

Diminishing returns

Cutting parts wear is a significant way to cut costs. **John Chadwick** reports on some of the latest aids in wear protection

With demand and prices for minerals at all-time highs, lost production is more costly than ever. For years, specialist companies have been developing harder, stronger and tougher wear materials to reduce downtime and maintenance costs. One example, **SSAB Oxelösund**, is an integrated steelworks with great expertise in developing and producing high-strength structural and abrasion-resistant steel plate.

Finding the perfect wear plate for the job depends on the application, the abrasiveness of minerals being handled, and the right balance between service intervals, downtime and material costs. SSAB's Wear Technology Group assists customers to analyse their specific wear processes and optimise design solutions, further enhancing products and maximising service life, payload and overall profitability. The HARDOX® relative wear concept and proprietary WearCalc™ prediction software, allows comparison of sliding wear as a function of mineral composition and wear plate abrasion resistance.

The company's flagship products – HARDOX 450 and HARDOX 500 – are abrasion-resistant plates with a hardness of 450 HBW and 500 HBW, respectively. HARDOX 450 is designed for applications requiring high abrasion resistance in combination with good cold bending properties and very good weldability. Applications include trucks, crushers, sieves,

feeders, skips, cutting edges, liners, hammers, conveyors and buckets. HARDOX 500 is a harder product offering greater wear-resistance.

HARDOX 550 was developed as the next step in terms of protection against impact and sliding wear. One area in which HARDOX 550 has been very successful is in comparison with 12 – 14% manganese steels. These steels work-harden under impact from about 300 – 350 Brinell as produced to around 550 Brinell. HARDOX 550 requires no work-hardening to achieve the 550 HBW level of hardness and will thus always provide maximum sliding abrasion.

HARDOX 600 meets the aggressive wear environments associated with applications such as chutes, armoured face conveyors and other high wear equipment. HARDOX 600 withstands impacts that often lead to fracture and destruction of high-chrome/white-iron castings and ceramics. "Like all HARDOX plate, HARDOX 600 has a level of user friendliness not found in many other products designed for high wear resistance," the company claims. "The need to sacrifice wear resistance to enhance impact strength has often been eliminated by the switch to HARDOX 600."

With a typical hardness of 650-700 HBW, HARDOX Extreme – SSAB's most innovative product – is designed to provide extreme wear life under extreme conditions. The combination of extreme wear resistance and workshop

SSAB Oxelösund HARDOX allows the design of low-weight truck bodies with the wear-resistant qualities of much heavier structures

friendliness allows enhanced workshop productivity and facilitates fabrication of customised wear parts. HARDOX Extreme competes well with Ni-hards, overlays and chromium-rich castings. For sliding wear with abrasive materials such as granite, wear resistance is approximately 1.75 times higher than HARDOX 600 and some 12 times higher than HARDOX 400. HARDOX Extreme can be welded, cut, milled and drilled using standard workshop practices.

HARDOX WEARPARTS™ is a global network of companies that manufacture and market products that use wear parts made of HARDOX, the most commonly used wear plate. There are some 75 members of the network worldwide carefully selected by SSAB Oxelösund for their great competency, service quality and extensive experience with HARDOX and its applications. The companies stock HARDOX wear plate, ensuring their customers have easy access to products. And certification ensures that a repair is an investment rather than a cost. Members of the network ensure that HARDOX wear-resistant steel is bent, drilled, cut, welded or milled to produce the wear part in accordance with the customer's specifications.

The **NanoSteel**® Co, a leader in nanostructured steel alloy surface technologies, has made commercially available the newest addition to its patented portfolio of Super Hard Steel® (SHS) products, SHS 9800 weld overlay for use in extreme service environments. SHS 9800 is a premium alloy solution that features an ultra-refined crystalline nanoscale microstructure, up to 1,000 times finer than existing solutions, resulting in very high hardness up to 71 HRC with exceptional resistance to severe sliding abrasion and impact.

