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Technical Newsletter from SIMONA AG 1/2010

dehoplast® superlining

Smooth handling of bulk materials

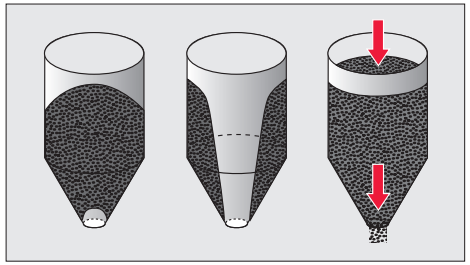
Opencast coal mining buckets in Australia lined with dehoplast® superlining.

Excellent slip properties combined with high strength and rigidity make ultra-high-molecular-weight plastics the material of choice for bulk applications – in underground mining, opencast mining, transport and production. dehoplast® superlining offered by SIMONA is an optimised line of products with excellent slip properties and very high wear resistance.

Handling solid bulk materials, such as coal, ores or salts has its challenges. As a result, even though hopper design may be state of the art, there are repeated cases of rat holes and bridges forming in hoppers or funnels. In particular, fine, cohesive substances in hoppers lead to relatively high levels of compaction and incrustations on the walls of the container on account of friction. These effects are intensified by moisture in the bulk material and the amount of time the material has spent in storage. In the case of materials-handling troughs and skips, too, bulk materials often cling to the walls and thus have to be removed by mechanical or manual means.

Optimising material flow

With plastic linings on the concrete or steel walls it is possible to effectively prevent incrustations, rat holes and bridges from forming. Bulk materials are discharged continuously owing to a low dynamic friction coefficient and the anti-adhesive properties of dehoplast® superlining plastic sheets. Compared to concrete, linings made of dehoplast® superlining also allow favourable wall angles in the construction of hoppers; the tipping angles required for unloading transport vehicles are also smaller. dehoplast® superlining sheets are made of ultra-high molecular weight polyethylene (PE-UHMW). Tailored to specific fields of application, various types of this material are manufactured by means of state-of-the-art pressing technology.



Bridging (left) and rat-holing (centre) occur if there is no suitable lining material. With dehoplast® superlining all the bulk material is discharged (right).

Minimising wear

Wear and tear on materials-handling equipment is another key problem with bulk applications. For example, new excavator buckets require maintenance after only a few years of handling sharp-edged, coarse bulk, as is the case in mines. In a sand-slurry wear test dehoplast® superlining achieves a 40 per cent better rating than structural steel. Materials handling equipment and machinery lined with dehoplast® superlining are therefore more wear-resistant and hence more durable – which is a significant economic advantage.

Wear figures acc. to sand-slurry test

PE-UHMW	90
Structural steel	160
Aluminium	300

dehoplast® superlining (PE-UHMW) is more wear-resistant, and hence more durable, than structural steel or aluminium.

Compared to linings of structural steel, dehoplast® superlining offers other benefits – the cost is one third of that of structural steel. Moreover, plastic is half the weight, despite being three times as thick.

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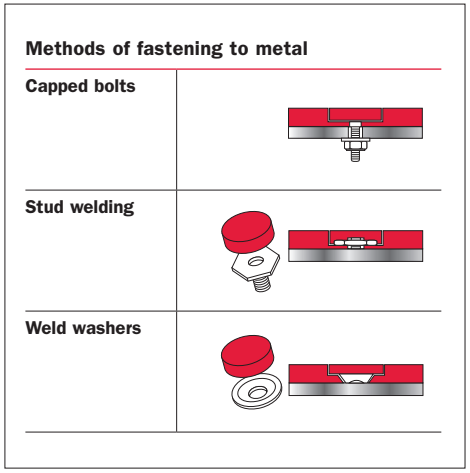
Many different applications

dehoplast® superlining is a common lining material in mining, quarrying, materials handling systems and production plants all over the world. Applications include hoppers, containers, silos, infeed funnels, chutes, trough chain conveyors, screw troughs, box feeders, materials handling troughs, vibratory conveyors, rail wagons, self-unloading ships, dump truck skips and wheeled loader shovels. The bulk materials typically handled are hard coal, copper ore, limestone, loam, gypsum, gravel, sand, fodder, sugar and salt.

Professional sheet installation

dehoplast® superlining has outstanding processing capabilities. Lining sheets are attached to metal, e.g. steel hoppers, with rust-resistant fasteners. Depending on the application, the fasteners are either bolted or welded to the surface. In concrete hoppers it is possible to use female thread bolts, capped bolts and brass expansion anchors for screwing down the plastic lining.



Attachment of dehoplast® superlining with a special stepped drill.

