COOLING & SOLIDIFICATION SYSTEMS FOR CHEMICAL PROCESSING

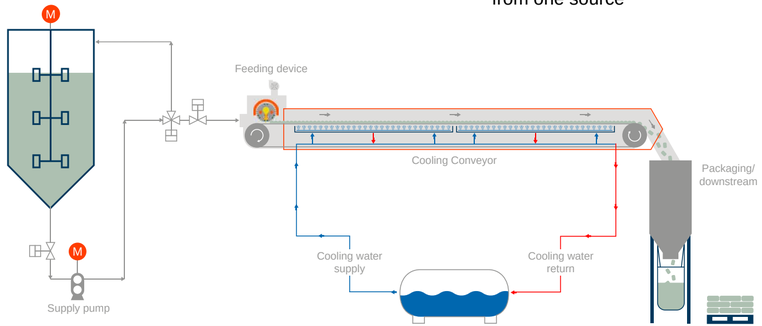
PROCESS EQUIPMENT FOR THE CHEMICAL INDUSTRY

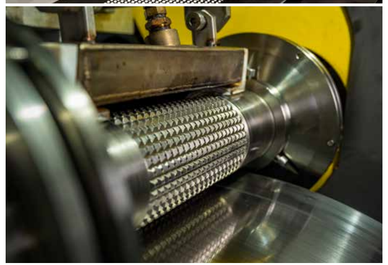
The Berndorf Band Group has stood for quality and innovation in the fields of engineering and manufacturing since 1843. We continue to be active in the chemical and petrochemical industries and have successfully installed Solidification and Cooling Systems for the processing of sulphur, waxes, resins, powder paint and other chemical products worldwide. From feasibility tests to designing, engineering, manufacturing and installing your Solidification and Cooling system - we are the reliable partner for your process.

FULL SOLUTION PROVIDER

To meet every customer requirement, we offer various feeding devices as well as Single and Double Belt Coolers. Additionally, we provide equipment for efficient fume extraction, expert handling of the produced pastilles or flakes, and bagging systems, allowing the customer to receive a fully customized machine.

- » Start-up & process technology support
- » Worldwide references with +500 conveyors built
- » High quality Steel Belts, machinery equipment and global service from one source





VERSATILE RANGE OF END PRODUCTS

Solidification and Cooling Systems are suitable for the production of a wide range of products. The upstream process is highly specific to the product and can vary depending on the requirements. Regardless, the outcome is a molten product that is transferred to the feeding device. This molten material is then applied onto a Steel Belt through different feeding devices, either in the form of a sheet or drops. The solidification process takes place on Single or Double Belt Coolers. Our Berndorf Cooling Systems ensure efficient heat transfer, allowing optimal evacuation of heat during the cooling and hardening stages for a variety of products using our indirect cooling method. The cooling water is recirculated using a pumping system after being collected in a stainless-steel reservoir integrated into the system. Once solidified, the product is removed from the Steel Belt and typically conveyed to a bagging system for further processing.

WAXES
Cosmetics, hydrocarbon, paraffin, etc.

BLACK CHEMICAL PRODUCTS
Bitumen, aspalthene, tar, pitch, etc.

CHEMICAL PRODUCTS
Aluminium sulphate, adhesives, hot melts, magnesium chloride, etc.

RESINS
Hydrocarbons, epoxy, phenolic, polyester, acrylic, polyamide etc.

OLEO CHEMICALS
Fatty-alcohols, acids, amines, amides, esters & stearins, polyethylene glycol, surfactants, etc.

POWDER PAINT
Functional (epoxy based), Decorative (polyester based), etc.

WORLDWIDE TEST CENTERS

+500 CONVEYORS BUILT

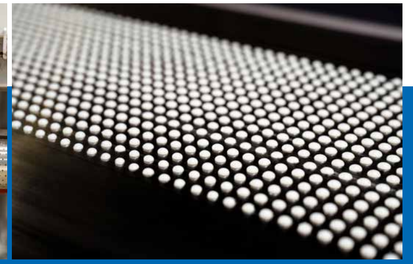
+200 BERNDROP® PASTILLATORS MANUFACTURED

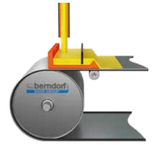
FEEDING DEVICES

A variety of Berndorf feeding devices has been developed to meet different process requirements for a wide range of products. The versatile application possibilities enable the production of materials ranging from low to high viscosities, with a melting temperature of up to 300°C | 572°F.