"As an alternative to carbide overlay and Q&T wear plate products, SHS 9800 wear plate provides a superior performing wear solution that helps customers lower maintenance costs and improve operational productivity," says David Paratore, President and CEO.

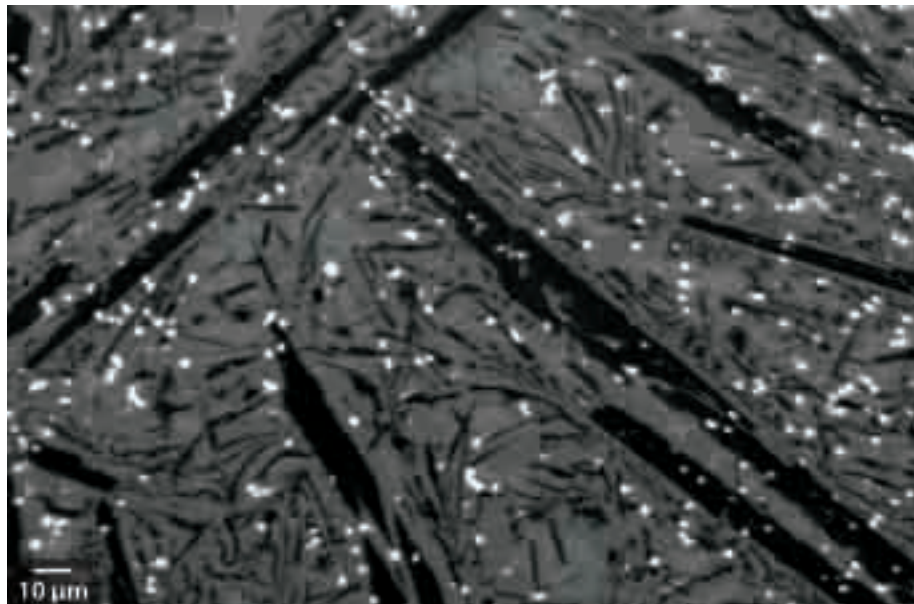
SHS 9800 excels in high wear environments such as liners for mine truck beds and bodies, loader buckets, dragline buckets and wheels, chutes, conveyors, crushers, troughs and hoppers.

Linatex has for many decades been associated with producing the highest quality rubber products specifically designed to combat the harshest abrasive environments. The knowledge and experience developed over this time has played a major role in the development of Linatex VS – a high quality uncured natural rubber specifically designed for hot bonding processes in abrasive fine slurry applications. Linatex says "VS provides end users with unmatched abrasion resistance in fine slurry applications."

Until now those using the hot bonding process have had to settle for a product that did not have the long lasting advantages of uncured rubber. The challenge was to develop a natural rubber for hot bonding that provided the end user with the differentiated wear performance they had come to expect with Linatex natural rubber.

Linatex VS has proven its performance in trials conducted in South America at Los Pelambres copper mine where it was placed in high wear piping from a cyclone cluster. When compared to the competitor product, Linatex VS provided four times the life of the rubber the client had been using. Linatex VS has also proved its worth in South Africa, with trials of moulded mining pump liners providing seven times the wear life performance of the proprietary rubber compound.

Metso has acquired PSP Slévárna, a producer of finished machined



SEM Micrograph of the SHS 9800 from NanoSteel

manganese wear parts located in Prerov, Czech Republic. With this Metso improved its capacity to supply wear parts to crushing and screening plants. Located close to Metso's markets and installed equipment base in Central and Eastern Europe, the new production plant will also generate savings and shorten wear parts lead times. PSP Slévárna has, until now, been a supplier to Metso.

20 years of Xtralloy

This year marks the 20th year anniversary for Xtralloy, **Columbia Steel's** unique high carbon and manganese alloy "that changed the way mining thinks about wear part life in tough, abrasive applications, the company says.

