubes extend service life when pumping abrasive materials such as wet concrete, soil, gravel and ore slurry. Round bars are the hard-wearing choice in sieve buckets, for example.

All Hardox® products are clearly marked. A unique identification number is stamped on the plates and sheets for traceability. Other data such as dimensions, serial number and heat number are printed before delivery. Knowing your product's unique identity makes workshop processing and quality control so much easier. The identifying marks also come in handy when storing smaller pieces of Hardox® steel for later use.

| HARDOX® PLATE AND SHEET | | | | | |
|-------------------------|----------------------|---|---|---|------------------------------------|
| Hardox® grade | Hardness nominal HBW | Impact toughness CVL typical for 20 mm (¾") J at -40°C (ft-lb at -40°F) | Relative service life interval ¹ | CEV/CET typical for 20 mm (¾") ² | Thickness range mm (inches) |
| Hardox® HiTuf | 350 | 95 (70) | | 0.55/0.36 ³ | 40-160 (1.57-6.3) |
| Hardox® 400 | 400 | 45 (33) | 1 | 0.44/0.28 | 2-130 (0.079 -5.12) ⁴ |
| Hardox® 450 | 450 | 50 (37) | 1.1-1.7 | 0.56/0.38 | 2.5-130 (0.098-5.12) ⁴ |
| | | | | 0.39/ 0.31 | 0.7-2.1 (0.028-0.083) ⁵ |
| Hardox® 500 | 500 | 37 (27) | 1.3-2.1 | 0.63/0.41 | 3-103 (0.118-4.06) |
| Hardox® 500 Tuf | 475-505 | 45 (33) | 1.3-2.1 | 0.52/0.36 | 4-25 (0.079-0.985) |
| Hardox® 550 | 550 | 30 (22) | 1.5-4.0 | 0.72/0.48 | 8-65 (0.315-2.56) |
| Hardox® 600 | 600 | 20 (15) | 1.8-8.0 | 0.76/0.58 | 6-65, metric only |
| Hardox® Extreme | 650-700 | 15 (< 11) | 2.0-18.0 | 0.65/0.54 | 8-19, metric only |
| Hardox® HiTemp | 350-400 | 60 (44) | | 0.59/0.40 | 5-51 (0.197-2) |

All plates are produced according to Hardox® wear plate guarantees or better.

1. Max/min sliding wear by SSAB WearCalc (mild steel 0.2-0.8)

2. CEV=C+Mn/6+(Cr+Mo+V)/5+(Cu+Ni)/15; CET=C+(Mn+Mo)/10+(Cr+Cu)/20+Ni/40

3. 70 mm (2.76")

4. Up to 160 mm (6.30") available upon request

5. Hardox® 450 CR

| HARDOX® TUBE | | | | |
|---------------|----------------------|----------------------------------|-------------------------------|----------------------------|
| Hardox® grade | Hardness nominal HBW | Yield strength typical MPa (Ksi) | Diameter external mm (inches) | Wall thickness mm (inches) |
| Hardox® 400 | 400 | 1000-1300 (145-188) | 76.1-219.1 (3-8 5/8) | 3.0-6.0 (0.118-0.236) |
| Hardox® 500 | 500 | 1200 (> 174) | 76.1-133 (3-5.24) | 2.0-6.0 (0.079-0.236) |

| HARDOX® ROUND BAR | | | | |
|-------------------|----------------------|---|--------------------------------|--------------------------|
| Hardox® grade | Hardness nominal HBW | Impact toughness CVL typical for 20 mm (¾") J at -40°C (Ft-lb at -40°F) | CEV/CET typical for 20 mm (¾") | Bar diameter mm (inches) |
| Hardox® 400 Bar | 400 | 45 (33) | 0.58/0.37 | 40-70 (1.57-2 ¾) |



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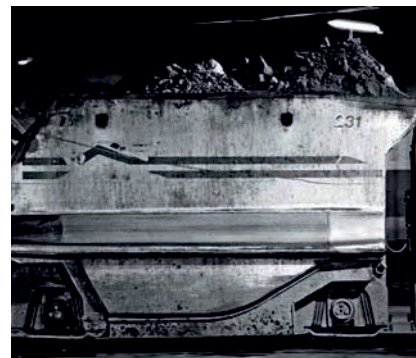