For producing **pastilles** the molten product gets pumped through a continuous material flow into the inner chamber of the **BernDrop®** pastillator, the stator. The predistribution pipe as well as the seal and metering bar distribute the material uniformly over the entire production width to the rotating outer shell. A variety of shells and metering bars are available to meet product-specific requirements. The diameter of the produced **pastilles** is mainly determined by the hole size, flow rate and rotational speed of the shell.

To produce **flakes**, various feeding devices such as the **BernFlow®**, **Casting Box**, or **Overflow Weir Feeder** are available. These devices continuously feed the raw material in sheet form onto the Steel Belt surface. On the discharging side, a Breaker or Cutter is required for controlled crushing of the product to **flakes**.



Feeding Devices		Facts	Typical Applications
BernDrop® with refeed bar		» Low to high viscosity products (~150 – 50,000 mPa.s) » Smooth shell and refeed bar » Best for products that tend to stick to the shell	**PASTILLES** » Black chemical products » Hot melt adhesives » Resins » Waxes, etc.
BernDrop® with raised shell		» Low to medium viscosity products (~2 – 5,000 mPa.s) » Special geometry of the raised shell, no refeed bar » Lower maintenance due to reduction of wear parts	**PASTILLES** » Sulphur » Sulphur bentonite » Waxes, etc.
Casting Box		» Low to medium viscosity products (~2 – 5,000 mPa.s) » Vertical gate to regulate product thickness » Typically with electrical heating	**FLAKES** » Oleo chemicals » Waxes, etc.
BernFlow®		» Medium to high viscosity products (~1,000 – 50,000 mPa.s) » Adjustable horizontal knife at bottom of device to regulate product thickness » Closed vessel to avoid oxidation of product	**FLAKES** » Hot melts » Resins » Waxes, etc.
Overflow Weir Feeder		» Low to high viscosity products (~150 – 10,000 mPa.s) » Simple and cost-efficient device which is easy to clean » Product thickness controlled by product feed pump	**FLAKES** » Black chemical products » Resins » Waxes, etc.

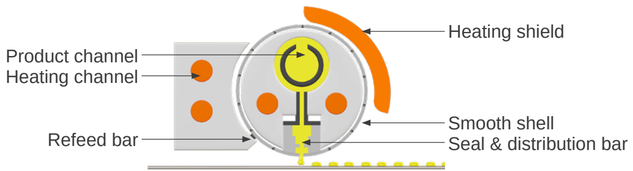
BERNDROP® WITH REFEED BAR

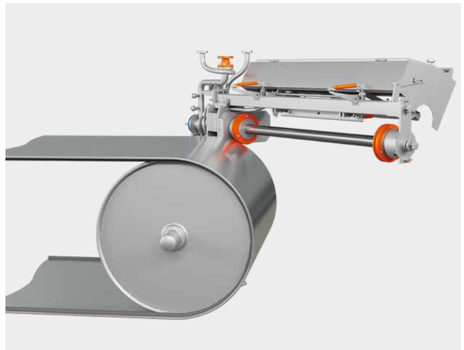
The **BernDrop® EF200** and the **BernDrop® AD300** are Pastillators equipped with a smooth perforated shell and a refeed bar. This setup is particularly beneficial for products that tend to accumulate on the outer surface. The heated refeed bar efficiently gathers any excess material and redistributes it into the holes of the shell. As an additional feature, we provide a swivel mechanism for effortless pastillator maintenance, along with enhanced safety measures to prevent Steel Belt damage.

SMOOTH OUTER SHELL
with a heated refeed bar to avoid excess material

WIDE RANGE OF VISCOSITY

EASY ACCESSIBILITY
for service, maintenance & cleaning





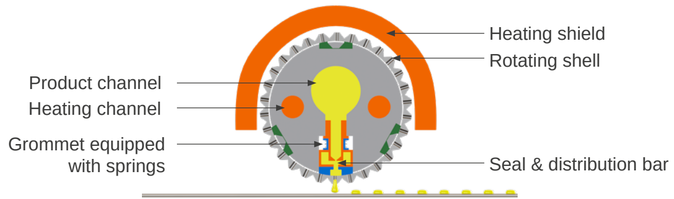
BERNDROP® WITH RAISED SHELL – NO REFEED BAR

The **BernDrop® AD200** Pastillator is designed with a raised shell that doesn‘t require a refeed bar, leading to fewer parts that need maintenance. This special design works well for products with **low** to **medium** viscosity. Because there is no need for a refeed bar, the **BernDrop® AD200** can run at higher speeds, possibly increasing production. As an added feature, the **BernDrop® AD200** can also operate with a smooth shell and refeed bar, expanding its production capabilities to accommodate a wider range of products.

