Innovative Solutions for Metals Processing Technology

Mill Brushes

Equipment & Systems

Non-woven Rolls

A Unit of the Jason Finishing Group

OSBORN

JACKSONLEA
Companies all over the world rely on the quality and efficiency of Osborn products. We are a true global finishing manufacturer, with manufacturing facilities in 12 countries; the United States, Mexico, Brazil, China, Denmark, France, Germany, Portugal, Romania, Spain, Sweden, Taiwan, and the United Kingdom, as well as a joint venture in India. We manufacture a broad range of standard products in addition to thousands of custom products specifically engineered for industrial applications. Our products are sold in more than 90 countries with all North American products meeting ANSI standards.

As a technical leader, we are the proud owner of many patents on both products and processes. The North American business includes six manufacturing facilities covering all product lines, and is headquartered in Cleveland, OH. Our primary manufacturing and distribution facility is centrally located in Richmond, IN. This worldwide manufacturing and comprehensive distribution network assures prompt delivery and technical support wherever and whenever it is needed.

Osborn brings innovation to the surface!

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**Terminology**

**APL:** Annealing Pickling Line  
**BAIL:** Bright Annealing Line  
**BL:** Brushing Line  
**CAL:** Continuous Annealing Line  
**CAPL:** Cold Strip - Annealing Pickling Line  
**CCL:** Color Coating Line  
**CGL:** Continuous Hot-dip Galvanising Line  
**CL:** Cleaning Line  
**CFL:** Continuous Pickling Line  
**CRM:** Cold Rolling Mill  
**DL:** Decoiling Line  
**DPL:** Decoiling Pushing Line  
**EAL:** Electrolytic Annealing Line  
**ECL:** Electrolytic Coating Line  
**EGL:** Electrolytic Galvanising Line  
**ETL:** Electrolytic Tinning Line  
**FL:** Finishing Line  
**GL:** Grinding Line  
**HAPL:** Hot Strip - Annealing Pickling Line  
**HCM:** Hot Continuous Mill  
**HIT:** Horizontal Heat Treatment Plant  
**HRC:** Hot Rolled Coils  
**HFM:** Hot Finishing Mill  
**HRFM:** Hot Reversing Finishing Mill  
**HRM:** Hot Rolling Mill  
**PL:** Polishing Line  
**PLS:** Pickling Section of Combined Tandem Cold Mill  
**SFL:** Slitting/Cross Cutting Line  
**SFM:** Skin Pass Mill  
**TLL:** Tension Level Line  
**TM:** Tempering Mill
BRUSH ROLL APPLICATION
Degreasing, Washing, and Cleaning

Today's metal manufacturers are faced with increasing demands for higher quality and more technical characteristics whether the product is aluminum, cold rolled steel, tin plated steel, electrical steel, galvanized strip, or other refined surface materials. Optimization of the tempering / refinement / coating operations of the strip cleaning section is especially critical due to increased processing speeds.

With the development of the HDL® brush roller, OSBORN provides an answer to these demands. When compared to conventional brush rollers, HDL® sets new standards in the degreasing and cleaning of strip surfaces. Brush performance and life are improved by selecting the correct filament, fill density, and brush construction, then maintaining the highest level of quality in production. This results in reduced operating and maintenance costs for our customers.

Customers' needs depend on the type and degree of soiling of the primary material as well as on the strip cleanliness required for the subsequent process step. While optimum degreasing and micro-cleaning may be achieved with non-abrasive multi-filaments, abrasive filaments are ideally suited for the removal of strongly adhesive rolling retentions from the previous rolling process.

OSBORN HDL® brush rollers are therefore individually tailored to the relevant case in hand. At the same time, multi-filaments and special mono-filaments can be used with or without an abrasive load as single bristle or mixture filaments.

OSBORN Innovations for cleaning sections in strip processing lines

- Alkaline brush cleaning
  - OSBORN HDL®
- Electrolytic cleaning
  - Load Runners®
- Brush Sealings
- Water rinsing

Besides brush rollers for degreasing and cleaning applications, OSBORN offers a series of other innovative products and solutions for cleaning sections of strip lines:

- **LOAD RUNNERS®** ensure a durable and maintenance-free function of roll exchange vehicles.