"Although high carbon and manganese steel from Europe began making inroads in the US in the early 1980s, it wasn't until 1986 that

high performance crusher wear parts significantly hit the market, when metallurgists at Columbia Steel developed a way to produce thick, heavy sections of the new alloy."

That process included an extensive field review of crusher operations throughout the US in the early 1980s by Product Engineer Chuck Hendrickson. "I visited 55 customers in 17 states in 21 days," recalls Hendrickson about the whirlwind tour. What he saw convinced Chief Metallurgist Phil Belding back at the Portland, Oregon, foundry that they were on to something.

"Heavy section cone liners were a casting type which had been universally avoided by all of the other premium manganese steel producers in this country," says Belding. By experimenting with both ingredients and processes - specifically heat treating - Belding and the Columbia Steel foundry found a solution to these problematic thick castings.

And the first product made from the new Xtralloy alloy: "We started by manufacturing 7-ft Symons cone parts," says Hendrickson. "Nowadays we produce a large volume of different cones and jaws, as well as gyratory concave segments, and even rolls for shredders."

Sandvik offers wear protection in metal, ceramic and rubber. Its HX900 cast-in-carbide is a unique wear material for the toughest conditions, combining the wear resistance of cemented carbide with the shock resistance, ductility and forming capability of nodular iron. The wear



LHD buckets are vital areas to be protected



Linatex wear piping

drum-vane and LHD bucket life. Also, continuous loading arm (CLA) tips protected by KenCast materials maintain their shape and productivity longer than non-carbide CLA tips. KenCast protects grouser bars and track pads from excessive wear and losing their grip in rugged terrain. It also provides optimum protection against abrasive sliding and impact wear on

resistance is generally 3-15 times higher than common structural steel, nodular iron, and welded material.

Sandvik's new range of ceramic wear plates (WT9200) and sheeting (WG9200) offers extremely long wear life in applications with severe abrasion. By embedding the ceramic tiles in rubber, the best properties of the two materials are combined. Thanks to the dampening properties of the rubber, the ceramic tiles can take a lot more impact than linings consisting of pure ceramic tiles.

The new modular WT7000 wear protection system comprises dual harness rubber, offering longer equipment life. As no steel is used, worn-out liners can easily be recycled. The weight is also less than other wear protection products, making it easier to handle.

Kennametal offers KenCast® parts for wear problems. This is an exclusive product protected by US. Kennametal takes tungsten carbide particles of varying sizes and metallurgically bonds them to air-hardened steel. It manufactures these castings at its own foundry to the size and shape required for any customer's particular application. KenCast parts combine the durability of steel with the wear resistance of carbide to create a wear part that withstands use in extremely abrasive and high-impact applications.

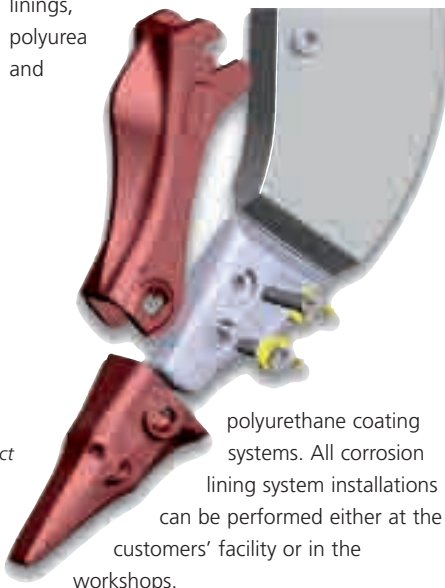
On surface, KenCast wear parts will significantly reduce costly wear on dragline and surface mining buckets when applied to bucket lips and wing shrouds. Underground, it is proven to substantially increase longwall

grizzlies and screens in processing.

KenCast parts can be made with a minimum thickness of 6.4 mm to a maximum of 203 mm. Width and length can go up to a maximum 508 mm. KenCast parts can be easily field installed by welding with low hydrogen welding rod or wire with no pre or post heat requirements.