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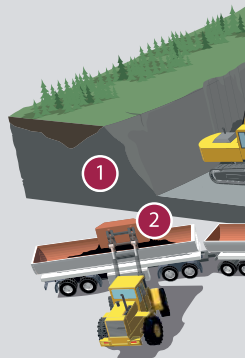
HARDOX



CEMENT PRODUCTION

The cement production process finds use for Hardox® wear plate all the way from the limestone quarry to loading and transporting the final product. The abrasive applications include excavating, crushing, screening and grinding the stone.

- | | |
|-----------------------------|-----------------------------------|
| 1. Open pit | 17. Preheating in cyclones |
| 2. Loader and tipper | 18. Rotary kiln |
| 3. Excavator and dump truck | 19. Clinker cooler |
| 4. Hopper | 20. Conveyor belt |
| 5. Conveyor belt | 21. Hammer crusher |
| 6. Jaw crusher | 22. Hopper |
| 7. Rubber conveyor belt | 23. Screw conveyor |
| 8. Crusher screen | 24. Silos |
| 9. Cone crusher | 25. Ball mill |
| 10. Chute | 26. Elevator bucket |
| 11. Conveyor belt | 27. Hopper |
| 12. Storage bins | 28. Silo |
| 13. Elevator buckets | 29. Transport of finished product |
| 14. Hopper | 30. Concrete transit mixer |
| 15. Conveyor belt | 31. Concrete pump truck |
| 16. Raw mill | |





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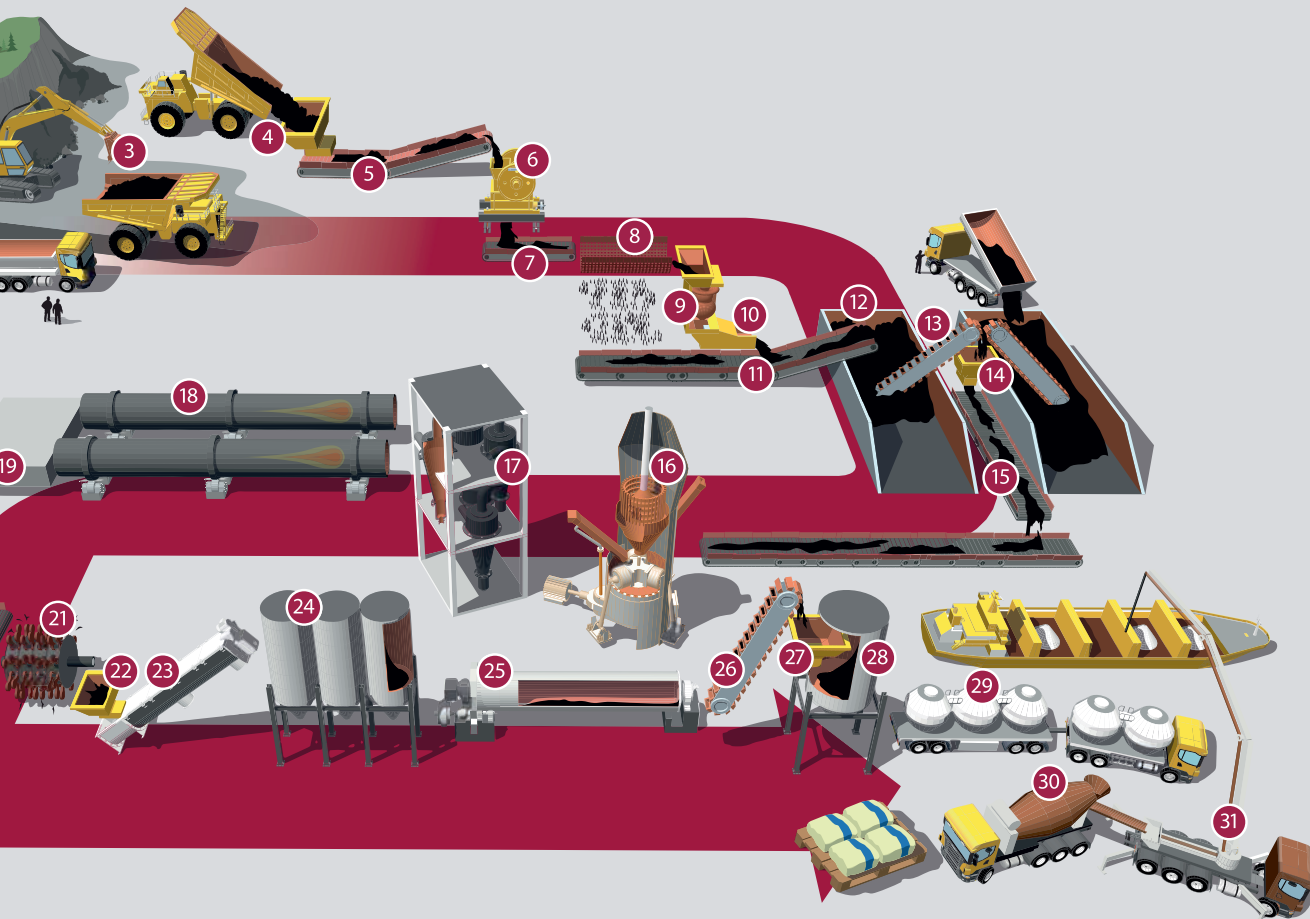


