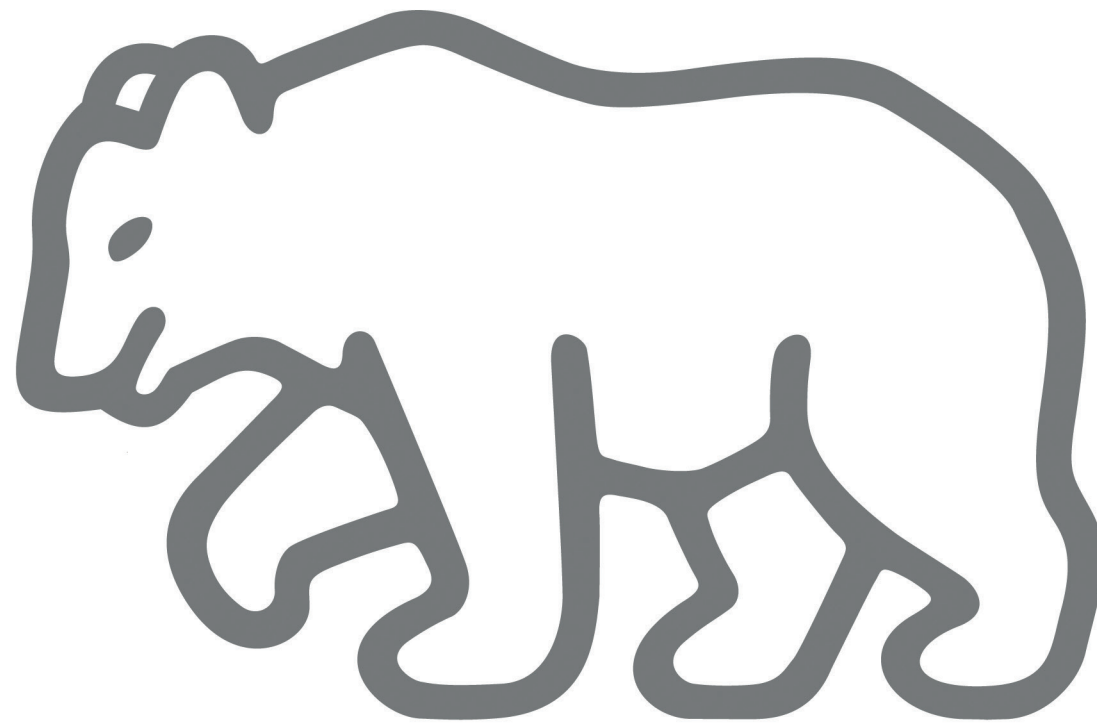




High Polished Steel Belts and Caster

Your solution for the production of high-quality films and foils



www.berndorfband-group.com

Extensive production processes for film and foil industry

With more than 90 years of experience, Berndorf Band Group is considered as the international market leader in the areas of steel belt production, belt system development as well as service for production and transport processes. In 1923, the first endless metal belt was used in a caster for film and foil production. In 1996 the first Berndorf high-tech caster was installed. International manufacturers of films and foils rely on the expertise of the Berndorf Band Group due to their solid technical expertise and state-of-the-art technology.

Worldwide global competition places high demands on the film and foil industry. Increasing energy and quality requirements are creating new challenges for producers. In order to manage them, Berndorf Band Group offers both - steel belts for existing belt systems and highly efficient steel belt casters.



Advantages of Berndorf Band Group

- + Individual steel belts and belt systems according to product requirements
- + Process control systems for belt system calibration without production downtime
- + Experimental tests on the laboratory caster in the Berndorf Group R&D center
- + Perfect belt geometry thanks to endless steel belts with highest polishing levels
- + Worldwide service
- + Steel belt, caster and service - your individual solution from one source

Individual polishing levels for perfect results

Whether for LCD screens, acrylic glass, filter membranes or ceramic foils - steel belts of Berndorf Band Group are characterized by their individual surface qualities and polishing grades.

Applications	Product examples
PMMA	Sanitary equipment, panels for moldings
Acrylic	Foils and plates for lighting applications
TAC	Polarisation filter for flat panel displays, packaging films
PI	Flexible printed circuit boards for mobile phones, microelectronics and optical applications
Filter membrane	Medical filters, ultrapure water
Special films	Packaging films, polarisation filter components
CNF (Cellulose Nano Fibril)	Innovative, sustainable films, foils and coatings



Highest precision thanks to individual steel belt surfaces

The high quality standards in the production of films and foils require steel belts with specially treated surfaces. Only with a steel of the highest purity class and a structureless polish, the high requirements for the precise production of optical films can be fulfilled. Berndorf Band Group is oriented to the individual requirements of end products as well as raw materials and offers steel belts with different surface finishes - mill finished, ground finished or polished. In order to protect the sensitive belt surface from contamination and damage until it is used by customers, new technologies are used which can be removed again without residue.

