



WRC System[®]

OPTIMISES THE USE
OF WEAR PLATE



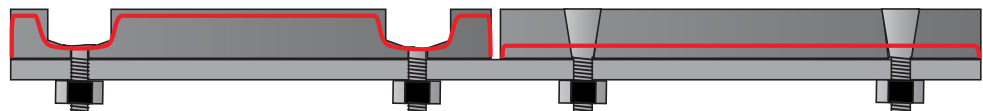
A FLUSH SURFACE FOR MINIMAL WEAR

The WRC screw with its conical head creates a smooth, almost homogeneous surface with the wear plate and assures even wear, without the recesses and irregularities which are normally a common source of concentrated wear. The choice of cutting technology and materials prevents the screw from rotating in the hole and simplifies the tightening from the nut side.

The flush surface makes the plate wear more evenly and contributes to greater material utilisation. WRC System® also lowers the risk of wear parts loosening due to worn-out screw heads. In addition, the WRC screw is easy to cut off during plate change-outs, as the surface is most often uncoated.



On the traditional plate, pictured left, we see crater wear is visible around the screw holes. The WRC plate to the right is mounted with our WRC screw with a conical head and in this plate it is almost impossible to discern the screws. Reference facility: Distribution level 833, LKAB, Kiruna.



The red lines illustrate the critical wear limit for traditional plate with countersunk screws and for WRC System® respectively. When countersunk screws are used, crater wear often causes screws to wear out before the plate is fully worn. In contrast, the WRC screw, which sits flush with the plate surface, promotes even wear and high material utilisation.



Installation of WRC socket screw.

WRC System®

BACKGROUND

WRC System® (Wear-Resistant Cone System) was born in 2007 from an idea created by Robert Nyberg and Harry Mäkelä. In subsequent years, product development has been carried out with the help of employees at LKAB who work with industrial wear problems on a daily basis. Matti Petäjaniemi, Planner at 833 metres, and Tim Heikkilä, Processor at Skip Maintenance, have contributed with their comments and expertise.

WRC System® was introduced at LKAB plants during an extensive and successful testing period in the years 2010-2012. The system is now standard at an increasing number of facilities in the LKAB mines.

A SYSTEM WITH MANY BENEFITS

WRC System®, which was developed by LKAB Mekaniska, part of the LKAB Group, offers many benefits. It optimises the use of wear plate and contributes to weight and cost reductions. Both our work environment and the external environment benefit from WRC System®.

THREE TYPES OF SCREWS

To broaden the use of WRC System® we have developed three different types of screws. Each screw has the unique conical shape in either head or socket.



WRC STANDARD

The original WRC screw is designed for tightening from the shell side (nut side).



WRC SOCKET SCREW

The patented socket screw, which consists of a shoulder screw with a detachable conical socket, is the solution when the screw must be tightened from the wear side (screw side).



WRC ROD SCREW

The rod screw with a detachable head is the alternative when extra long screws are needed. The conical screw head with internal thread is used together with a regular threaded rod of desired length. The WRC rod screw is designed for tightening from the shell side (nut side).



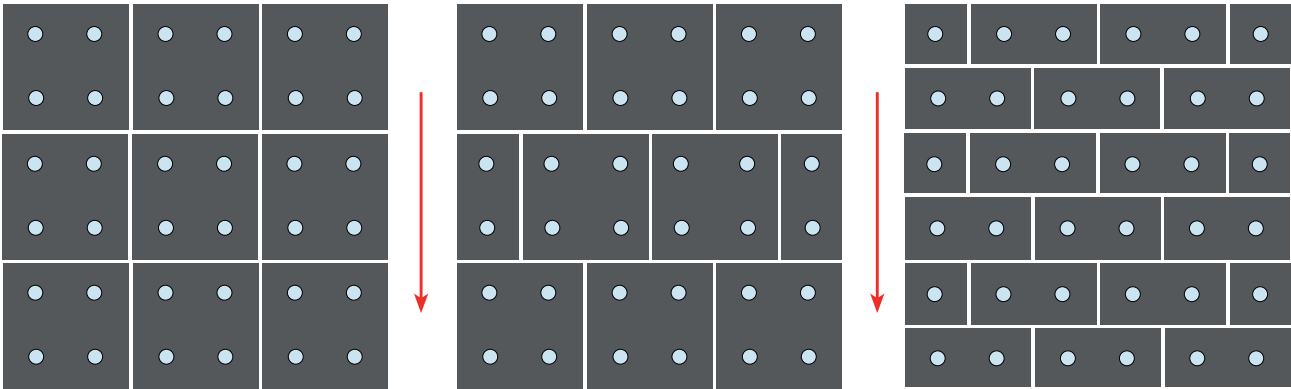
The WRC socket screw is installed from the wear side.