- Temperature and alkaline resistant brush seals provide optimum splash protection on the strip inlet and outlet of individual machine elements.

- Space saving brush machines conserve plant floor area during the modernization of strip lines through compact design and improved cleaning efficiency.
The activation of the strip surface is an important task both in the production of rolled cladings as well as in the coating and/or finishing of strip steel, tinplate, electrical steel strip and other materials. In rolled cladding, the core and, if necessary, the overlay strips or plates have to be freed initially from oil, grease, dirt, carbon particles and oxides. This is done with the help of brush rollers in alkaline cleaning or acidic pickling processes.

In the next process step, an activation of surfaces then takes place by generating a defined roughness using abrasive or wire brushes. A similar process also happens in continuous strip coating. In both cases, an optimal adhesion is guaranteed for the subsequent rolled cladding and/or organic or metallic coating through surface activation.

Here too, HDL® rollers from OSBORN create an ideal combination of the different brush functions needed by our customers. The combination of non-abrasive multi-filaments and abrasive materials work together to ensure optimum micro-cleaning as well as surface activation. The grinding agent, grain size, face density and abrasive content are also individually adjusted to the respective individual application.

OSBORN has been devoted to this challenge for years. We are focused on being the premier producer of brush rollers through the development of innovative microfilaments and brush constructions while maintaining the highest quality.

The brush roller itself is only part of the solution. This technologically demanding application can only be optimized with a precise matching of the brush tool to operational and process parameters. To insure consistent brush performance from beginning to end, OSBORN utilizes extensive means in the manufacturing process to reproduce each brush to the desired specifications.

For the cleaning of deflector, shape control or thickness measurement rolls, special wear-resistant non-abrasive plastic filaments are used. They ensure an equally thorough removal of solids and liquid materials without damaging the roll surface or altering the roughness. At the same time, the filament type and bristle diameter are dependent on the surface hardness and the degree of pollution of the roll that requires cleaning.
BRUSH ROLL APPLICATION

1.4 Strip Polishing and Finishing

When it comes to optical finishing of strip surfaces in the form of polishing, satinizing, finishing or decorative brushing, you’re in good hands with OSBORN. Through our extensive experience in the machining of steel, stainless, aluminum, and other non-ferrous surfaces, OSBORN extends a technological advantage for each customer’s benefit.

In addition to high-quality wire and abrasive brushes, we also rely on mergers with JacksonLea® and the Lippert-Unipol Group, both global leaders in abrasive and polishing tools. We can combine polishing and abrasive rollers as well as polishing compounds on a selection / combination of tools and processing alternatives. This is unique in the market, which gives each customer the advantage of the most optimal surface finishing in their respective applications.

Today, increasingly higher demands are made on the final machining of strips. By correcting small defects in the final machining operations, optically perfect and homogenous surfaces are achieved over the entire field of vision. This applies equally to the operators of strip lines as well as for service centers or direct processors of coils.

Different types of roller brushes and coverings can also be used based on several factors - material type, quality, surface hardness, and the desired final finish. For determining the respective optimum tool, we carry out individual pilot tests at test lines in our laboratory.

<table>
<thead>
<tr>
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<th>Process Line</th>
<th>Description of Application</th>
<th>OSBORN Product Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strip polishing and finishing</td>
<td>Carbon Steel</td>
<td>PL, APL, FL</td>
<td>Oxide removal, polishing and finishing of hardened and tempered strips</td>
<td>Brush rolls, abrasive or wire filled, OSBORN HDL® Technology, Lipprite® abrasive non-woven rolls; Polishing emulsion</td>
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<tr>
<td></td>
<td>Stainless Steel</td>
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<tr>
<td></td>
<td>Aluminum</td>
<td></td>
<td>Oxide removal, polishing and finishing, and generating decorative surfaces</td>
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<td></td>
<td>Non-Ferrous</td>
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1.5 Scale Removal

For de-scaling strip surfaces after hot and cold mill processes, our brush rollers have been setting standards for years. OSBORN’s developments and innovations in both brush construction and filaments have set the international standards in annealing/pickling lines for steel or bright annealing lines for stainless strip materials.

Through the development of special abrasive and non-abrasive facing materials, combined with an improved level of acid resistance and excellent wearing properties, the life of brush rollers in stainless steel strip lines has now been significantly increased. This allows tremendous cost savings in the form of extended service life and lower maintenance costs.

