BRÜCKNER
MASCHINENBAU

UNIVERSAL TECHNOLOGY CENTER
FOR FILM ORIENTATION


LISIM®
BRÜCKNER

Brückner‘s unique technology center

A key element of various partnerships

Since the company’s foundation in 1960, Brückner Maschinenbau’s strategy has included the operation of an own pilot line and a technology centre to investigate developments in processes and technology. It is ideally suited to enabling us to develop and offer technological expertise within the market. It also acts as a meeting point for raw material suppliers, film producers and converters, who use it as an arena for their own R & D activities, the pre-marketing of their new films or for staff training.

The following pages will give you a deeper insight how to benefit from our sophisticated facilities:

- **Pilot line** for manufacturing numerous film types up to 7 layers in all stretching modes, using a wide variety of resins
- **Laboratory stretching machine** for monoaxial & biaxial film orientation to test films and sheets in a very simple an economical manner
- **Laboratory extrusion** for the production of the necessary cast films which are then examined on the lab stretcher
- **Chemical & film laboratory**, fully equipped for all mechanical, optical and electrical tests as well as for chemical analysis

CONTENT

Pilot Line

Unique flexibility for all kinds of stretching

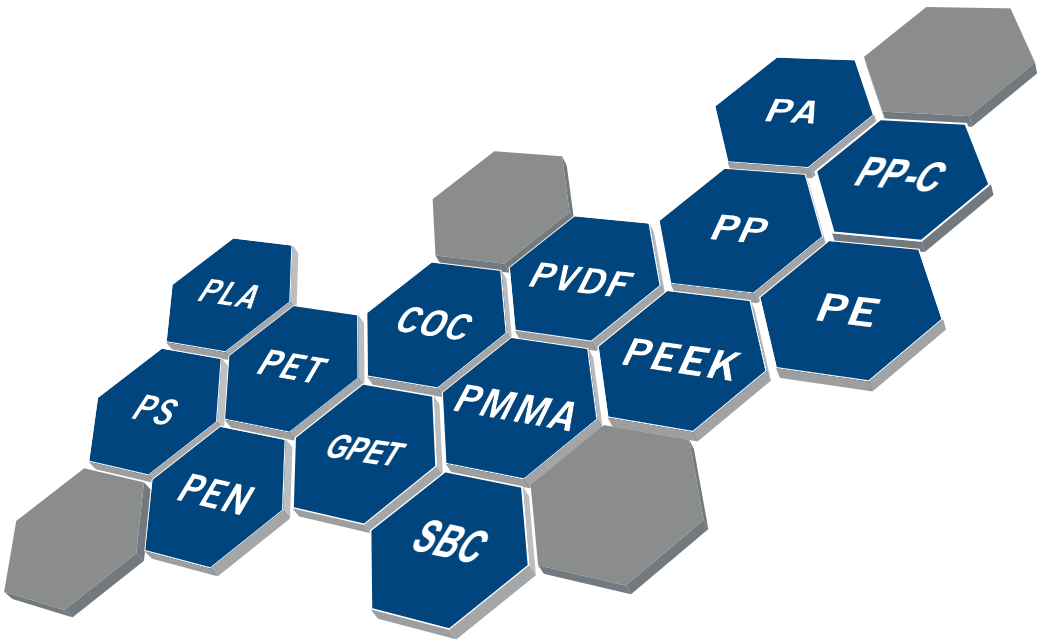
Our Pilot Line has been further extended with a highly flexible machine direction orienter unit (MDO), additional clips to simulate a chain track for transverse direction orienter (TDO) and a newly integrated process control software.

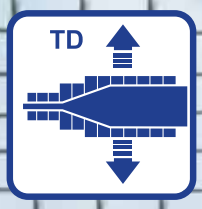
Thus, for the first time, numerous film types up to 7 layers can be manufactured in all stretching modes, using a wide variety of resins:

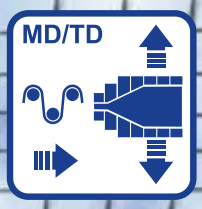
- MD (machine direction) stretching for e.g. tapes
- TD (transverse direction) stretching for e.g. sleeves
- Biaxial sequential stretching for packaging and technical films
- Biaxial simultaneous stretching for specialty films (unique LISIM® technology)

The Pilot Line is the perfect environment for R&D and sample production for BOPP, BOPET, BOPA, BOPS, BOPLA, MOPET-G, MOPS and many other film types.

BASIC SPECIFICATIONS	SEQUENTIAL	SIMULTANEOUS
Thickness range	1 - 120 µm	1 - 500 µm
Stretching ratio MD	2 - 10	2 - 10
Stretching ratio TD	3 - 10	3 - 10
Line speed	150 m/min	150 m/min
Net output	250 kg/h	250 kg/h