GEOMETRY OF RAISED SHELL
allows elimination of refeed bar

HIGHER POSSIBLE PRODUCTION OUTPUT

LOWER MAINTENANCE
due to reduction of wear parts



THE MOLTEN PRODUCT IS APPLIED ONTO THE STEEL BELT IN A SHEET FORM USING THE FOLLOWING FEEDING DEVICES. WITH A BREAKER AT THE DISCHARGE END, THE MANUFACTURED PRODUCT SHEET CAN BE SIZED TO THE REQUIRED FLAKE SIZE.

BERNFLOW®

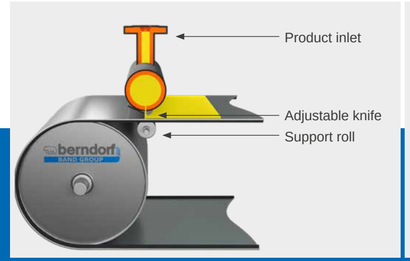
The **BernFlow®** is designed as a closed system that can be heated using thermal oil or steam heating elements, making it suitable for **medium** to **high** viscosity products. Its closed vessel design is ideal for preventing product oxidation. To adjust product thickness, an adjustable knife is located at the bottom of the feeding device, allowing for thickness adjustments during production as needed.

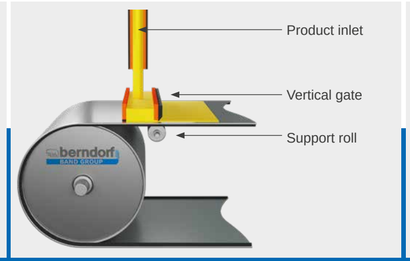
CASTING BOX

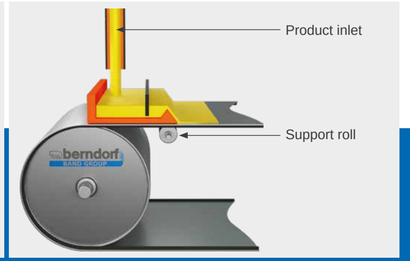
The **Casting Box** is a four-sided device made of stainless steel, capable of being heated by electric, thermal oil, or steam heating elements, and is suitable for **low** to **medium** viscosity products. Product thickness is determined by manually altering the distance between the vertically adjustable gate of the **Casting Box** and the **Steel Belt**. In combination with its optimal belt geometry and the support roll underneath, the **Casting Box** can accurately maintain product tolerances for thin items and has no limitations on thicker products.

OVERFLOW WEIR

The **Overflow Weir Feeder** can be heated with thermal oil or steam heating elements and is suitable for **medium** to **high** viscosity products. The product is pumped into the reservoir of the **Overflow Weir Feeder**. By design, when the level exceeds its volume, the product overflows onto the Steel Belt. Consequently, the thickness of the product is established and controlled by the feeding pump. The **Overflow Weir Feeder** is a very cost efficient and easy to clean device.







DISCHARGING DEVICES

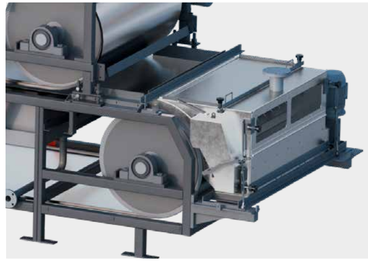
The following discharge devices are used to remove the solidified product from the Steel Belt: A product breaker is used for flakes, while a blade assembly is used for pastilles.

PRODUCT BREAKER

The **Product Breaker** can be used with both **Single** and **Double Belt Coolers**. The system includes two breaker shafts that work together to create shaped **flakes**. The size of the **flakes** can be changed by adjusting the design and spacing of the bottom Breaker shaft. All pins on the Breaker shaft are fully welded and made of stainless steel, as is the housing. This ensures a clean and durable system suitable for various products and industries.

BLADE ASSEMBLY

The **blade** is responsible for removing the product **pastilles** from the **Steel Belt**. Pneumatics are utilized to maintain uniform pressure of the blade against the belt, ensuring safe removal. Various types of blade materials are available depending on the product being processed.