Ideally, the abrasive rollers are inserted on roller systems with flow through shafts. Apart from improved cooling of the filaments in the continuous operation of the roller, these also provide continuous rinsing of acid or other corrosive mediums from the brush lining. OSBORN’s design engineers optimize the rinse function by combining the correct number and size of the cooling holes to achieve the desired amount of flow.

Where stainless steel materials reach their limits in high acid concentrations, special protective coatings on shafts and accessories provide the optimal protection of these components.

In addition, steel shafts with shock and impact resistant coatings provide cost benefits as they are an interesting alternative to stainless steel bodies.

In manufacturing stainless steel flat products, OSBORN’s intelligent solutions and innovations play a part in process optimization and quality improvement as well.

Our solutions are deployed for de-scaling hot and cold mill strip surfaces at many levels of the value chain:

- HDL® brush rollers with a micro-fibre brush for careful and thorough cleaning of sensitive strip surfaces
- Acid and temperature resistant brush sealings
- Lipprite® abrasive rollers for surface finishing and follow-up processing plates and strips
- Helimaster brush rollers for cleaning rolls in skin pass mills
- High temperature brush transport rolls for hot and cold strip on continuous furnace lines
- Brush transportation rolls for reducing noise on slitting and cross-cutting lines for heavy plates
- LOAD RUNNERS® heavy load rolls in coil transportation devices or roll exchange vehicles.

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<tbody>
<tr>
<td>Scale removal</td>
<td>Carbon Steel</td>
<td>CPL</td>
<td>Heavy duty descaling prior to acid pickling</td>
<td>Brush rolls, abrasive or wire filled, Heavy abrasive brush rolls, OSBORN HDL® Technology, Lipprite® abrasive non-woven rolls</td>
</tr>
<tr>
<td></td>
<td>Stainless Steel</td>
<td>HAPL</td>
<td>Heavy duty scaling between acid tanks</td>
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</tr>
<tr>
<td></td>
<td>Non-Ferrous</td>
<td>HAPL</td>
<td>Scale and dirt removal prior to rolling</td>
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</tbody>
</table>
Almost 50 years ago, OSBORN developed a revolutionary technology using brushes in continuous rolling processes of hot mills to optimally regulate the oxide film on working and back-up rollers. As a result, hundreds of hot mills worldwide have been equipped with OSBORN technology.

To date, specially designed wire qualities, abrasive multi-filaments, individually camber ground surfaces and extensive experience in optimizing the use of brushes in numerous individual applications have secured a major technological advantage in this field. Customers worldwide benefit from OSBORN’s experience.

### BRUSH ROLL APPLICATION

#### Roll Coating Control

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<tbody>
<tr>
<td>Roll Coating Control</td>
<td>Aluminum</td>
<td>CPL</td>
<td>Control of the oxide layer and removal of oxides</td>
<td>Helimaster® Brush rolls abrasive or wire-filled</td>
</tr>
<tr>
<td></td>
<td>Non-Ferrous</td>
<td>HCM</td>
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Lateral rings made of composite fibre materials for limiting immersion depth and sleeves for splash guarding journals and bearings - developments created by OSBORN.

On hard chrome working rollers, abrasive multi-filaments with a high density achieve a particularly uniform brushing and cleaning of roll surfaces.

### BRUSH ROLL APPLICATION

#### Transport Roll Systems for High Temperature Applications

Roll coverings made from extremely dense stainless steel wires in special alloys and resistant to high temperatures provide specific product features and strong advantages compared to uncoated transportation shafts or furnace rollers with ceramic coatings. These can be used in different horizontal heat treatment lines for strips of steel, stainless steel or non ferrous metals.