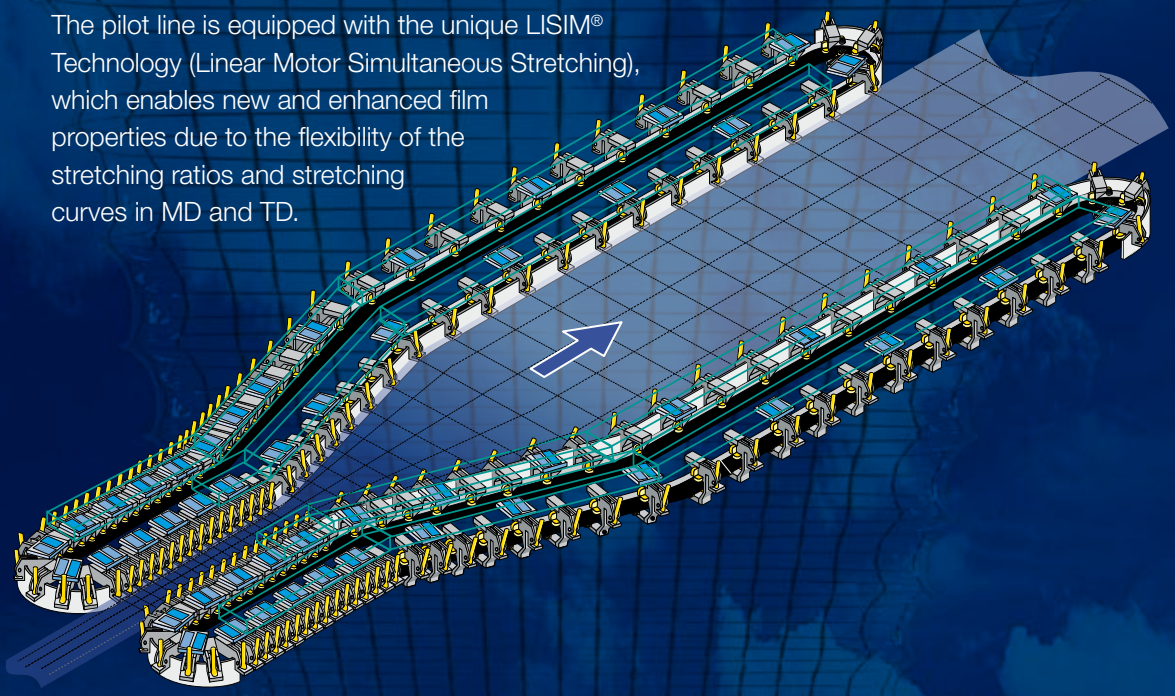




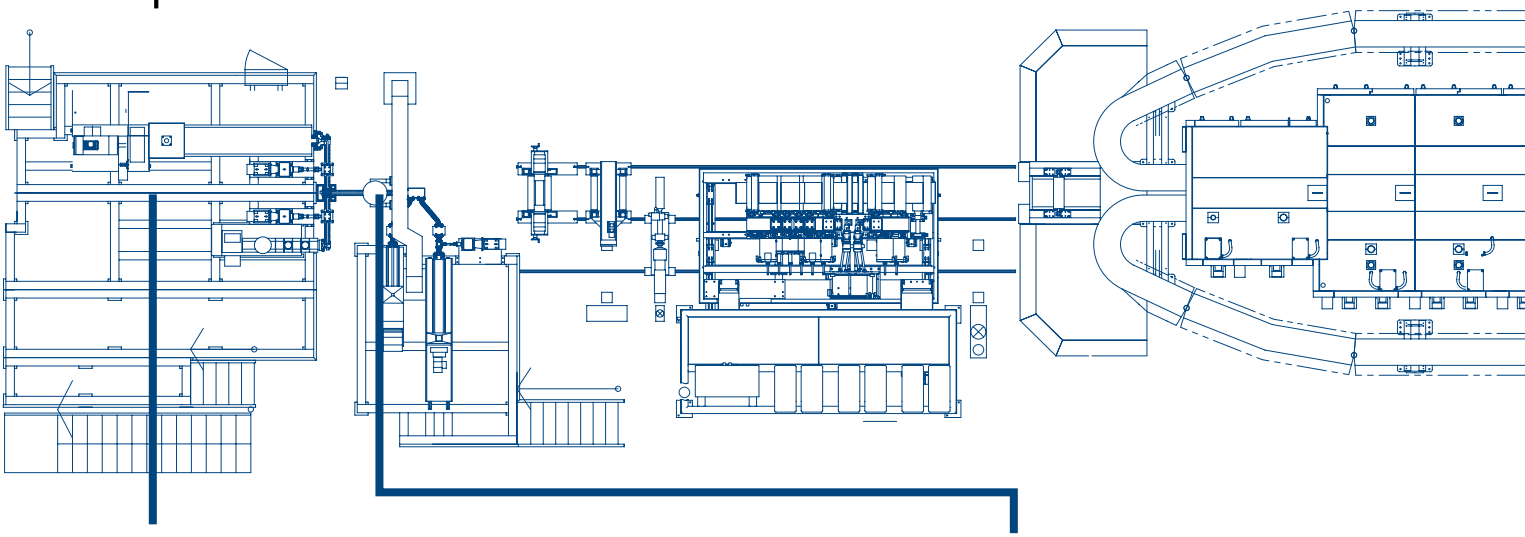
LISIM® Technology

Simultaneous orientation: Well proven & unique technology

The pilot line is equipped with the unique LISIM® Technology (Linear Motor Simultaneous Stretching), which enables new and enhanced film properties due to the flexibility of the stretching ratios and stretching curves in MD and TD.



Components



Resin Supply

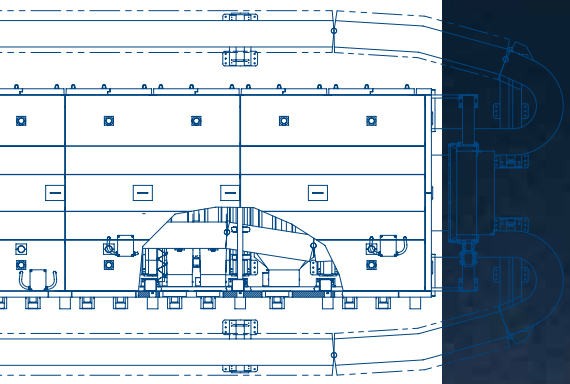
The resin supply provides automatic and programmable mixing features for the main and co-extruder . Accurate composition is secured by gravimetric dosing units

RESIN SUPPLY		
Conveying system		suction
Units for resin supply		bins
pre-dried material		octabins
Dosing system for main extruder and coextruder 1		gravimetric
Number of components		4
Dosing range	main extruder	40-400 kg/h & 2-20 kg/h
	coextruder 1	10-100 kg/h & 1-10 kg/h
Dosing accuracy		±0,5 %

Extrusion

Perfect extrusion is precondition for any kind of oriented film. A wide range of polymers, blends and co-extrusion possibilities can be processed with the most flexible extrusion set-up, consisting of 3 twin screw and 3 single screw extruders.

EXTRUSION	
Main extrusion 1 (for layer configuration A)	
Twin screw extruder BT-55-32D	
Diameter:	55 mm
L/D-ratio:	32 D
Metering pump:	45 ccm/rev
Output max.:	PET: 350 kg/h
	PP: 210 kg/h
Co-extrusion 1 (for layer configuration B)	
Twin screw extruder BT-43-30D	
Diameter:	43 mm
L/D-ratio:	30 D
Metering pump:	26 ccm/rev
Output max.:	PET: 160 kg/h
	PP: 100 kg/h
Co-extrusion 2 (for layer configuration C)	
Single screw extruder BS-50-30D	
Diameter:	50 mm
L/D-ratio:	30 D
Metering pump:	28 ccm/rev
Output max.:	PET: 45 kg/h
	PP: 40 kg/h



	Main extrusion 2 (for layer configuration A)	
	Twin screw extruder BTS-75-34D	
	Diameter:	75 mm
	L/D-ratio:	34 D / 42 D
	Metering pump:	45 ccm/rev
	Output max.:	PET: 450 kg/h
		PP: 450 kg/h
	Co-extrusion 3 (for layer configuration D)	
	Single srew extruder BS-35-30D	
	Diameter:	35 mm
	L/D-ratio:	30 D
	Output max.:	PET: 20 kg/h with PET screw
		PP: 20 kg/h
	Co-extrusion 4 (for layer configuration E)	
	Single screw extruder BS-35-30D	
	Diameter:	35 mm
	L/D-ratio:	30 D
	Output max.:	PET: 20 kg/h with PET screw
		PP: 20 kg/h

Die

Extruder configuration letter A, B, C, D, E corresponding to extruder table on page 6.
Most oriented films require multilayer structures, realized by co-extrusion and multilayer extrusion dies or feed-block adapters. A huge variety of die configurations with 1, 3, 5 and 7 layers are available in different width, adapted to the stretching ratio of the individual polymers

PP 3-LAYER DIE

Technical features	
Width (mm):	270
Die lip gap (mm):	1.7-3.5
Die lip adjustment:	automatic
Bolt pitch (mm):	10

Extruder configuration

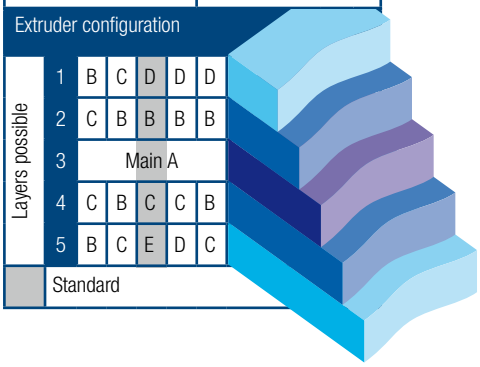
Layers possible					
1	B	B	C	E	
2		Main A			
3	C	B	C	D	
	Standard				