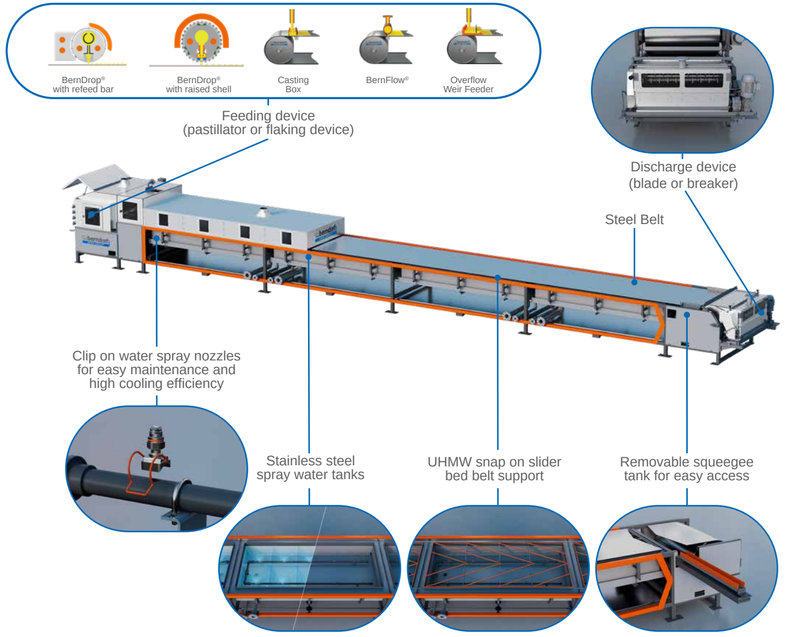


SINGLE BELT COOLING SYSTEMS

Single Belt Coolers are used for producing **pastilles** and **flakes**, thus they can be operated with all available **feeding devices** as well as a **blade** or **breaker** assembly at the discharge. With unique features such as **clip-on water spray nozzles**, **UHMW snap-on slider bed belt support**, and **removable squeegee tank** assembly, **Single Belt Coolers** ensure the highest cooling efficiency and easy maintenance. The high-quality **Steel Belt** guarantees seamless and reliable belt operation.

Additional equipment like water skids or hoods for fume reduction can be provided upon request.

- All feeding devices possible
- Highly efficient cooling concept - environmentally friendly due to closed water circuit
- Steel Belts with perfect belt geometry, due to production in endless condition lead to optimal belt run and life

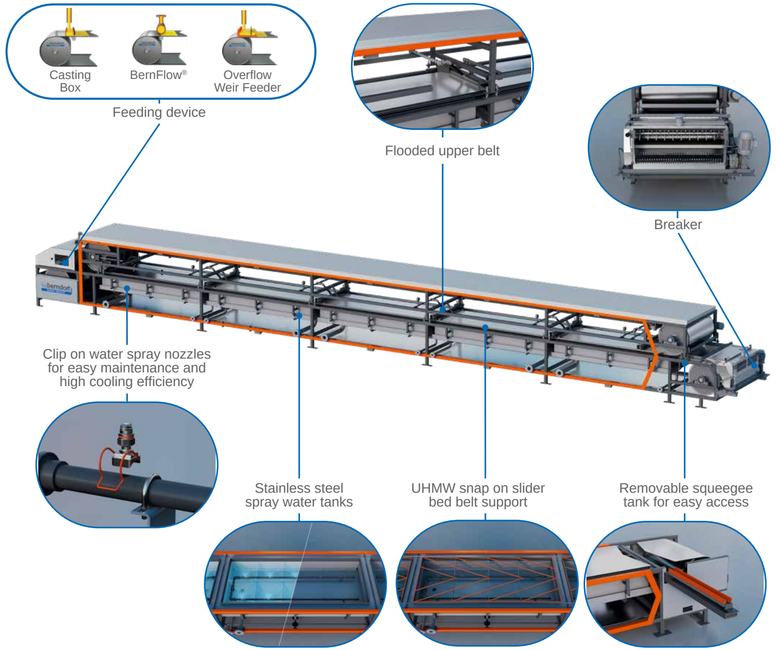


DOUBLE BELT COOLING SYSTEMS

Double Belt Coolers are designed to increase capacity and process products that tend to curl away from the **Steel Belt**. With products positioned between two chilled surfaces, they achieve faster cooling and higher capacity within the same overall cooler length. They are also effective for cooling thick products at high rates. The upper belt is flooded with water, while the lower belt uses a spray system like the **Single Belt Cooler**. Additionally, they can function as a **Single Belt Cooler** by lifting the upper belt.