- + Spotless and brilliant surface polishes for optical requirements
- + Exclusive manufactured materials of the highest purity class
- + High strength and resistance for a long belt life
- + Laser welds for lowest possible visibility in the final product
- + Customized sizes and belt dimensions for every application
- + Minimal deviations in flatness and thickness for precise end products
- + Vibration-free and smooth belt running characteristics to prevent production disruptions
- + Worldwide service for fast and competent support



„The endless nano-polished belt is characterized by its high-quality belt characteristics and its long lifetime. A specially developed surface protection leaves no residue on the steel belt surface and, coupled with nano-technology, allows an immediate use of the belt. This „ready-to-use model“ is unique in the world and demonstrates our innovative edge.“

- Martin Feyer
Director Sales

Physical and mechanical characteristics of steel belts

Material			NICRO 12.1	NICRO 22 V
Type			CrNi 17 7	CrNiMo 17 12 2
Similar material		DIN AISI	1.4310 301	1.4401 316
Tensile strength	at 20 °C	N/mm ²	1.150	1.130
0.2%-yield offset strength	at 20 °C	N/mm ²	950	1.000
Hardness		Rockwell HRC	37.0	33.0
		Vickers HV 10	360	330
Elongation 50 mm		%	18	12
Welding factor			0.70	0.70
Fatigue strength under reversed bending stress*)	at 20 °C	N/mm ²	480	440
Modulus of elasticity	at 20 °C	N/mm ²	200,000	200,000
	at 200 °C	N/mm ²	180,000	180,000
Density		kg/dm ³	7.90	7.95
Mean coefficient of thermal expansion	20-100 °C	10 ⁻⁶ m/m°C	16.0	16.5
	20-200 °C	10 ⁻⁶ m/m°C	17.0	17.5
Specific heat		J/g°C	0.50	0.50
Thermal conductivity	at 20 °C	W/m°C	15	15
Specific electric resistance	at 20 °C	Ohm mm ² /m	0.73	0.75
Max. permissible operating temperature		°C	250	250
		°F	480	480
Tensile strength at max. permissible operating temperature		N/mm ²	940	900
0.2%-yield offset strength at max. permissible operating temperature		N/mm ²	770	800

*50% of the test specimens withstand 2,000,000 load cycles. Typical values. Subject to change due to technological progress. Errors and omissions excepted. Further technical data upon request.

Individual casting and drying systems with endless applications

Steel Belt Casting and Drying Systems of Berndorf Band Group enable the precise production of high-quality films and foils for various industries through a thermal drying process. Each product has different manufacturing process requests and requires a precisely designed and coordinated system. Berndorf Band Group offers product-specific solutions and exact system calibration for a safe and sustainable production.

Advantages

- + High temperature accuracy for uniform drying
 - + Water $\pm 0,1$ °C
 - + Air $\pm 1,0$ °C
- + Precise belt run control for a perfect interaction with the product feed
- + Customer and product specific design based on thermal simulations
- + Solvent recovery for environmentally friendly and efficient production
- + Inline measurement of the solvent concentration in the film
- + Safe system implementation according to the standards and guidelines for explosion protection
- + Product-specific system design supported by laboratory tests and results from the simulation model „Virtual Caster“



Virtual Caster

The virtual caster is a model-based simulation and process control system. The base of the system is a comprehensive drying simulation of the film in the production line. The simulation uses laboratory measurements of the actually used casting solution and is adapted to the real machine behavior during installation and commissioning.

Based on the results of the drying simulation of different film thicknesses, the virtual caster in full configuration, with all the sensors required for a closed loop, can carry out the adjustments of the system automatically when speed changes. This significantly increases operational safety, especially during starting, film thickness changes, and helps preventing film breaks. The virtual caster can also be used for advanced control strategies (eg. targeted solvent concentration and temperature in specific parts of the system) or only for displaying recommended machine settings.



Laboratory caster for the production of thin films & membranes

The Research & Development Center offers a wide range of options for your individual product development, process design and various test procedures. When visiting Berndorf, you benefit from the interaction of competent specialists with the latest technologies. Our experts are able to test individual processes for their effectiveness using various process steps.

The Labor Caster offers you a unique opportunity to test the production options of your products and applications, as our center is able to perform individual casting processes on different steel belt surfaces with your casting solutions and to test them for their suitability, and, if necessary, to optimize them. We support you in product development, process design and test procedure as well as in the production of first production batches.

Applications for the Laboratory Caster

- + Test production of water-based films and foils
- + Production of new materials
- + Evaluation of optimal process and system parameters
- + Individual process development by experts
- + Optimization of the drying process
- + Energy optimization for process and machine designs



Technical Highlights Laboratory Caster

- + High precision slot die
- + Patented slot die bearing for accurate and even film thickness
- + Use of the entire belt length is possible
- + High-efficiency nozzle boxes and/or direct and counterflow channel flow for gentle film drying
- + High polished stainless steel belts with precise geometric properties
- + High quality stainless steel belts with the appropriate surface from mill finished to nano polish
- + Film winding and stripping unit
- + Various simulation tools

Technical specifications

- + Material application with slot die or doctor blade
- + Process temperature: 25 °C - 200 °C
- + Coating width: 550 mm
- + Adjustable process speed: 0.1 m/min - 3.0 m/min
- + Length of the drying channel: 2 m each (in top and bottom strand)



Steel Belts | Belt Systems | Worldwide Service