PP 5-LAYER DIE

Technical features	
Width(mm):	270
Die lip gap (mm):	1.7-3.5
Die lip adjustment:	automatic
Bolt pitch (mm):	10

Extruder configuration

Layers possible						
1	B	C	D	D	D	
2	C	B	B	B	B	
3	Main A					
4	C	B	C	C	B	
5	B	C	E	D	C	
	Standard					

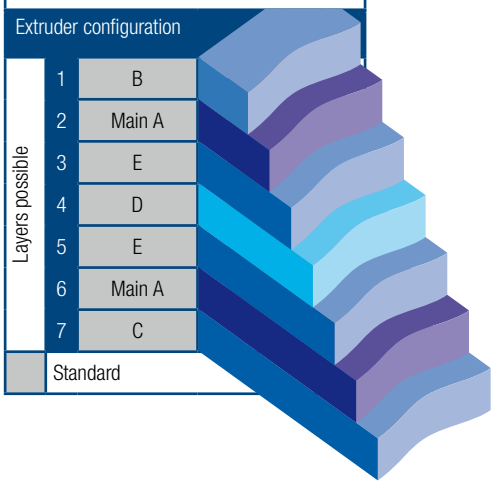


PP 7-LAYER DIE

Technical features		
Width (mm):	400	
Die lip gap (mm):	0.5-2.5	1.7-3.5
Die lip adjustment:	automatic	
Bolt pitch (mm):	10	
Tie Layer	Extruder E	
Barrier Layer	Extruder D	

Extruder configuration

Layers possible		
1	B	
2	Main A	
3	E	
4	D	
5	E	
6	Main A	
7	C	
	Standard	



PET 1-LAYER DIE

Technical features			
Width (mm):	430		
Die lip gap (mm):	0.0-1.2	0.7-1.7*	1.2-2.2
Die lip adjustment:	automatic		
Bolt pitch (mm):	28.5		
Feed block	3 versions		

* Recessed

Extruder configuration

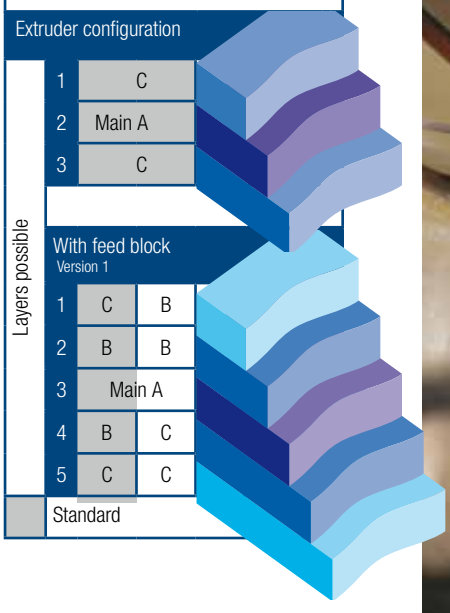
Layers possible				
1	Main A or Coex B or C			
	With feed block Version 1			
1	B	C	B	
2		Main A		
3	B	C	C	
	With feed block Version 2			
1	B			
2	Main A			
	With feed block Version 3			
1	Main A			
2	C			
	Standard			

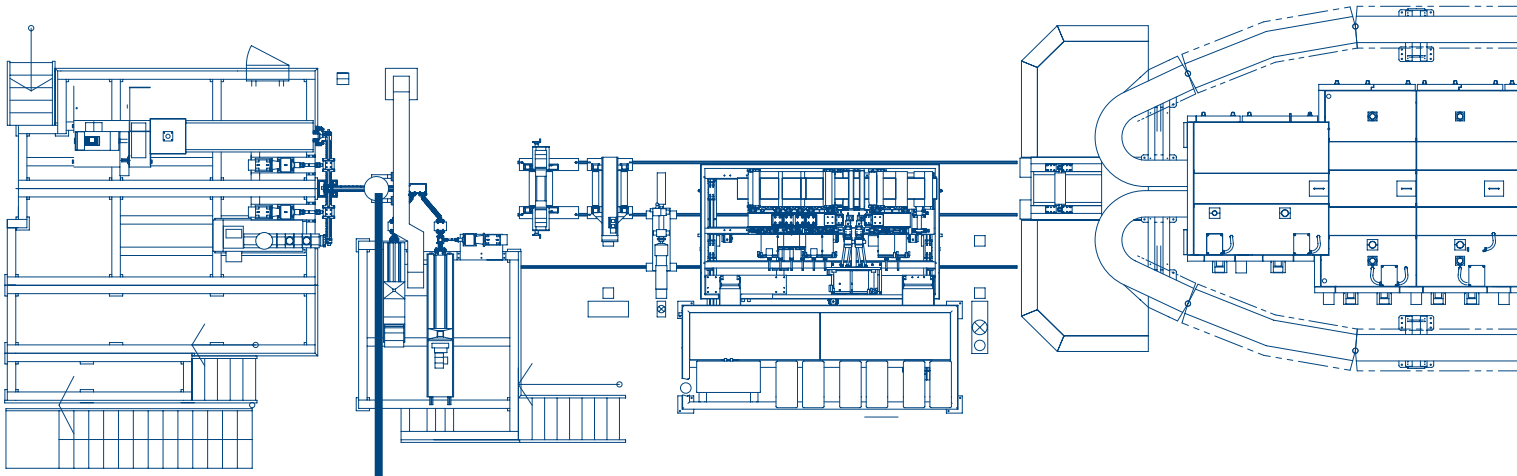
PET 3-LAYER DIE

Technical features	
Width (mm):	430
Die lip gap (mm):	1.5-5.0
Die lip adjustment:	automatic
Bolt pitch (mm):	28.5
Feed block	1 version

Extruder configuration

Layers possible			
1	C		
2	Main A		
3	C		
	With feed block Version 1		
1	C	B	
2	B	B	
3	Main A		
4	B	C	
5	C	C	
	Standard		





1-LAYER DIE SPECIAL PURPOSE

Technical features			
Width (mm):	550		
Die lip gap (mm):	2.0 - 3.6	0.5-1.2*	1.0-2.0
Die lip adjustment:	automatic		
Bolt pitch (mm):	28.5		
Feed block	3 versions		

* Recessed

Extruder configuration

Layers possible

1	Main A			
With feed block Version 1				
1	B	C	B	
2		Main A		
3	B	C	C	
With feed block Version 2				
1	B			
2	Main A			
With feed block Version 3				
1	Main A			
2	C			
Standard				

1-LAYER DIE SPECIAL PURPOSE

Technical features	
Width (mm):	430
Die lip gap (mm):	0.25 - 1.5
Die lip adjustment:	automatic
Bolt pitch (mm):	15.0

Extruder configuration

Layers possible

1	Main A

5-LAYER DIE SPECIAL PURPOSE

Technical features	
Width (mm):	500
Die lip gap (mm):	0.5-2.5
Die lip adjustment:	automatic
Bolt pitch (mm):	15.0
Feed block	2 versions