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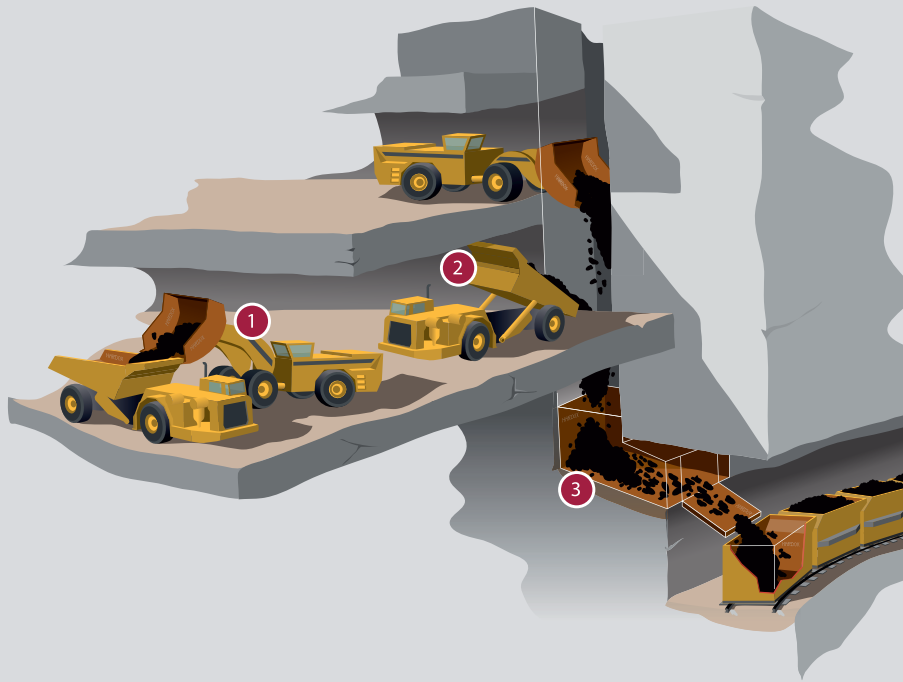
ON SITE



UNDERGROUND MINING

Hardox® wear plate is a reliable and flexible solution for underground mining operations. Its outstanding weldability and workshop-friendly properties make it easy to perform on-site repairs, often inside the mine without having to bring the equipment to the surface. This keeps production up and maintenance costs down.