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<tbody>
<tr>
<td>Transport roll systems for high temperature applications</td>
<td>Carbon Steel</td>
<td>HHT plate furnaces</td>
<td>Transportation of high temp strip; Avoidance of transport roll pick-up and surface damages</td>
<td>High temp brush rolls; brush transport roll systems</td>
</tr>
<tr>
<td></td>
<td>Stainless Steel</td>
<td>BAL, CAPL, CAL, HAPL</td>
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<tr>
<td></td>
<td>Aluminum</td>
<td>HHT</td>
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<td>Non-Ferrous</td>
<td>HHT</td>
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</table>

Properties and Advantages

- Temperature resistance of up to approx. 2000°F
- Shaft construction with internal cooling
- Extremely dense and accurate neutrally ground surface of the rolls
- Significantly better heat transfer characteristics of the tips of the wires in comparison to full metal surfaces
- No scale pick up (formation of spots) on account of the absorption properties of the exposed brush surface
- Reduced maintenance

- Particularly careful transportation of the plates and reduction of damage to the surface
- Very low wear to the rolls with significantly longer lifespan than ceramic coatings or other roll coatings

**Excellent brush life without scale pick-up - up to 2000°F**
The benefits of using these specially designed transport brushes with heat resistant wires are very clear:

- Optimum heat transfer between the transportation roll and the plate
- Long-standing lifetime without significant wear of the brushes
- Complete avoidance of scale pick-up and spot formation on the surface of the roller, just as it is the case with self-contained roller coverings
- Total-care transportation of the plates during the heat treatment without damaging the surfaces of the plates

Aside from the production of new rolls, the recovering and replacement of worn brushes in older lines is also one of our core competences.

By precisely measuring the course of the plate as well as the state of the individual rolls within the furnace by means of self-developed test equipment, we are able to optimize plate tracking if needed, which maximizes the output of the entire system.

### Application Category

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<tr>
<td>Transport roll systems for HHT furnaces</td>
<td>Aluminum</td>
<td>HHT plate furnaces</td>
<td>Transportation of hot plates through the heat treatment process; optimized heat transfer; Avoidance of transport roll pick-up and surface damages</td>
<td>Brush transport rolls; HHT brush transport roll systems; Furnace capacity increase concepts</td>
</tr>
</tbody>
</table>

With brush furnace transportation rolls, OSBORN customers can place their trust in several decades of experience and well known global references. In the complex production of the rolls, some with a total length of over 20 ft, the highest level of precision and reliability are required in all manufacturing processes. After the rolls have been manufactured, the latter course of the sheet is accurately simulated in advance in our factory. For roll assemblies in new furnace lines, this allows OSBORN to guarantee an optimum course of the sheet within tight tolerances even when starting the run.

In order to guarantee the lowest possible sheet tracking with the ‘re-brushing’ of entire furnace zones, the transportation of the sheets is simulated on a test rig just like new lines.
When transporting the sheets onto rolling tables, extreme noise levels may occur in slitting/cross cutting lines by heavy plates after the shearing process. At over 110 dB, this may exceed the threshold of noise pain for the human ear.

By coating the bright transport rollers with brush sections, the noise level can be reduced to approximately 70 dB so that any health risk to the labor force is significantly reduced.

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<td>Transport roll systems for noise reductions</td>
<td>Carbon Steel, Stainless Steel, Aluminum, Non-Ferrous</td>
<td>SL, CCL, transport roll tables</td>
<td>Low noise, surface friendly transportation of plates or sheets</td>
<td>Noise-reduction transport rolls; Noise-reduction transport roll systems</td>
</tr>
</tbody>
</table>

All in all, our brush transportation rolls offer a number of advantages for the user through their positive product features:

- Significant noise reduction in transporting sheets > 30%
- Improved and safer working conditions
- Reduced investment costs by applying brush cassettes to existing shafts
- Reduced wear of the heavy wire brush roll surface
- Roll service life of up to 10 years
- Particularly careful transportation of the sheet surface
- Reduced maintenance costs for the rolling table

In addition to the manufacturing of complete brush rollers with different shafts and body constructions, our range of services also includes bearing units, splash rings and accessories.

We also manufacture and supply shafts and complete systems for other roll types used in strip line systems. These come without or upon request, with hard chrome, polyurethane, rubber or other special coatings.

**BRUSH ROLL APPLICATION**

**Transport Roll Systems for Noise Reduction**

OSBORN has developed extensive experience in the design of brush roll systems through cooperation with premier machinery manufacturers as well as working directly with actual metal processors for production line optimization. Through our worldwide sales and service network we are able to guarantee comprehensive technical support for new production lines around the globe in all stages of project development from the initial design to commissioning. Many well-known manufacturers in the area of strip and heat treatment plants and rolling mill technology benefit from this expertise, which ultimately rewards the plant operator in the form of highly-engineered products, innovative technologies and cost-effective solutions.