Optional equipment includes water skids or a top cover for the upper belt.

- Upper and lower belt cooling for high efficiency and effective cooling of thicker products
- Best for products that tend to curl away from the Steel Belt
- The upper Steel Belt is flooded with water, which is drained at the end of each zone by a pump



STEEL BELTS & EQUIPMENT

FIND OUT MORE

Choosing the right Steel Belt material is of crucial importance for sectors like the chemical industry. The Steel Belts excel in mechanical, physical, and geometric properties, so they can endure constant dynamic loads for long periods of time.

Due to the unique production method the Berndorf Steel Belts provide optimum flatness & straightness which secures a smooth and reliable belt run and extended belt life time.

HIGH QUALITY STEEL BELTS

- Optimum flatness & straightness due to special production method
- High-alloyed steel materials for corrosion resistance
- High dynamic fatigue strength offers resistance to deformation
- Perfect adhesion of vee-ropes
- Smooth surface

VEE-ROPES & RETAINING STRIPS

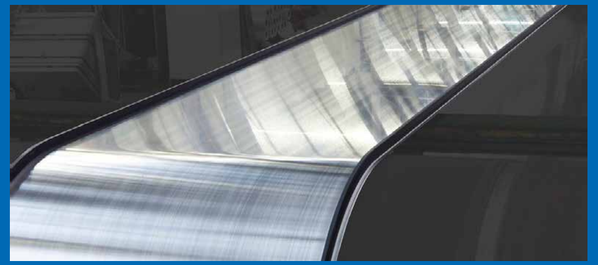
We ensure perfect adhesion of vee-ropes and retaining strips.

Vee-rope-material	Operating temperatures
Nitrile rubber	-20 °C to +100 °C | -4 °F to +212 °F
Natural rubber	-60 °C to +60 °C | -76 °F to +140 °F
Stainless steel spiral Vee-rope	Up to the max. permissible operating temperature of the respective belt material

Retaining strip-material	Operating temperatures
Nitrile rubber	-20 °C to +100 °C | -4 °F to +212 °F
Natural rubber	-60 °C to +60 °C | -76 °F to +140 °F
Silicon rubber	-80 °C to +300 °C | -112 °F to +572 °F

GUIDING/SUPPORTING SHEAVES & DRUMS

A wide range of guiding/supporting sheaves and drums as well as alternative belt tracking systems are available for an optimal belt tension.



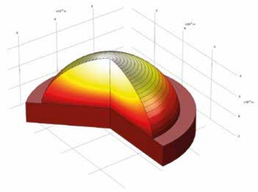
STEEL BELTS FOR THE CHEMICAL INDUSTRY

PHYSICAL AND MECHANICAL PROPERTIES. TYPICAL VALUES.