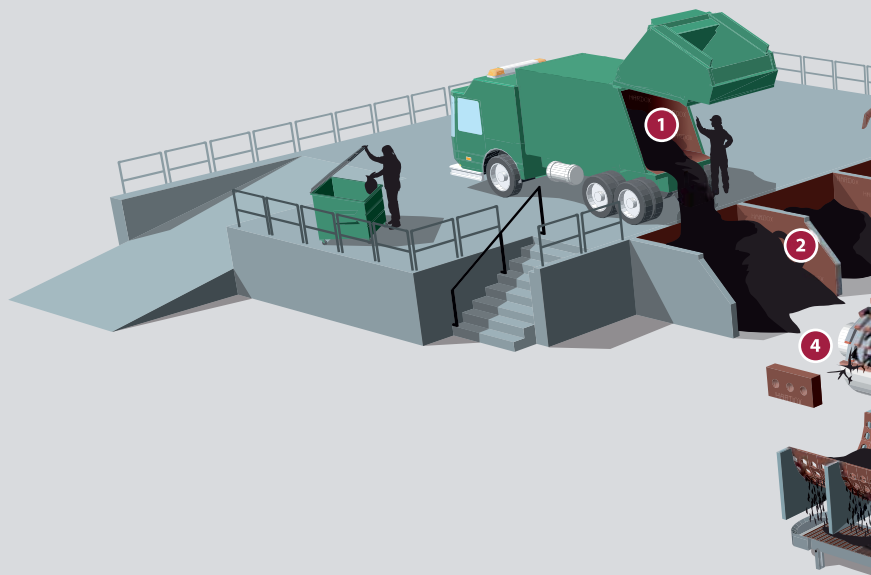
1. Front loader
2. Dump truck
3. Buffer bin
4. Rail road car
5. Discharge site
6. Transfer chute
7. Feeder
8. Screener
9. Crusher
10. Conveyor
11. Measuring bin
12. Skip