REMA TIP TOP offers a complete line of rubber and ceramic linings, molded rubber wear plates & bars, urethane linings, UHMW-PE linings, PTFE linings in addition to a complete line of rubber working tools. It also offers customers both field installation and/or workshop lining services.

The expanded Corrosion Protection product line and services provides maximum protection for systems even under the most extreme conditions. REMA TIP TOP manufactures and installs a wide range of pre-cured soft rubber lining systems, self vulcanising soft rubber lining, autoclave vulcanised soft and hard rubber linings, flake coatings and laminate linings, polyurea and



polyurethane coating systems. All corrosion lining system installations can be performed either at the customers' facility or in the workshops.

The fixing of MTG Systems RipMet comprises easy to extract pins, an MTGtwist retainer made from elastomer and polyurethane and a standard shaped square hole. The MTG plug prevents the square hole from becoming filled with soil and saves time and cleaning in disassembly.

Ground engaging

Accommodating greater demand from mining, **Berco** is expanding its Mining Products division, with the installation of its second Maxi Press. The press is scheduled to double production of stamped products for mining equipment. With a screw diameter of 900 mm and 16,000 t of press force, it is ideally suited to the production of links, toothed sectors, roller bodies and shafts for heavy duty dozers and mining excavators, thanks to the optimal match between press force and weight of the components to be produced.

The layout of the new press line has been designed to optimise the production cycle in comparison to the existing - and even larger - 32,000 t Maxi Press. The efficiency of the process will be enhanced by the introduction of numerous articulated robots for handling workpieces, thus automating the process as far as possible. This is intended to reduce production costs - an essential condition for Berco to grow its competitiveness in this market.

Esco announced four new products at MINExpo, the EverSharp™ cast lip system, the EverSharp LHD lip system, the Posilok® Plus mining tooth system and the ProFill™ dragline bucket.

MTG also took part in Minexpo and displayed the new RipMet. This system incorporates the MTGtwist hammerless tooth-adapter fastening system. MTG reports the following advantages for the hammerless ripper system:

- Longer working life with optimal penetration
 - While other Ripper Systems on the market need to be changed, RipMet continues to work longer with excellent penetration
 - The small profile of the adapter nose allows for a longer tooth with a higher percentage of wear material and it also extends the life of the tooth
 - It guarantees optimal penetration up to the end of its life
 - The protector optimises the penetration of the adapter through the entire life
 - It improves material flows and optimises penetration.
- Excellent resistance for the toughest applications
 - The stabilisation surfaces of the fitting system guarantee improved distribution of forces; it minimises breakages, even in the most extreme applications
 - The fitting system prevents the pin from becoming buckled or broken.

- Safe and easy to change the teeth
 - It prevents accidents caused by hitting or flying particles
 - The force required is much less than traditional hammer systems
 - Faster and easier to change the teeth.
- Excellent retention, completely eliminating tooth losses.

Making wear parts

Chemtura Corp claims to have "recast the rules of urethane manufacturing" with new Adiprene® Duracast™ Two-Component Urethane System. This groundbreaking advance enables customers to pour parts of all sizes, including some of the largest, most intricate parts ever—all with greater ease, toughness and durability than ever before possible. The two components of Adiprene Duracast, with its proprietary curative, offer high performance through superior phase segregation.

With no MOCA or BDO cures, Adiprene Duracast delivers significantly longer pot life and quick demould times. As a result, manufacturers gain tighter control over ratio and waste—and higher productivity at lower cost.