Material			Nicro 12.1	Nicro 22	Nicro 31	Nicro 52	Nicro 52.6	Nicro 85	Nicro 94	Titanium
Type			CrNi 17 7	CrNiMo 17 12 2	CrNiTi 13 4	CrNiCuTi 15 7	CrNiCuTi 15 7	CrNiCuTi 25 7 4	CrNiMoN 22 5 3	Grade 2
Similar material		DIN AISI	1.4310 301	1.4401 316	1.4313			1.4410	1.4462	3.7035
Tensile strength	at 20 °C at 68 °F	N/mm² psi	1,150 166,800	1,100 159,500	1,080 156,600	1,150 166,800	1,550 224,800	1,350 195,800	1,400 203,100	390 56,600
0.2 %-offset yield strength	at 20 °C at 68 °F	N/mm² psi	950 137,800	970 140,700	1,050 152,300	1,100 159,500	1,500 217,600	1,250 181,300	1,050 152,300	275 39,900
Hardness		Rockwell HRC Vickers HV 10	37.0 360	33.0 330	33.0 330	37.0 360	48.0 480	39.0 380	36.0 350	 160
Elongation 50 mm | 1.97 in		%	18	12	5	8	6	6	9.5	20
Welding factor			0.70	0.65	0.95	0.95	0.80	0.70	0.65	0.95
Fatigue strength under reversed bending stress*	at 20 °C at 68 °F	N/mm² psi	480 69,600	440 63,800	480 69,600	500 72,500	700 101,500	385 55,900	450 65,300	250 36,300
Modulus of elasticity	at 20 °C at 200 °C at 68 °F at 392 °F	N/mm² N/mm² ksi ksi	200,000 180,000 29,000 26,100	200,000 180,000 29,000 26,100	205,000 29,700	200,000 188,000 29,000 27,300	200,000 188,000 29,000 27,300	200,000 186,000 29,000 27,000	200,000 184,000 29,000 26,700	106,000 15,400
Density		kg/dm³ lb/in³	7.90 0.29	7.95 0.29	7.70 0.28	7.74 0.28	7.74 0.28	7.80 0.28	7.80 0.28	4.53 0.16
Mean coefficient of thermal expansion	20-100 °C 20-200 °C 20-300 °C 20-400 °C 68-212 °F 68-392 °F 68-572 °F 68-752 °F	10⁻⁶m/m°C 10⁻⁶m/m°C 10⁻⁶m/m°C 10⁻⁶m/m°C 10⁻⁶in/in°F 10⁻⁶in/in°F 10⁻⁶in/in°F 10⁻⁶in/in°F	16.0 17.0 8.9 9.4	16.5 17.5 9.2 9.7	10.8 11.2 11.7 6.0 6.2 6.5	10.9 11.5 11.7 6.1 6.4 6.5	10.9 11.5 11.7 6.1 6.4 6.5	13.0 13.5 14.0 7.2 7.5 7.8	13.3 13.8 14.2 7.4 7.7 7.9	8.5 8.9 4.7 4.9
Specific heat		J/g°C BTU/lb°F	0.50 0.12	0.50 0.12	0.46 0.11	0.50 0.12	0.50 0.12	0.50 0.12	0.50 0.12	0.52 0.12
Thermal conductivity	at 20 °C at 68 °F	W/m°C BTU/lb°F	15 8.7	15 8.7	21 12.1	16 9.3	16 9.3	15 8.7	15 8.7	20 11.6
Specific electric resistance	at 20 °C at 68 °F	Ω mm²/m µΩ in	0.73 28.74	0.75 29.53	0.60 23.62	0.80 31.50	0.80 31.50	0.80 31.50	0.80 31.50	0.78 30.71
Min. permissible operating temperature		°C °F	-196 -321	-196 -321				-50 -58	-50 -58	
Max. permissible operating temperature		°C °F	250 482	250 482	350 662	350 662	350 662	250 482	250 482	250 482
Tensile strength at max. permissible operating temp.		N/mm² psi	940 136,300	870 126,200	970 140,700	900 130,500	1,250 181,300	1,070 155,200	1,130 163,900	225 32,600
0.2 %-offset yield strength at max. permissible oper. temp.		N/mm² psi	770 111,700	770 111,700	930 134,900	830 120,400	1,180 171,100	1,020 147,900	990 143,600	135 19,600

Special materials available upon request. | *50 % of the test specimens withstand 2,000,000 load cycles. If not otherwise specified, the values given apply at room temperature. Subject to change due to technological progress. Errors and omissons excepted.

PRODUCTION TESTS IN OUR TEST CENTERS IN AUSTRIA, NORTH AMERICA & ASIA



Benefit from the possibility of professional and economic feasibility studies for your existing and new product ideas at our test centers located in Europe, North America and Asia. Our experts will guide you through the process and help you find the perfect solution for your business.

Test the production of pastilles and flakes with our range of Single and Double Belt Coolers and various feeding systems. Our team of experts is ready to assist you every step of the way.

Additionally, take advantage of Berndorf's process simulation tool as an addition to the feasibility study, which enables the determination of the theoretical cooling curve based on physical parameters of the product.

- Worldwide test centers for feasibility studies
- Single and Double Belt Coolers
- All feeding devices
- Customized machine design based on testing parameters

GLOBAL SERVICE THAT NEVER STOPS

To ensure that your operations run at the highest productivity possible, the Berndorf Band Group offers extensive services and pioneering service equipment centered around Steel Belts and Belt Systems. From installation management to commissioning, we support and advise you on how to get the best use out of your machine. With our highly qualified service technicians and our innovative methods, we ensure satisfied customers around the globe.

- **SPARE & WEAR PART MANAGEMENT**
- **RETROFITTING: UPGRADES & UPDATES**
- **REMOTE SUPPORT**
- **TRAINING FOR YOUR IN-HOUSE TECHNICIANS**
- **INNOVATIVE WELDING & REPAIR TECHNOLOGIES, PATENTED EQUIPMENT**
- **INSPECTION & MAINTENANCE TO ELIMINATE BELT TRACKING ISSUES**

EN 07/2025

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