Extruder configuration

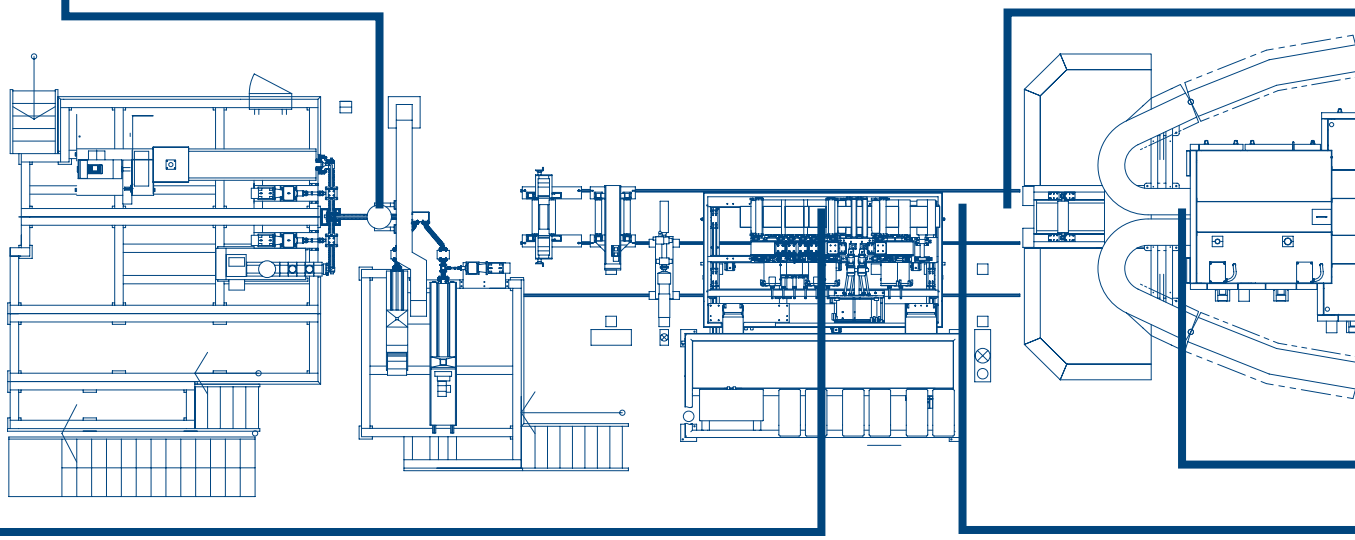
Layers possible

1	E	D	B	C	C	C	E	D
2	C	C	C	B	B	B	B	B
3	Main A							
4	B	B	C	B	B	B	B	B
5	E	D	B	C	E	D	C	C
With feed block Version 1								
1	D							
2	B							
3	Main A							
4	C							
5	E							
With feed block Version 2								
1	B	B	B	B	D	B		
2	D	B	A	A	B	A		
3	Main A					Main C		
4	E	C	A	A	C	A		
5	C	C	B	C	E	B		
Standard								

Casting Unit

Film casting requires different configurations, depending on the polymer and thickness. The set-up with or without water-bath, air cooling, chill-roll diameter and wide adjustable temperature range is arranged in order to provide optimum casting quality. This requires also very specific pinning technologies (electrostatic , air knife, HPA, roll).

CASTING UNIT	
Chill roll diameter	800 mm
Chill roll width	650 mm
Chill roll temperature	10-130°C
Pinning system PET:	Electrostatic wire
PP:	Air knife
PP/PA:	H. p. air knife
Waterbath temp. range PP:	15-60°C
Speed range	3-100 m/min
Thickness gauge	X-ray



MDO

The machine direction orienting machine is equipped with all necessary features which are required for MD or biaxial oriented film types. This includes multi-gap stretching with integrated IR heaters, direct drive system for all rolls and exchangeable casings

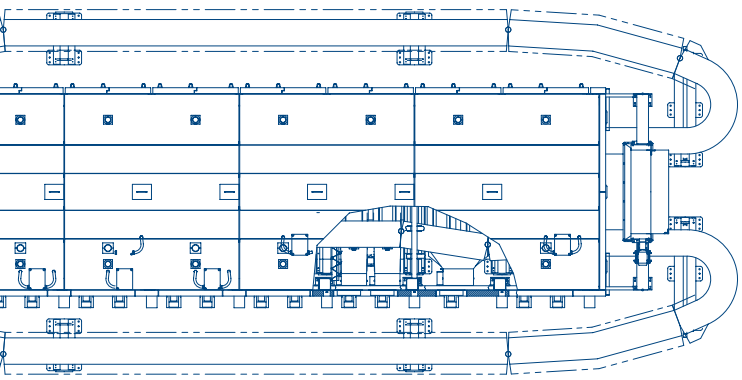
MDO (Option: MDO corona system)			
	Preheating	Stretching	Annealing
Number of rolls	6	4	2
Roll diameter	350 mm	100 mm	350 mm
Roll surface	Chrome / Teflon	Chrome	Chrome
Roll width	670 mm	670 mm	670 mm
Number of stretching gaps	-	3	-
Number of nip rolls	2	4	1
Tension measuring rolls	1	-	1

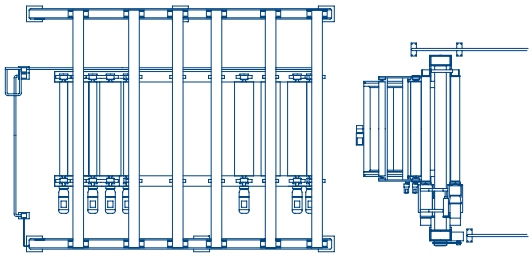
IR Heater

An infrared heating station is used for preheating thick cast films before simultaneous stretching. Due to segmented heating elements it is possible to adjust dedicated temperature profiles across the widtha

IR PREHEATER (simultaneous process only)	
Heaters	32 ceramic
Working width	500 mm
Length of heater	1,000 mm
Heating power	800 W per unit
Power consumption	2 x 25.6 kW
Control circuits	8

IR EDGE HEATER	
Heater type	High intensity ceramic radiator
Heating length	254 mm
Power consumption	2 x 1,000 W
Distance to film	40-150 mm





Corona

A corona treatment is necessary before the inline coating process (ILC) in order to achieve good coating adhesion

CORONA (for coater)	
Pre-treatment of cast films (bottom side) and MD films	
Generator	Digital IGBT
Output power	6 kW (sim), 2 kW(seq)
Treatment width	500 mm
Electrodes	1 (3 fins)
Treatment roll	Temprature controlled