For optimum lining results, bulk material should always be prevented from slipping underneath. In addition, acute angles should be avoided. This can be achieved by fitting the sheets with overlaps, e.g. using 45-degree chamfers, rounded corners and edge strips made of stainless steel. The fixing points are covered with matching dehoplast® superlining caps. As an alternative to the methods available for overlapping, joints can be welded using hot-gas extrusion welding equipment. The number and layout of fasteners depends on requirements and the particular application.

SIMONA staff at the Technical Service Centre will be only too pleased to advise you on professional sheet installation or provide theoretical and practical training sessions.

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Plastics Expertise

The sand-slurry test

The so-called sand-slurry test is a procedure in which the volumetric wear of a material is measured during rotation in a sand/water mixture at room temperature in relation to a reference sample made of PE-UHMW (ultra-high molecular weight polyethylene/GUR® 4120). This test method does not determine absolute values but relative ones. The measured value of the PE-UHMW is arbitrarily assumed to be 100 and that of the material being tested is related to that figure.

According to DIN 50320, which was withdrawn in 1997, wear is defined to be a continuous loss of material from the surface of the solid body. It has mechanical causes, that is, contact movement and relative movement of a solid, liquid or gaseous opposing body.

The process of material separation from the surface is highly complex and chiefly dependent on external conditions. It is therefore not possible to develop a single test method for all stresses. For this reason, different test methods were developed according to a very wide variety of applications so the results are not comparable and may even contradict one another.

For applications in which wear takes place as a result of “slip” it has become evident that high-density polyethylene (PE-HD) has a longer service life as its molecular weight (molar mass) increases. In order to simulate this behaviour in an appropriate experiment, various test methods were developed. With regard to effort and reproducibility, the sand-slurry test became established as a suitable test method back in the 1970s. In this test method it is possible to differentiate PE-HD types by molar mass. As a result, in DIN 16972 [Pressed sheets of high-density polyethylene (PE-UHMW), (PE-HMW), (PE-HD) – Technical Terms of Supply] wear, inter alia, is measured by the sand-slurry method of differentiating the PE types indicated.

The current standard that describes the sand-slurry test in greater detail is ISO 15527 (First edition 2007-10-01). It is interesting to note that the sand-slurry test documents the fact that PE-UHMW is more wear resistant, and hence more durable, than St 37 structural steel or aluminium.

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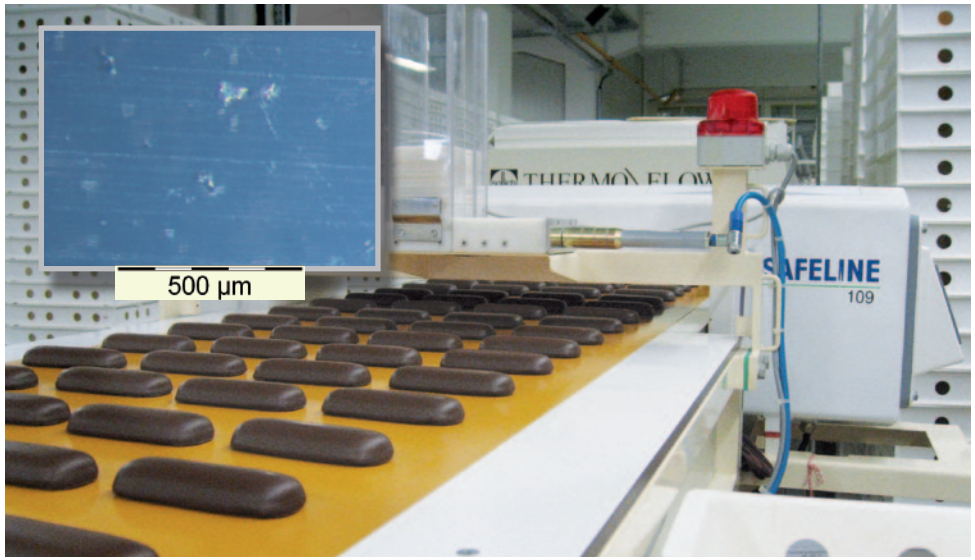
New semi-finished plastics for the food industry

Improved safety in the food industry with dehoplast® x-detect

Up until recently, metal was the primary material used in food packaging machinery, but for certain sections of the machinery that are subject to particular wear and tear, plastics are now being deployed more frequently. Due to its high durability and suitability for contact with foodstuffs, dehoplast® PE-1000 (ultra-high-molecular-weight polyethylene/PE-UHMW) is particularly suited to this purpose.