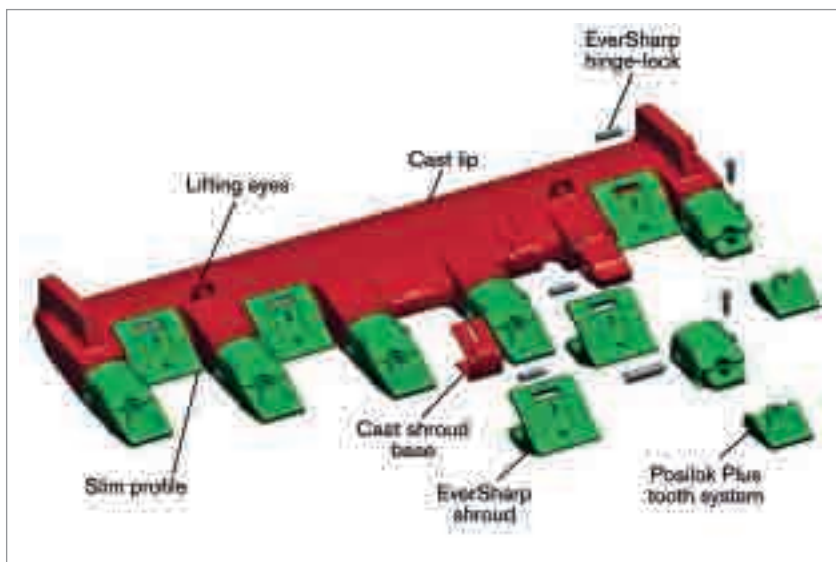
"Adiprene Duracast demonstrates total improvement in process, product and cost," says Matthew Hellstern, VP, Chemtura Urethanes. "With the flexibility of making large or small parts with fast or slow cures,

Bearing the strain

The Timken Company recently released a new 170-page Timken® bearing maintenance manual. Written for original equipment manufacturers, end-users and students, the manual is designed as a technical reference on bearing maintenance in industrial and other applications.

The manual covers maintenance procedures for Timken's most common roller bearing designs including tapered, cylindrical, spherical, ball, needle and thrust bearings. Detailed chapters cover general handling and inspection as well as internal clearances for each bearing type. Other topics include the importance of proper lubrication practices, maintenance tools and grease selection.

Visit www.timken.com/catalogs.



ESCO's new EverSharp cast lip system for mining applications is cast in premium ESCO alloys. It is not only tremendously strong, but provides increased safety and excellent performance. The Posilok Plus tooth system, with its hammerless locking device, is standard and offers improved safety, reliability and penetration. The EverSharp lip bottom and shroud are moved up and out of the wear path to reduce wear and improve loading with a more efficient bucket curl. The results: reduced maintenance, improved fuel economy and better productivity

customers may now be able to capitalise on applications that were once too difficult to produce with cast urethane or rubber."

Rankin® Automation brings an advance in making uniform tungsten carbide deposits for extreme wear resistance and hardfacing applications with the debut of the Manual Vibratory Carbide Feeder and the Single Axis Automated Hardfacing Machine. The systems support effective use and extended wear of ground engagement and heavy wear parts including cone and gyratory crushers, wear plate, teeth and adapters, buckets and drag line shovels, and scraper edges, lips, and sidebars.

The Manual Vibratory Carbide Feeder is simple to operate and provides a unique handheld,

The Adiprene Duracast Two-Component Urethane System allows customers to pour parts of all sizes

automated feeder for all grades of tungsten carbide. It offers tungsten carbide concentration up to 75%, less carbide dilution, high and fast deposit rates, and thicker deposits for longer life.

The systems now offered by Rankin Automation range from this light and portable machine to heavy duty automated systems including the new Single Axis Automated

Hardfacing Machine. The latter is an automated system for applying hardfacing overlays and for the bulk feeding of all grades of tungsten carbide. It offers virtually impenetrable deposits of up to 80% concentration of the desired mesh of tungsten carbide, with repeatability and consistency of deposition.

Rankin Industries is a designer and manufacturer of a full range of build-up and hardfacing products and specialty alloys. Broco® is the world leader in exothermic cutting and underwater welding systems. Strong Welding Products® offers a selection of cost-effective welding products. Rankin and its sister companies serve industrial maintenance and repair market. **IM**