INSTALLATION FROM WEAR SIDE

WRC SOCKET SCREW

For situations where tightening from the screw side (wear side) is necessary we have developed a socket screw which consists of a shoulder screw with a detachable conical socket. The patented socket screw enables us to tighten the screw from the wear side and still obtain a flush finish for minimised wear.

The socket screw can be designed for manual cutting or with a break-away head which snaps off when adequate torque is applied.



TRADITIONAL INSTALLATION

A traditional mounting pattern creates long, continuous gaps in the material direction.

OVERLAPPING PATTERN

We recommend using overlapping mounting patterns where possible.

SHORTER GAPS

By using smaller plates and overlapping patterns we achieve very short gaps in the material direction.

HIGHER MATERIAL UTILISATION

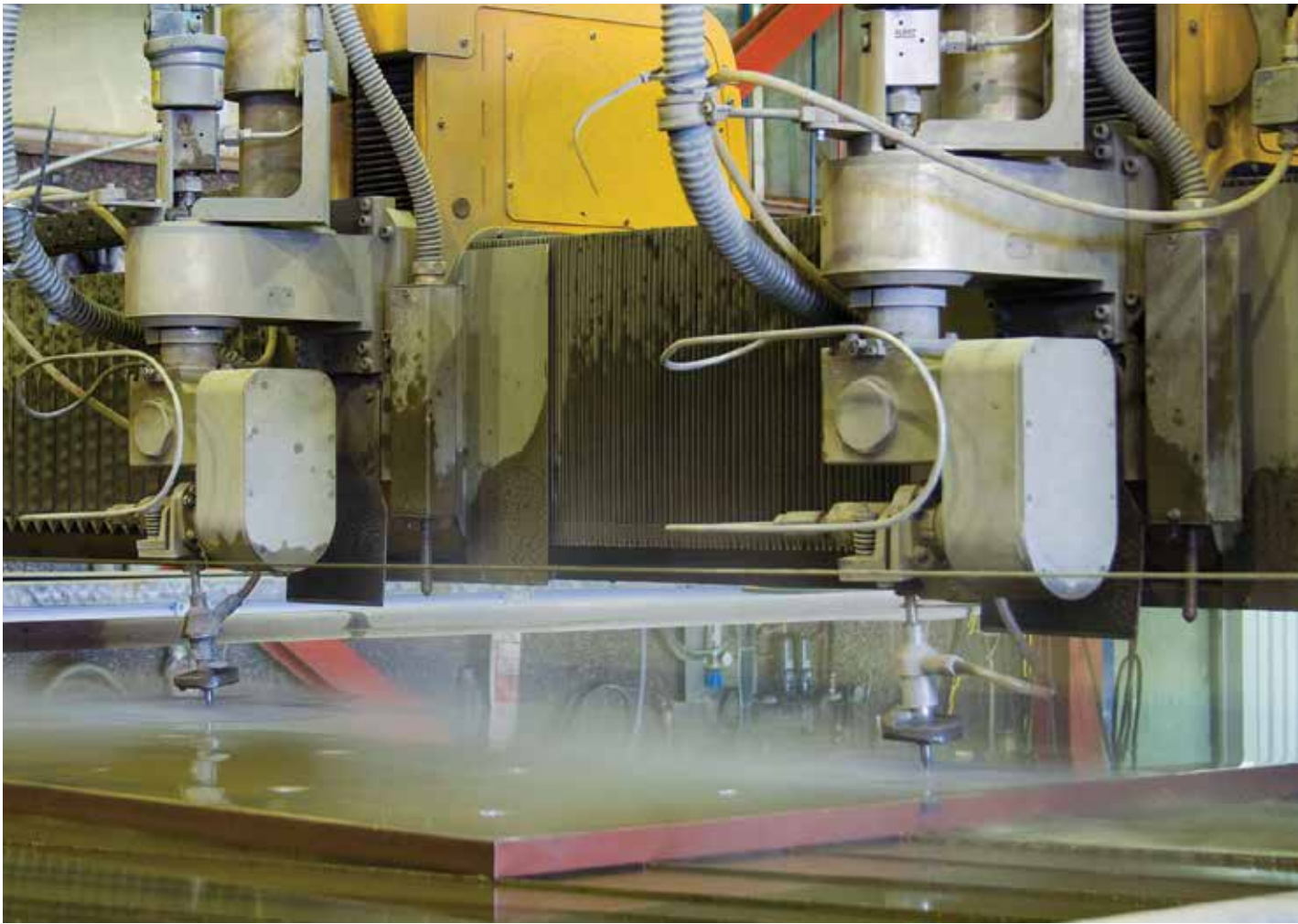
THE BENEFITS OF SMALLER PLATES

The WRC plates are cut with abrasive water - a technology with high precision that allows us to have smaller gaps between the plates. By reducing the size of the gap we are able to provide better protection for the sheet casing which is exposed to direct wear in the gap. We are also able to work with a larger number of smaller and lighter plates. While the running metre of the gap is increased, the gap is made smaller and plates can be mounted in an optimised pattern.