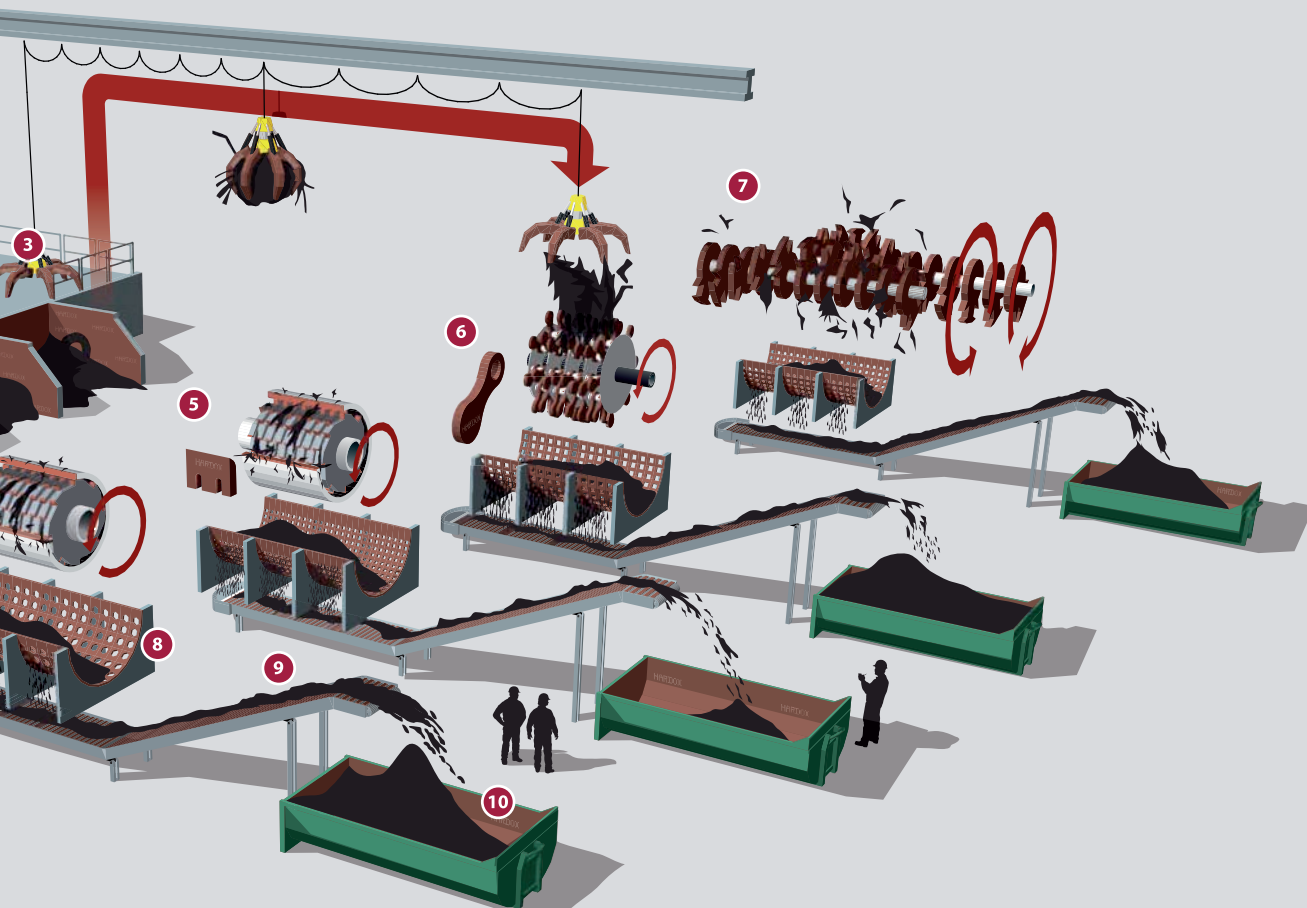
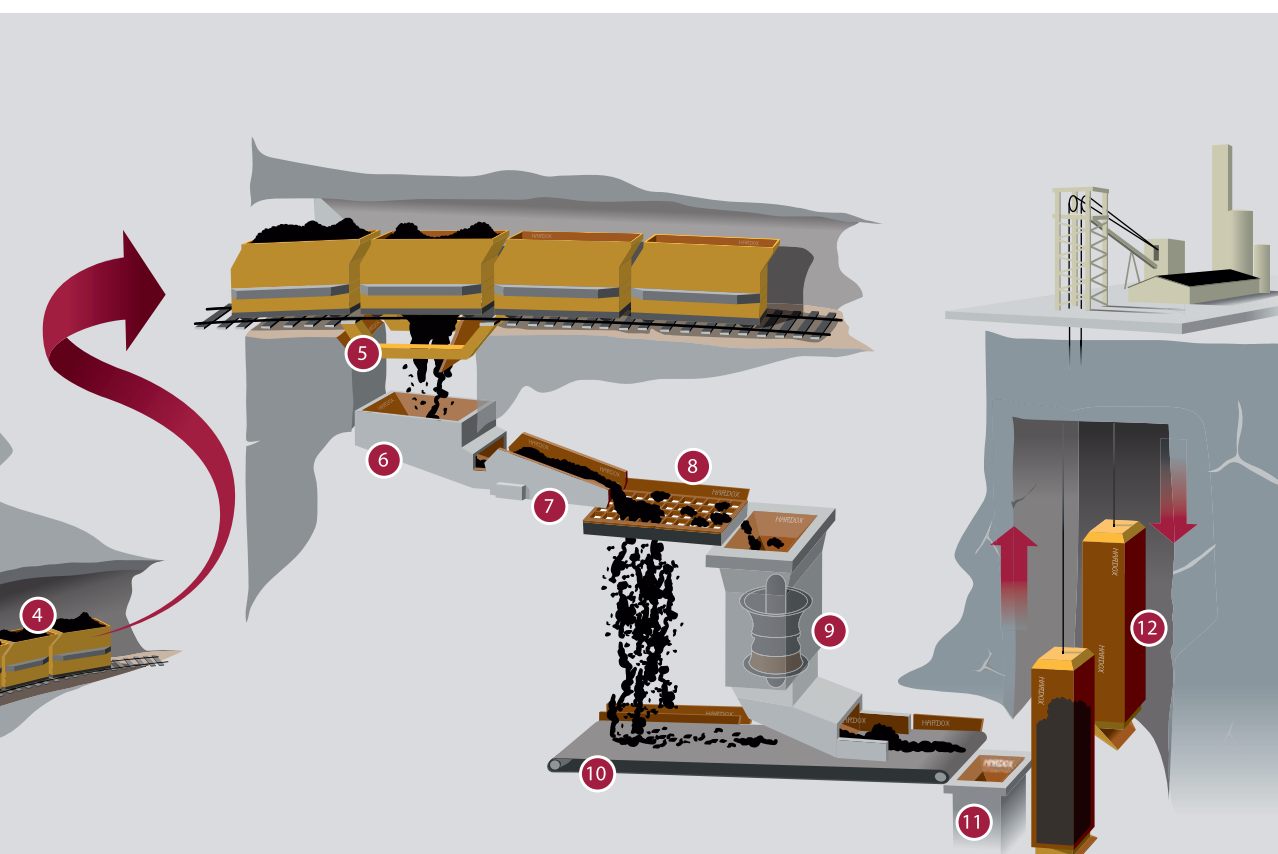