**BRUSH ROLL SYSTEMS**

**Complete Brush Roll Systems**

**Product Group**

<table>
<thead>
<tr>
<th>OSBORN Product Range</th>
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<tbody>
<tr>
<td>Shafts for brush rolls</td>
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<tr>
<td>Brush roll fillings</td>
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<tr>
<td>Re-usable bodies</td>
</tr>
<tr>
<td>Shafts for back-up rolls and other roll types</td>
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<tr>
<td>Balancing collars</td>
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<tr>
<td>Bearings and Complete bearing units</td>
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<tr>
<td>Splash rings</td>
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<tr>
<td>Other fittings and accessories</td>
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<tr>
<td>Transport boxes and packaging concepts</td>
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</tbody>
</table>

Customized solutions for equipment manufacturers
At OSBORN, decades of global expertise is consistently combined with a local, comprehensive all-round service package on the customer’s premises. In addition to six centralized technology centers in Asia, Europe, North America and South America, other OSBORN service centers and local partners are located in many other countries to offer a comprehensive service for your rollers. This allows customers around the globe to directly benefit from our technology and the comprehensive range of services on-site.

### BRUSH ROLL SYSTEMS
**Factory Assembly (FA) Brush Roll Systems**

**Product Group**  | **OSBORN Product Range**
--- | ---
Factory Assembly (FA) brush roll systems (Integrated maintenance service) | Brush roll re-filling
| Integrated maintenance service concepts
| Re-trimming and re-balancing of brush rolls
| Shafts and journal control and repairing
| Bearing control and exchange
| Shaft improvement/adaption
| Shaft straightening
| Stress free annealing of shafts
| Replacement of end and balancing collars
| Replacement of fittings and accessories
| Transport and packaging concepts
| Supply of brush roll trimming equipment

Apart from the direct re-brushing of customers’ shafts or the on-site assembly of brush cassettes, our comprehensive range of services includes all necessary inspections as well as repair and service work related to our customer’s needs.

Upon receipt by our service center, each roller immediately undergoes a professional inspection in accordance to the agreed-upon service contract. The condition of each brush is documented by use of standardized protocols to determine any repairs that may be recommended.

The quiet and low-vibration running of the rollers is important in order to avoid shatter marks or shading on the strip surface caused by the brush roller. Before recovering, each shaft is therefore examined with regard to imbalance and concentricity deviation.

The longer the service life of rollers, the more important it is to have the proper condition of the bearings to avoid additional downtime or outages. For this reason, bearing units are checked and maintained by us. If necessary, the bearing unit or other accessories are renewed.

Worn bearing seats are welded and precisely re-machined to the original specification. Following this, immediate re-brushing or assembly of prefabricated brush cassettes takes place.

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*We combine global know-how with local full service*
BRUSH ROLL SYSTEMS
Customer Assembly (CA) Brush Roll Systems

OSBORN has the right solution for customers who want to recover and maintain their brushes in-house – roller systems for self-assembly. Our range of products and services includes cassettes in fully-automatic spiral or disk constructions as well as one-way tube bodies and single discs or loose spirals. In order to individually adapt these to existing shaft constructions, they are additionally provided with one-way adapters, if required.

As such, we can supply the right cassette for almost every different shaft that a customer has, unlike any other manufacturer in the world. At the same time all of the usual filaments, wires or natural bristles can be processed and realized according to individual requirements at different trim lengths and densities - from light to standard, to extremely dense.

We also provide the right equipment for simple follow-up shearing of the roller on a lathe.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Customer Assembly (CA) brush roll systems</td>
<td></td>
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<tr>
<td>- Cassette brush rolls - spiral type</td>
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<tr>
<td>- Cassette brush rolls - disk type</td>
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<tr>
<td>- Brush rolls - one-way tube construction</td>
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<tr>
<td>- Hotani® Cassette brush rolls</td>
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<tr>
<td>- Single brush disks</td>
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<td>- Loose spiral coils</td>
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OSBORN HDL® Brush Rolls

OSBORN International once again sets a new benchmark in brush technology with our latest development – HDL brush rollers. By combining streamlined brush construction with specially developed microfiber fill materials, we have been able to introduce a product with significantly improved performance levels and wear properties. Constantly increasing demands on production lines can be addressed through Osborn’s close cooperation with technology partners throughout the world.