By using smaller and lighter plates we are able to minimise heavy and dangerous lifts. Smaller plates also have the advantage of being easy to change in case of concentrated wear. When large plates are used, the entire plate must often be replaced, even though only a section of the plate is worn (see photo at right).



A large wear plate subjected to concentrated wear forces us to replace more volumes than necessary.



LKAB Mekaniska's 5-axis waterjet cutting machine.

MORE ADVANTAGES

WATERJET CUTTING:

- No thermal influence which lowers the resistance properties of the material
- High precision
- Environmentally friendly

LIGHTER MACHINERY:

- No welding required at plate change-outs
- Easy to replace one or more plates
- Easier plate change-outs allow the use of lighter plates which results in lower tare weights

WATERJET CUTTING

For best results, the WRC plate is cut with abrasive water, which means that all kinds of steel grades and hardening processes can be used - without thermal influences on the material.

EASIER PLATE CHANGE-OUTS

WRC plates installed with conical screw heads, and possibly with socket screws for tightening from the wear side, are easier to change than traditional plates.

This is particularly true when WRC plates replace welded options. Traditional wear plates are often welded to truck beds and buckets, a process which is complex and requires welding skills and specific equipment.

LIGHTER MACHINERY

The WRC plate is thanks to its smooth surface very durable and yet easy to replace. It is therefore often possible to go down in plate thickness and lower the tare weight of the machinery - measures which contribute positively to both the environment and to productivity. WRC System® is compatible with all types of machinery (e.g. trucks, dumpers, loaders, excavators, etc.) and is currently used on truck beds by LTH at LKAB in Kiruna.

A TRUCK WITH WRC PLATES

The eight rear plates, which are exposed to the most wear, are smaller than the other plates and easy to replace with a wrench during short downtimes.





OUR VISION

REDUCING WEAR PLATE COSTS

Our vision is that your company will use WRC System® for all wear plates where possible.

WRC System® offers a highly flexible, high-performance wear plate system with storage and fitting close to your operation. The result is a powerful reduction of your wear plate costs.

Our objective when developing WRC System® has been to create a system with a favourable overall economy.

WRC System® enables our customers to select plate of the right quality for the right facility.

The following benefits are included:

- The choice of optimised steel quality is simplified
- Briefer downtimes
- Lower labour costs
- Unnecessary wear on the facilities is minimised
- Reduced overall consumption of hardened steel
- Fewer breakdowns

BENEFITS AND STANDARDS

PROCESS BENEFITS

- A more even wear pattern reduces the risk of unscheduled downtimes and utilises the steel raw material better
- Smaller plates are easier to change

BENEFITS FOR THE WORKING ENVIRONMENT

- Lighter plates minimise the risk involved in lifting and handling
- Plates can be cut with gas (when water-cut rolled plate is used, e.g. Hardox)

ENVIRONMENTAL BENEFITS

- Higher material utilisation thanks to more even wear and through the use of smaller plates for more exact plate change-outs
- Lower transport volumes of heavy hardened steel thanks to improved material utilisation
- The use of thinner plates, which are easy to replace on mobile units, such as trucks and dumpers, results in lower tare weights and increased payloads
- Plates are cut with energy-efficient waterjet cutting technology

A COMPATIBLE SYSTEM

- Easily adapted to fit the appropriate standard for hole patterns
- Compatible with a wide variety of steel grades and thicknesses

Screw standards:

- Plate (6)-10 mm M12
- Plate (10)-25 mm M16
- Plate (25)-100 mm M20

SUPPLIED COMPLETE

WRC System® is supplied complete with the right screws, washers and nuts for your use. First-time assembly is carried out by our WRC team or, alternatively, by your own staff under guidance of our WRC supervisor.



CONTACTS

Robert Nyberg, LKAB Mekaniska
robert.nyberg@lkab.com, +46 (0)70-348 45 12

WRC PLATES / SALES

Peter Degerbjörk, LKAB Mekaniska
peter.degerbjork@lkab.com, +46 (0)70-175 79 82

WRC SUPERVISOR

Örjan Andersson, LKAB Mekaniska
orjan.andersson@lkab.com, +46 (0)70-668 45 03

WRC CONSTRUCTION

Harry Mäkelä, LKAB Mekaniska
harry.makela@lkab.com, +46 (0)980-685 13

WRC SCREWS

Per Stöckel, LKAB Mekaniska
per.stockel@lkab.com, +46 (0)70-658 45 44

OPERATIONS MANAGER

Fredric Alm and Runar Gudmundson, Alm & ME
Daniel Kangas, HEEDMARK AB

PHOTOGRAPHS

LKAB Mekaniska

Box 826
981 28 Kiruna
Sweden

Visiting address: Lastvägen 14

Switch board: +46 (0)771-760 210

Fax: +46 (0)771-760 211