RECYCLING

Recycling processes, such as the fragmentizing of waste, places enormous demands on equipment. In order to stay productive and competitive it is vital to use materials that withstand the abuse. Hardox® wear plate is the solution. Developed specifically for tough demands, Hardox® wear plate allows recyclers and recycling equipment manufacturers to cut costs, improve service life, and optimize production.

1. Garbage truck
2. Liner plates
3. Grapples
4. Prismatic knives
5. Granulator knives
6. Hammer mills
7. Shredders
8. Sieves/screens
9. Conveyor belt
10. Containers





QUARRYING AND OPEN-PIT MINING

Quarrying and open-pit mining operations deliver some of the world's toughest wear challenges. Throughout the whole production flow, Hardox® wear plate's superior wear resistance translates to extended service life between repairs or replacement of parts.

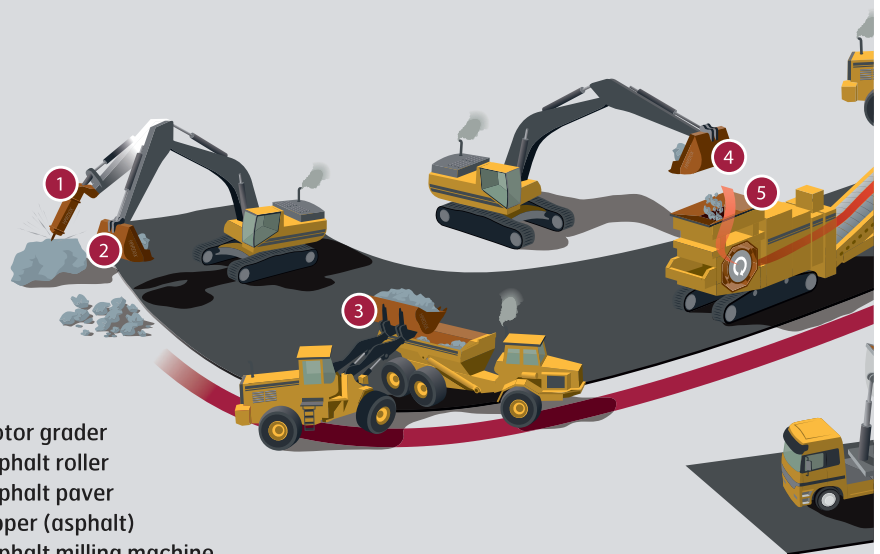
1. Shovel
2. Bulldozer
3. Dump truck
4. Excavator
5. Dump pocket
6. Feeder
7. Screener
8. Jaw crusher
9. Conveyor
10. Transfer chute
11. Hammer crusher
12. Final screening
13. Loader
14. Tipper