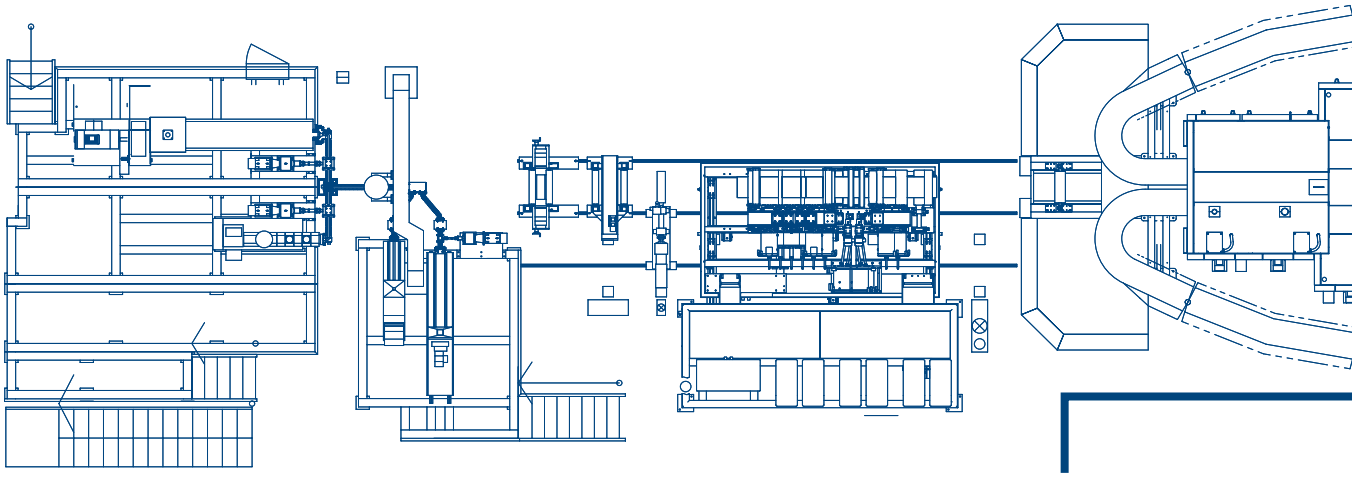
Inline-coater

Inline Coating (ILC) offers an added value to oriented films by achieving functional layers on the film surface, i.e. for improved metal adhesion. For this reason an ILC process is available for sequential and simultaneous stretching, using a gravure coating with adjustable layer thickness.

INLINE-COATER
Applying water based coatings on BOPET film (bottom side)
Simultaneous / sequential stretching mode
Web width (WW) at coater: 200-550 mm
Film thickness at coater: up to 2,000 µm
Resins: Acrylates, Polyester, Polyurethane
Coating thickness range (wet): 2-30 g/m^2
Viscosity: 10-250 mPas

TDO / LISIM® Oven

The multi-functional TDO / LISIM® allows simultaneous stretching using the patented LISIM® technology, with individual linear motor driven clips. Stretching ratio, stretching curves and relaxation functions can be adjusted in MD and TD in a most flexible way. The unit can also run as a normal TDO, simulating a chain track system, which is used for TD as well as for sequential stretching process.

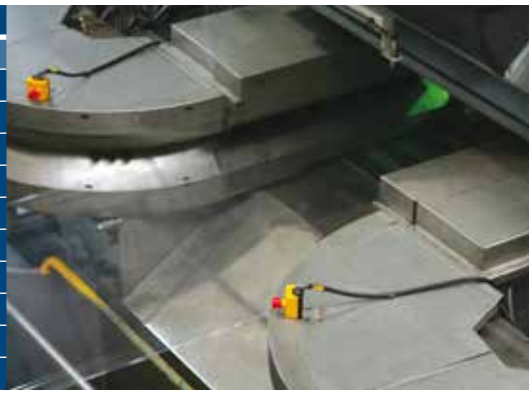


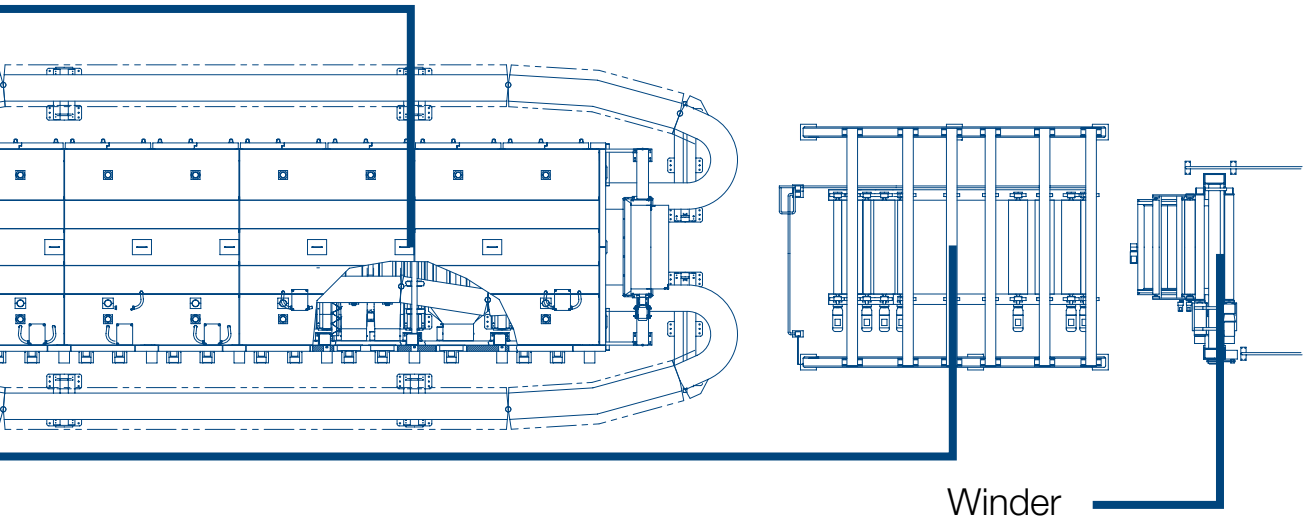
PULL ROLL STAND		
Number of rolls	10	
Roll diameter	150 mm (360 mm at treaters), 400 mm at suction roll	
Roll width	1,800 mm	
Speed range	2-400 m/min	
Number of drives	10	
Thickness gauge	X-ray, Pm 147 and infra-red sensors	
Corona treatment	Bottom	
	Generator	Digital IGBT
	Output power	10 kW
	Treatment width	1290 mm
	Electrodes	2 (15 fins each)
	Treatment roll	Temperature controlled
	Side treated should be the outer side of the test roll	
Flame treatment	Top	
	Type	Flame plasma treater
	Fuel gas	Propane
	System	Excess oxygen controlled (optimal flame quality control)
	Parameters	- excess oxygen - mixture gas volume flow (energy level) - gap (easily adjustable during production)
	Treatment roll	Temperature controlled
	Side treated is the inner side of the test roll	
Edge trimming	Trimmed edges thickness	2-60 µm
	Width of trimmed edges	2x10-300 mm
	Possible edge trim positions	3
	Possible edge suction positions	2
	Kinds of trimming	Blade
	Options	Optical inspection system, dust removal system

Pull-roll Stand

In the pull-roll unit all typical functions like tension insulation, edge trim, thickness gauge, corona

LISIM® TENTER/TDO				
	Preheating	Stretching	Annealing	Cooling
Zone length [m]	2.47 or 4.13	1.65, 3.3 or 4.95	4.95, 6.6 or 8.25	0.83
Fan motor	Frequency adj.	Frequency adj.	Frequency adj.	Frequency adj.
Temperature range	200 °C	230 °C	260 °C	Ambient
Width clip to clip min *	180 mm	1,028 mm	1,028 mm	1,028 mm
Width clip to clip max *	500 mm	1,800 mm	1,800 mm	1,680 mm
MD stretching ratios	3 - 10 (flexible after 2,475 m); fixed MD ratio 1.66 or 2.33 (simultaneous) is possible			
Clipping range	100 - 3,500 µm			
Entrance speed min.	3 m/min			
Exit speed max.	85 m/min (sequential); 90 m/min (simultaneous)			
* Depending on used extrusion die widths				





and flame treatment are installed. Furthermore a wide range of inline measurement systems, like optical inspection, molecular orientation angle, haze and porosity are available.