OSBORN HDL® provides even more than this. HDL optimizes the brush within the working parameters of each application.

In the first step to find a solution for you, we will analyze the current fine weaknesses. Depending on the type of line and degree to which the brushes are required for cleaning, degreasing and surface activation, an individual covering is defined for the roller. This covering is made from non-abrasive and/or abrasive microfibers and monofilaments. Parallel to this, the shaft construction is optimized and adjusted. In general, the customers’ existing shafts can be used. The usage parameters of the respective brush rollers are evaluated with regard to cooling, in-feed and revolution speed. We then develop a customized optimization recommendation.

Compared to conventional standard brushes, OSBORN HDL® rollers offer decisive advantages:

- Significantly increased lifetime and reduced operating, maintenance and overall brush costs
- Improved cleanliness levels in strip cleaning, contributing to quality improvements, process optimization and increases in line speed

Unlike conventional mono-filaments with bristle diameters ranging between 0.15 and 1.5 mm, our Novofil microfiber material can also reach rough depths of strip surfaces. This is due to their very thin thread thicknesses of up to 0.02 mm, which brings with it significantly improved cleaning and degreasing levels. In the process, a multi-filament bristle can be made from several hundred microfibers. Due to the extremely high density and the individual mix with new, especially hard and rigid abrasive materials, heavy soiling and coarse metallic rolling retentions are removed in a way which is better than ever before.

OSBORN HDL® - the benchmark in lifetime and brush performance

Micro filaments improve strip cleanliness

Sample Brush Roll System for simple self-assembly onto customer’s shaft
Lipprite® abrasive rollers are manufactured from abrasive non-woven flaps through radial adhesion to a core. The abrasive grain made of silicon carbide (SiC) or aluminium oxide (Al2O3) is, at the same time, embedded into the surface of the random web fibre non-woven material (made of polyamide or other synthetic material) by means of resin. The aggressiveness of the roller is individually determined by selecting the best material grain and density of the material, i.e. the number of flaps.

An optional additional impregnation makes the roller even more aggressive and increases the life span. It is necessary to keep in mind, however, that because of the significantly increased hardness, impregnated rollers are less flexible. As such, surface undulations can be harder to balance, which may result in a less uniform finish or, in terms of the machining profile, visual shading.

Lipprite® abrasive rollers are manufactured from abrasive non-woven flaps through radial adhesion to a core. The abrasive grain made of silicon carbide (SiC) or aluminium oxide (Al2O3) is, at the same time, embedded into the surface of the random web fibre non-woven material (made of polyamide or other synthetic material) by means of resin. The aggressiveness of the roller is individually determined by selecting the best material grain and density of the material, i.e. the number of flaps.

An optional additional impregnation makes the roller even more aggressive and increases the life span. It is necessary to keep in mind, however, that because of the significantly increased hardness, impregnated rollers are less flexible. As such, surface undulations can be harder to balance, which may result in a less uniform finish or, in terms of the machining profile, visual shading.

Through the merger of the groups OSBORN International JacksonLea, and Lippert-Unipol, we have been able to significantly expand our range in the field of rollers for achieving any technical or optical surface finishing.

In the process, Lipprite® abrasive rollers represent an alternative to brush rollers in various applications. Besides finishing applications, they are used for working-roll cleaning, for surface activation, as well as for de-scaling.

### Overview of the roller coverings and material specifications for Lipprite® abrasive rollers

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Grain Specification</th>
<th>Surface Roughness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silicon carbide abrasive (SiC)</td>
<td>S4 medium MED</td>
<td>Grain 100</td>
</tr>
<tr>
<td></td>
<td>S6 fine FN</td>
<td>Grain 180 - 240</td>
</tr>
<tr>
<td></td>
<td>S7 very fine VFN</td>
<td>Grain 280 - 320</td>
</tr>
<tr>
<td></td>
<td>S8 super fine SFN</td>
<td>Grain 500</td>
</tr>
<tr>
<td></td>
<td>S9 ultra fine UFN</td>
<td>Grain 800</td>
</tr>
<tr>
<td></td>
<td>S10 micro fine MFN</td>
<td>Grain 1500</td>
</tr>
<tr>
<td>Aluminium oxide abrasive grain</td>
<td>A1 coarse XCRS</td>
<td>Grain 36</td>
</tr>
<tr>
<td>(Al2O3)</td>
<td>A2 medium MED</td>
<td>Grain 80</td>
</tr>
<tr>
<td></td>
<td>A4 fine FN</td>
<td>Grain 180 - 240</td>
</tr>
<tr>
<td></td>
<td>A7 very fine VFN</td>
<td>Grain 280 - 320</td>
</tr>
</tbody>
</table>