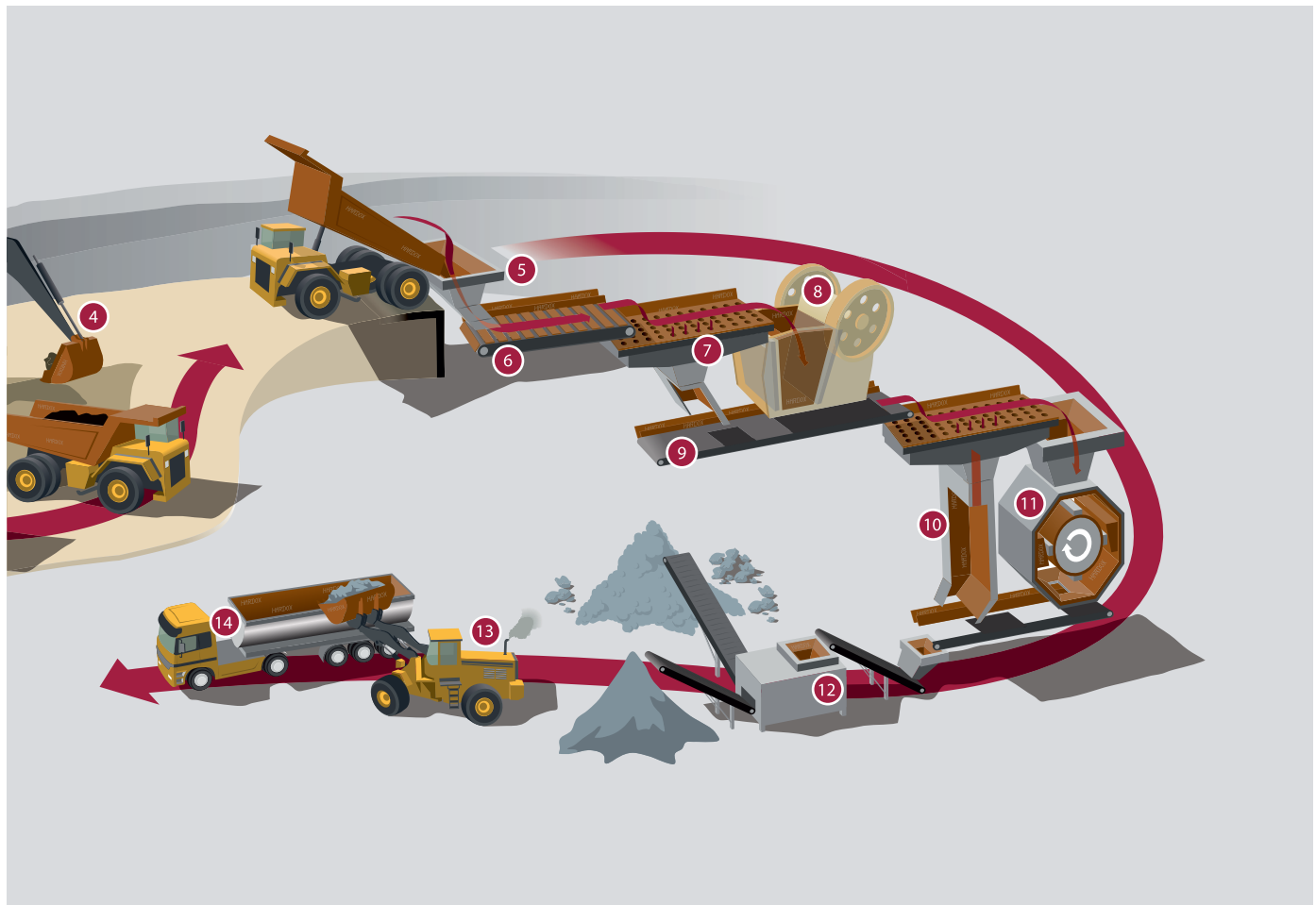


ROAD BUILDING

Road building needs a variety of equipment, from trucks that transport heavy material long distances to machines that withstand extreme wear when breaking ground. The unique properties of Hardox® wear plate take you beyond conventional design thinking. For example, its superior strength allows for thinner steel that lowers overall weight and enables increased payloads.

1. Hydraulic hammer
2. Excavator bucket
3. Bucket
4. Excavator bucket
5. Crusher
6. Bucket
7. Bucket
8. Asphalt plant
9. Tipper (asphalt)
10. Tipper (gravel)
11. Bulldozer
12. Motor grader
13. Asphalt roller
14. Asphalt paver
15. Tipper (asphalt)
16. Asphalt milling machine





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