Winder

The winder allows gap and contact-winding up to a net-film width of 1.2 m. Programmable tension and contact pressure curves are used to adapt the winding characteristic to the individual film types.

WINDER	
Film width max.	1,270 mm
Winding ø max.	500 mm
Winding mode	Gap, contact
Oscillation range	± 50 mm
Wrapping angle	0°, 90° or 180°
Core inner ø	6”
Type	2 station turret winder
Characteristic	Tension: 2-900 N/m, pressure max.: 900 N/m

Organisation

Book your trial periods online

The pilot line is used for Brückner‘s own R&D projects as well as for customer trials. Customers are film producers, resin producers, converters, brand owners and universities, who all benefit from the outstanding R&D facilities. The set-up and schedule is available on the technology center‘s website and can be used to make online reservations:

www.brueckner.com/en/brueckner-maschinenbau/technology-center/

All facilities are operated by experienced personal, and customer trials are prepared, conducted and evaluated, including reports by additional engineers. The process data and, if required, also the laboratory evaluations, are documented for the customers.
The operation of the pilot-line is usually during the day shift, but in case of film production for premarketing purpose, a 3-shift operation is also feasible.

Experiences Pilot Line

BOPP 2-100 µm 1/3/5/7-layer

- Balanced film
- MD tensilized film
- MD shrink label film
- High shrink cigarette film
- Low sealing temperature film
- White shrink label
- Matt film
- High sealing strenth
- Ultra high barrier film
- Foamed film (synthetic paper)
- Breathable film
- 7-layer high barrier film
- Thin capacitor film
- Multi functional film
- Synthetic paper

BOPET 1-400 µm 1/3/5-layer

- MD tensilized film
- Ultra thin film
- Thick film (optical grade)
- Balanced film
- Matt film
- Heat sealable film
- Synthetic paper
- Low bowing, low shrink film
- MD tensilized film
- MD/TD shrink label
- Chemically treated
- White film

BOPA 4-25 µm

- Low bowing film
- Low shrink film
- Low haze
- High barrier film
- Ultra thin film

BOPE 15-50 µm 3/5-layer

- Display shrink film
- Barrier shrink film
- Low shrink film
- Bundle shrink film
- Breathable film

Battery Separator Film 9-40 µm 1-layer

- High porosity
- Low electrolyte resistance
- High puncture strength
- Shutdown function

and others:

BOPLA, BOCOC, BOPVDF, BOPEN, BOPEEK,

Shrink film for sleeves (MOPET, MOPS, MOPLA)

Film Testing Laboratory

MECHANICAL TESTS

THICKNESS GAUGE (mechanical & electronical)
Thickness measurement of castfilm and endfilm

TENSILE TESTING MACHINE
Determination of:
- Tensile strength, elongation, E-Modulus,
- Sealing strength, min. sealing temperature
- Tear propagation resistance
- Pinhole resistance
- Bending stiffness

FRICTION TESTER
Determination of:
- Static and kinetic CoF
- Hot slip test with heated plate

HEATING OVEN, AUTOCLAVE, WATERBATH
Shrinkage tests under various conditions

SURFACE ROUGHNESS TESTER
Determination of surface roughness of all film types

HEAT SEALING MACHINE
Sealing of coex-film with different parameters

OPTICAL TESTS

GLOSSMETER
Measurement of gloss (20°,45°,60°,85° angle)

HAZEMETER
Measurement of haze, transmittance and clarity

COLOR MEASURING INSTRUMENT
Measurement of opacity, whiteness and color

OPTICAL DENSITY MEASURING INSTRUMENT
Measurement of optical density of metallized film

ILLUMINATED PLATE
Examination of film defects

ILLUMINATED MAGNIFIER
Examination of film defects

ELECTRICAL TESTS

RESISTIVITY MEASURING INSTRUMENT
Determination of volume resistance of capacitor film

DIELECTRIC STRENGTH TESTER
Determination of dielectric strength of capacitor film (AC or DC)

DIGIBRIDGE
Determination of loss factor and dielectric constant of capacitor film

BATTERY SEPARATOR FILM TESTS

GURLEY TESTER
Measuring of air permitivity

POROMETER
Determination of pore size and pore size distribution

CONTINUOUS THICKNESS MEASUREMENT
High resolution thickness measurement

MICROSCOPES

POLARIZATION MICROSCOPE
- Optical examinations of film with transmitted and incident light
- Determination of the co-extrusion layer thicknesss of cast film

3D LASERSCANNING MICROSCOPE
- High resolution images
- Large depth of field
- Fast 3D color images
- Non-destructive profilometrie & roughness measurement

RAW MATERIAL TESTS

HUMIDITY TESTER
Determination of moisture content in raw material

ADDITIONAL INSTRUMENTS

TENSIOMETER
Preparing and controlling corona testing inks

METALLIZER
Metallizing film samples for measuring electrical properties

ANALYTICAL BALANCE
- Determination of film density
- Determination of area weight

MICROTOME
Preparing microtome cuts to characterize the layer thickness of cast film with the microscope

MUELLER MATRIX POLARIMETER
- Retardation and birefringence measurement
- 3-dimensional refractive index measurement
- Molecular orientation angle and fast axis measurement
- Spectral transmission measurement (400-800nm)
- Polarization and diattenuation measurement

Chemical Laboratory

Cooperations with Universities & External Institutes

SIMULTANEOUS DSC/TGA- UNIT

Thermal characterization of solids and liquids

Special features:

- Analysis of phase transitions eg. Tg, Tm, Tc, Trec
- Thermal stability

FT IR SPECTROMETER

- Measurements in transmission and reflection mode
- Identification of substances, e.g. co- monomers
- Thermal degradation of polymers
- Examination of surfaces like coex-layers and coatings

MUFFLE FURNACE

Temperatures up to 1000°C

- Determination of ash content
- Determination of catalyst residues and
- Content of inorganic fillers and additives

OVEN WITH CIRCULATING AIR

- Thermal stability
- Chemical stability

VACUUM DRYING CABINET

- With vacuum pump, T up to 200°C
- Determination of content of volatiles

DSC UNIT WITH SAMPLE CHANGER

Thermal characterization of solids and liquids

Special features:

- Cp-value determination
- OIT measurement
- Automatic sample changer

ANALYTIC BALANCE

- Accuracy 0.1mg
- Weighing-in of samples for DSC, volatiles, etc.