### Different hardness specifications for Lipprite®

- **A1** - extra coarse
- **A2** - coarse
- **A4** - medium
- **A6** - fine
- **A7** - very fine

### Additional Lipprite® impregnation for increased lifetime and roller performance

- PH 90 Standard hard impregnation
- PH 210 extra hard

The processing results achieved by Lipprite® abrasive rollers may vary depending on the roller specifications, surface and individual usage parameters. For orientation, the following approximate values for the achievable surface roughness (R♭) are:

- A4 (coarse) = 3.3 - 3.9 µm
- A6 (fine) = 2.9 - 3.6 µm
- A7 (very fine) = 1.1 - 1.8 µm

Based on many years of experience or by individual tests on our test lines, we are able to specify the right product in a targeted way for almost any surface roughness required. Contact our application engineers.

Technical data and product characteristics:

- **max. roller width**: 6.5 ft
- **max. roller diameter**: 1.5 ft
- **Versions available with or without impregnation**
- **Rollers are dynamically balanced in accordance with DIN EN ISO 1940**

Recommendations concerning the use of rollers:

- **Use in wet or dry operations**
- **Optimum cutting speed**: 49-82 ft/s
- **Line (strip) speed or feed speed up to**: 98 ft/min. (max.)
- **Processing in the opposite direction to the running direction of the material feed**
- **Optimum depth of immersion**: 0.078-0.23 in, depending on the roller diameter and hardness
- **Oscillation improves the uniformity of the machining profile**
By working with many of the world’s foremost equipment manufacturers, we can offer professionally engineered brush machines and line concepts that extend performance past established standard machinery. Our primary focus is to replace old equipment which no longer works efficiently in existing lines, while at the same time optimizing brush rollers and usage parameters to achieve sustainable quality and process improvements.

New intelligent concepts for brushing machines

Along with this background, we are also able to offer a new, fully patented machine package which includes a variety of innovative developments:

- A rigid machine housing which is heavily cushioned against vibrations and protected against corrosion made of a composite stainless steel/mineral cast construction
- Compact and extremely dense OSBORN HDL® brush rollers enable precise control of the depth of immersion
- Easy and quicker replacement of the rollers within a few minutes using an insertion skid with no additional dismantling tools
- Compact design enabling the unit to require little space - only 5 ft for each upper/lower brush for strip widths up of to approx. 6.5 ft

- Easy and precise positioning of the rollers through mechanical clamping
- Optimum and reliable feeding of the brush rollers via the immersion depth by means of height adjustment using precision lifting spindle elements with a servo positioning motor (parallelism tolerance approx. 0.003 in)
- Replacement of the rollers without disassembling the bearing units
- Optical control at any time through side access doors with large windows on the operator side and the interior lighting of the plant
- Non-contact measurement of the roller diameter in operation
- Optional construction according to the brush/brush principle

For many years, Japanese lines have maintained a leading role in technology. Together with our Japanese partners, we have been able to successfully install new line projects with renowned steel producers in North America, Europe, Asia, and Africa.

With these lines, the brush/brush principle instead of the conventional brush/back-up roll design provides a number of advantages:

- Due to the reduction of required roll pairs by half, a 50% space saving is achieved.
- In the case of thin straps, the brush in the border area no longer works on the back-up roll but combs in the opposite brush. Fully uniform wear of the brush balling is achieved in the border area through the additional oscillation of the rolls.
- In all, the performance of the respective strip cleaning unit is significantly improved. As a result, strip quality and line speed can be increased.
- Acquisition and maintenance costs are correspondingly reduced.
- Above all, when exchanging brush machines in existing strip lines, valuable space for additional pre-cleaning sections can be achieved in addition to more intensive brushing.
- The contact surfaces strip/upper brush and strip/lower brush are identical. This reduces vibrations. Through gentler running of the strip, shading and shatter marks on the strip surface are avoided.