Despite being eminently suitable for use in the food industry, such material always used to have the disadvantage that, in the event of a fracture, small fragments of plastic could make their way into the food during the packaging process. Up until now, such plastic particles could not be detected by metal detectors, so if any plastic from the packaging machinery did break off, some of the packaged food had to be manually checked or even discarded. This was a significant cost factor.



Metal detectors in use in confectionery production; above left: microscopic image of detectable metal shavings in dehoplast® x-detect

Photo: Mettler-Toledo Product Inspection Germany

In order to solve this problem, SIMONA developed a material that can be detected by the kind of metal detectors commonly installed in food packaging machinery.

dehoplast® x-detect is designed to be detected by metal detectors, which makes it suitable for use in the food industry (filling systems, packaging machines or labelling machines) and in the pharmaceuticals industry. However, the degree of detectability is dependent on many factors and should first be determined by running a preliminary trial. This is not only true of dehoplast® x-detect, as it is standard practice wherever metal detectors are used. Detectability depends on such things as the metal detector itself (e. g. the electronics used, the degree of sensitivity, size of opening, place of installation, vibrations, etc.), and the food items in question, (i. e. their water content, temperature and humidity). For this reason, we always recommend making contact with the relevant manufacturer of the metal detector.

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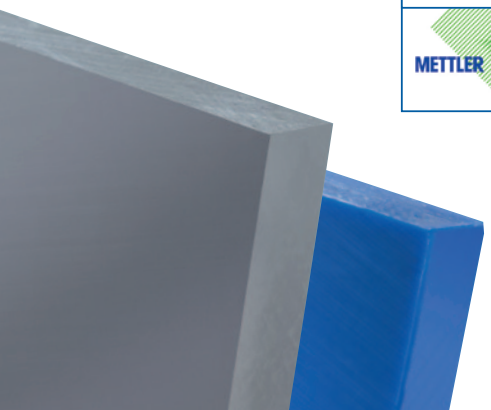

Your contact

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Christian Schmitt has a business management qualification (VWA) and works as Product Manager for the SIMONA AG Mechanical Engineering & Transport Systems business unit.

His role includes the product areas of pressed sheets, solid rods, profiles and finished parts. After completing his training as an industrial clerk with SIMONA and attaining his commercial college entrance qualification, Christian Schmitt was taken on as a member of the SIMONA sales team. In 2007 he moved to the Mechanical Engineering & Transport Systems business unit, which also involved relocation to Würdinghausen. Since February 2009, Christian Schmitt has been responsible for product management within the Mechanical Engineering & Transport Systems business unit in Kirn. He looks forward to assisting you with your projects or any questions you might have.

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SIMONA® Eco-Ice

Energy-efficient ice rinks made of plastic

Left: ice hockey players on a permanently installed ice rink made out of SIMONA® Eco-Ice in Romania. Right: Mobile ice rink for the Christmas period.

City council and local authority managers have to take energy efficiency into account in almost all of their decision making these days. This is particularly true of municipal leisure facilities, which include year-round ice rinks for leisure or training purposes. While ice rinks increase the popularity of a city, they do consume a great deal of energy. Ice rink surfaces made of SIMONA® Eco-Ice ultra-smooth plastic sheeting offer significant potential for savings on energy and operating costs.

Sustainable cost and energy savings

Unlike conventional ice rinks, facilities constructed with SIMONA® Eco-Ice require no refrigeration systems or cooling fluids and no ice machines to produce ice. Conventional skates glide directly over the interlocked plastic panels. In fact, the smoothness of SIMONA® Eco-Ice is virtually identical to that of freshly cleaned artificial ice. With SIMONA® Eco-Ice you also make a contribution to environmental protection, thanks to the inherent energy savings.

Universal applicability

SIMONA® Eco-Ice plastic sheets are suitable for interior use and, with UV stabilisation (which comes with a ten-year guarantee), are also suitable for year-round outdoor use. Whether it be for ice skating or ice hockey, ice rinks in leisure parks and hotels or for special events and festivities such as Christmas markets – ice rinks made out of SIMONA® Eco-Ice are already in use in many different places.

SIMONA® Eco-Ice comes in the following types of polyethylene: PE-HD (heat-resistant), PE-HMW (high-molecular-weight) and PE-UHMW (ultra-high-molecular-weight).

Its high durability makes SIMONA® Eco-Ice largely maintenance-free and long-lasting, with consistently good glide properties. Under normal circumstances, plastic ice rinks can be skated on for up to ten years without becoming brittle or scuffed. All it takes to keep them performing well is cleaning every ten days or so with an industrial vacuum cleaner or high-pressure hose.

SIMONA® Eco-Ice is excellent to work with and extremely versatile. The sheets can be laid by means of the tongue-and-groove method to form an absolutely smooth surface.

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