MELT FLOW TESTER

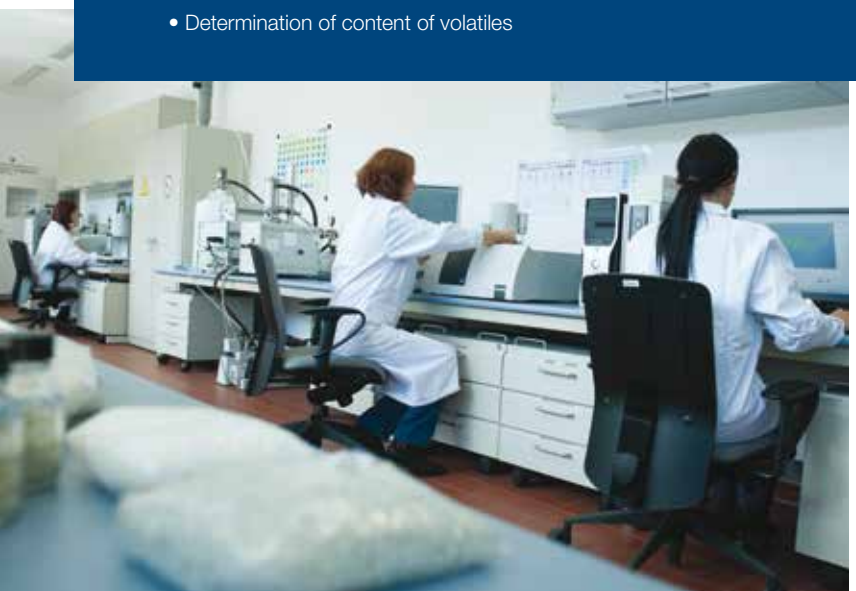
Determination of melt flow rate and melt volume rate

RESISTIVITY GAUGE

Determination of resistance and resistivity of Battery Separator Film

FLAME IONISATION DETECTOR

- Detecting the presence of hydrocarbons, and other carbon-containing compounds
- Measurement of emissions
- Monitoring the maximum allowed working place concentration (MAK)
- Process optimization



Karo IV

Test films and sheets
in a very simple an economical manner

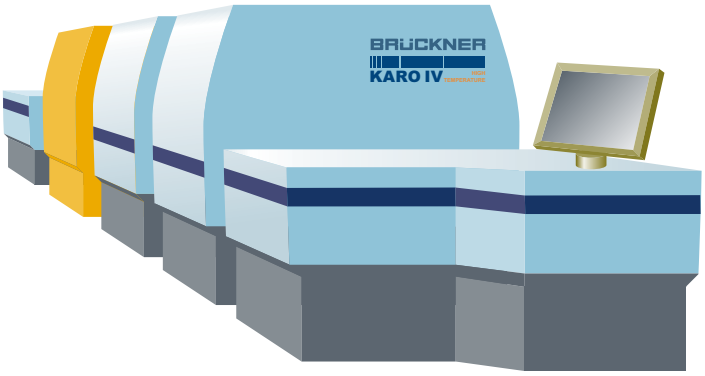
With our **laboratory stretching machine KARO IV** for monoaxial and biaxial film orientation it is possible to test films and sheets in a very simple and economical manner - in the sequential as well as in the simultaneous stretching mode.

Highlights

- High stretching ratios starting from 1.01 x 1.01 up to 10 x 10
- Heating capability up to 400 °C
- Up to 3 independent heating modules
- MD retardation for optical films (MDX < 1, while TDX > 1)
- Sample loading station outside the hot oven area
- Exchangeable clip tables

Features

- Easy and comfortable operation by advanced PC control panel
- Free programmable test sequences, parameters for each direction:
  - stretching ratio
  - stretching speed profile (constant speed, constant rate, user-defined)
  - relaxation ratio
- Pneumatic sample support
- Heating by air circulation, with independent and separated oven zones for accurate and close to production conditions
- State of the art measurement equipment for:
  - stretching forces
  - displacement
  - sample surface temperature
  - clip temperature
  - oven temperatures



System components

Basic unit, ready for operation

OPERATION MODULE

- Oven module I
- Oven module II

ELECTRICAL SYSTEMS

- PLC control system
- Firewall server
- PC data acquisition software package
- Stretching force measuring
- Displacement measuring
- IR film temperature measuring

Option

OVEN MODULE III

- High temperature version 400 °C
- 2nd IR film temperature measuring
- 4x7 clips configuration
- 4x9 clips configuration
- Power transformer

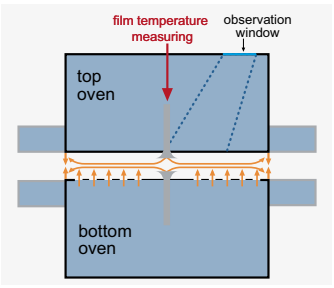
TECHNICAL DATA

SAMPLE THICKNESS	20 – 4,000 µm	**STRETCHING SPEED**	5 – 500 mm/s
MIN. SAMPLE DIMENSIONS • 5 clip configuration • 7 clip configuration • 9 clip configuration	90 x 90 mm 115 x 115 mm* 140 x 140 mm*	**OPERATING TEMPERATURE** High temperature version	RT – 300°C RT – 400°C
MAX. STRETCHED SAMPLE dimensions (all configurations)	730 x 730 mm	**STRETCHING FORCE PER AXIS**	2,000 N
STRETCHING RATIOS ON BOTH AXES • 5 clip configuration • 7 clip configuration • 9 clip configuration	 10.4 : 1 7.7 : 1* 6.0 : 1*	**MACHINE DIMENSIONS:** • two oven design • three oven design	L x W x H [m] 4.5 x 1.9 x 1.7 5.6 x 1.9 x 1.7*

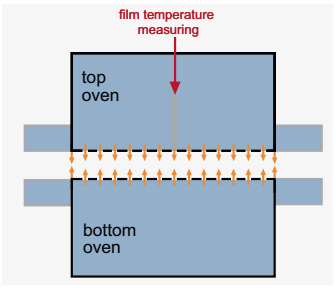
ALL FIGURES REPRESENT THE MAXIMUM RANGE
* not available at Brückner's technology center