Brushing machine in brush/brush construction including oscillation

Brushing machine in brush/brush construction including oscillation
Apart from an extensive standard program of over 300 articles in stock or available at short notice (up to a diameter of 10 in), special sized rolls can also be tailor-made in small quantities for special requirements.

Load Runners® carry heavy loads in harsh environments.
### Novofil Synthetic Monofilaments - NON ABRASIVE

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Novofil NN</th>
<th>Novofil NM</th>
<th>Novofil NH</th>
<th>Novofil NR</th>
<th>Novofil PT</th>
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</thead>
<tbody>
<tr>
<td>Density (g/cm³)</td>
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<td>1.1</td>
<td>1.07</td>
<td>1.14</td>
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<td>Temperature Resistance</td>
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<td>Water Absorption</td>
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<td>Mechanical Properties</td>
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<tr>
<td>Against acids</td>
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### Novofil Synthetic Monofilaments - ABRASIVE

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<th>Novofil NN-S</th>
<th>Novofil NN-A</th>
<th>Novofil NH-S</th>
<th>Novofil NH-A</th>
<th>Novofil NR-S</th>
<th>Novofil NR-A</th>
<th>Novofil PT-S</th>
<th>Novofil PT-A</th>
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<tbody>
<tr>
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<td>1.07</td>
<td>1.14</td>
<td>1.16</td>
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<tr>
<td>Temperature Resistance</td>
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<td>90</td>
<td>190</td>
<td>190</td>
<td>100</td>
<td>100</td>
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<tr>
<td>Max. short-term (°C)</td>
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<td>120</td>
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</tr>
<tr>
<td>Bend recovery</td>
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<td>+</td>
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<td>Stiffness</td>
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<td>0</td>
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<td>+</td>
<td>+</td>
<td>+</td>
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<tr>
<td>Resistance to abrasion</td>
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<td>+</td>
<td>+</td>
<td>0</td>
<td>+</td>
<td>+</td>
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</tr>
<tr>
<td>Chemical resistance</td>
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<tr>
<td>Against alkalines</td>
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<td>+</td>
<td>+</td>
<td>+</td>
<td>0</td>
<td>0</td>
<td></td>
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<tr>
<td>Against acids</td>
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</tbody>
</table>

### Metallic and non ferrous wires

<table>
<thead>
<tr>
<th>Material Group</th>
<th>Steel wire</th>
<th>CDS Steel wire</th>
<th>All Steel wire</th>
<th>Brass coated stainless steel</th>
<th>Stainless Steel wire</th>
<th>Highly non-corrosive resistant steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Steel</td>
<td>Steel</td>
<td>Steel</td>
<td>Steel</td>
<td>Steel</td>
<td>Stainless</td>
</tr>
<tr>
<td>Density (g/cm³)</td>
<td>7.85</td>
<td>7.85</td>
<td>7.85</td>
<td>7.85</td>
<td>7.90</td>
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<tr>
<td>Tensile strength</td>
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<td>1200</td>
<td>1200</td>
<td>1200</td>
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<td>Fatigue resistance</td>
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<td>-</td>
</tr>
</tbody>
</table>

### Natural fibers and animal hair

<table>
<thead>
<tr>
<th>Material Group</th>
<th>Novofil NY</th>
<th>Novofil NY-A</th>
<th>Novofil NY-S</th>
<th>Novofil MX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abrasive Material</td>
<td>-</td>
<td>Alumd</td>
<td>SiC</td>
<td>SiC/Alumd</td>
</tr>
<tr>
<td>Material Group</td>
<td>Animal hair</td>
<td>Tampico</td>
<td></td>
<td>Natural fiber</td>
</tr>
<tr>
<td>Abrisive Material</td>
<td>-</td>
<td>Alumd</td>
<td>SiC</td>
<td>SiC/Alumd</td>
</tr>
<tr>
<td>Properties</td>
<td>Micro-fiber multifilaments are usually manufactured with high densities into special OSBORN HDL® brush constructions. The filament selection and specification will be defined and customized to the specific application.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The filament selection and specification will be defined and customized to the specific application.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Our application engineers are glad to give further assistance.</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>