Sample loading

Oven I: Pre-heating, stretching



Oven II + III: Stretching, annealing, relaxation



Sample unloading

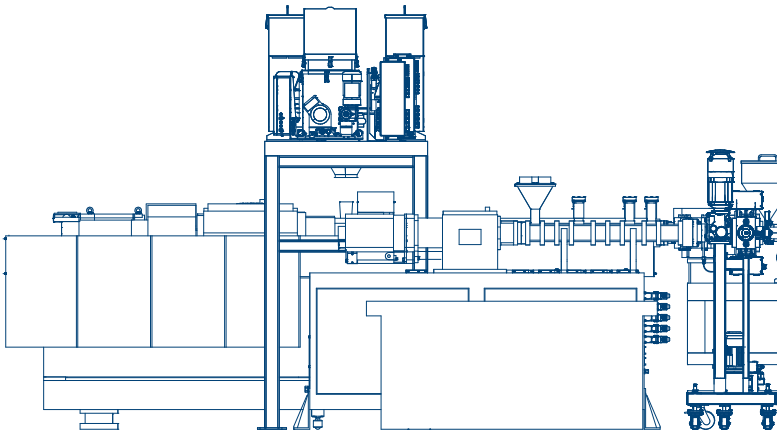
Laboratory Extrusion Line

EXTRUSION		
Main extrusion 1		
BSF-HEX: Twin screw extruder ZSE 40HP-56D		
Screw diameter:	40 mm	
L/D-ratio:	56:1	
Speed	400 rpm	
Degasing:	2 passive vacuum zones	
Liquid dosing:	Prepared at 6 zones	
Metering pump:	4,7 ccm/rev	
Filter:	Pre-strainer:	500 µm
	Screen changer:	100-500 µm @ 7 cm^2
Output max.:	5-40 kg/h	
HEX (Co-extrusion 1)		
Twin screw extruder ZE25Ax42D-UTXi		
Screw diameter	25 mm	
L/D-ratio:	42:1	
Speed:	600 rpm	
Degasing:	3 vacuum zones (1 passive)	
Liquid dosing:	Prepared at 6 zones	
Metering pump:	4,7 ccm/rev	
Filter:	Pre-strainer:	500 µm
	Screen changer:	100-500 µm @ 7 cm^2
Output max.:	5-30 kg/h	
COEX (Co-extrusion 2)		
Screw diameter	30 mm	
L/D-ratio:	30:1	
Speed:	250 rpm	
Metering pump::	2,8 ccm/rev	
Filter:	Pre-strainer:	500 µm
	Screen changer:	100-500 µm @ 3.1 cm^2
Output max.:	1-15 kg/h	

Multi-layer film extrusion for various film types

The R&D environment has been expanded by a new laboratory extrusion line which offers the following features in addition to the pilot line:

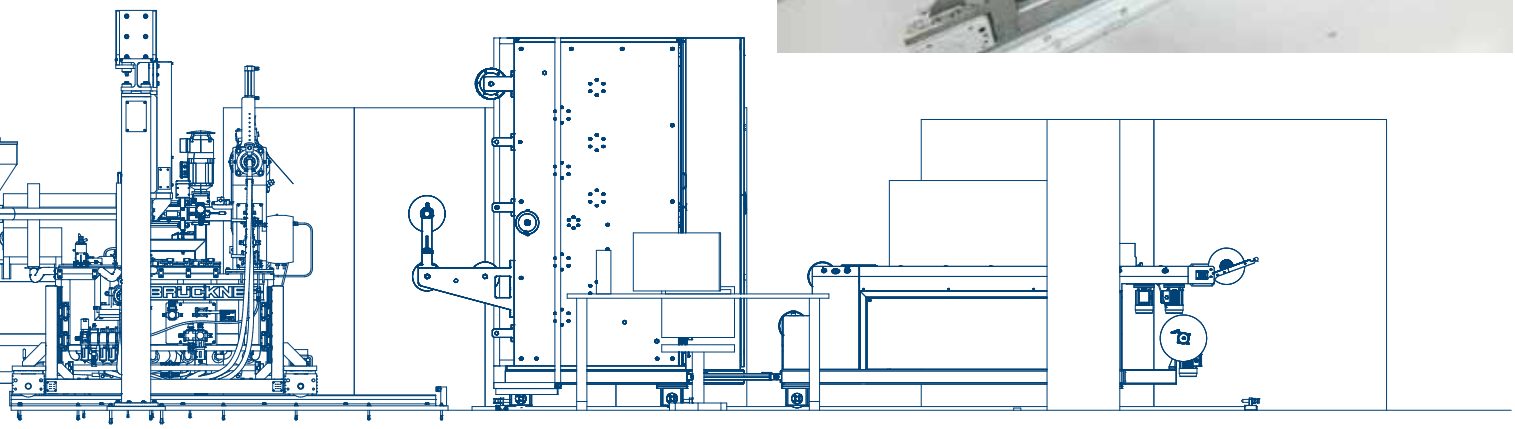
- Excellent mixing and homogenization of blends with a 56 D twin screw extruder
- Co-extrusion with 3 extruders and die with multi-layer feedblock
- Cast film and MD-oriented film for subsequent stretching on the lab stretcher
- Set-up for basic R&D for battery separator films



RESIN SUPPLY	
Dosing Unit 1	
Dosing A:	gravimetric pellets 0,3-30 kg/h
Dosing B:	gravimetric pellets 0,3-30 kg/h
Dosing C:	powder 0,1-10 kg/h
Dosing Unit 2	
Dosing A:	gravimetric pellets 5-30 kg/h
Dosing B:	gravimetric pellets or powder 5-30 kg/h

MULTIPURPOSE DIE	
Slot die Ultraflex U-100	
Feedblock:	3-Layer Ultraflow IV-L
Width:	270 mm
Die lip gap:	0,2 – 2,0 mm
Degasing:	2 passive vacuum zones
Die lip adjustment:	13 differential push/pull screws
Bolt pitch:	21 mm
Heating:	5 electrical heated temperature zones + heated die lips
Laminar adaptors:	ABA, CBC, ABC, B
Extruder configuration:	B: BSF-HEX or HEX or COEX ABC: A=HEX, B= BSF-HEX, C=COEX ABA: A=HEX, B=BSF-HEX CBC: C=COEX, B=HEX or C=COEX, B=BSF-HEX

CASTING UNIT	
Chill roll diameter:	350 mm
Chilll roll width:	350 mm
Chill roll temperature:	15-130°C
Pinning system:	Electrostatic wire, High pressure air knife, Nip roll
Water- /Solvent-bath:	20-60°C
Speed range:	0,2-30 m/min



MDO			
Machine direction orienter LMDO-350-250			
	Preheating	Stretching	Annealing
Number of rolls:	5	2	3
Roll diameter:	250 mm	90 mm	250 mm
Roll width:	350 mm	350 mm	350 mm
Roll surface	Chrome	Chrome	Chrome
Nip rolls (rubber):	2	2	2

Speed range:	0,2 - 30 m/min
Stretching ratio:	1-10
Stretching gap:	1 (stepless adjustable)
Roll temperature range:	20-150°C
Option:	Unwinder for R-2-R operation

PULL ROLL STAND	
Winder LWU-350/L	
Roll diameter:	2 x 200 mm at inlet, 6 x 50 mm at idler rolls
Roll width:	350 mm
Speed range:	0,2-30 m/min
Number of drives:	3
Edge trim	with wind up cassettes
Winder:	pneumatic clamped, core Ø 3 Inch

Brückner Maschinenbau

Your partner in the plastics film industry for over half a century.

Ludwig Eckart
COO Sales and Project Management

Michael Baumeister
COO Technology and Logistics

Stefan Neumann
CFO Chief Financial Officer

For more than half a century we have been striving for excellence. We keep our sights set firmly on our mission: to provide the latest technology and the highest quality and services “made in Germany” for our customers worldwide.

We aim thereby to contribute to their success in their various industries and to build up a long-term relationship with customers and partners alike.
Within the family-owned Brückner Group our decisions are based on sustainability, continuity, reliability and respect for the environment.

Technology centres are a key element of our various partnerships within the industry. From the outset, Brückner has been running its own pilot line in order to deliver process and technological innovations for our clients.

Our brand new „Innovation Test Centre“ is the latest highlight, underlining Brückner’s focus on innovation and R&D. It is an important part of the professional development process at Brückner because we aim to offer our customers proven technological solutions that are absolutely reliable.

In line with our claim “Stretching the Limits”, we look forward to providing added value for our customers by understanding their needs and the challenges facing them throughout the value chain of the plastics film industry.

STRETCHING
THE LIMITS

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