

40 Auftragssysteme aus einer Hand

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Coatema<sup>®</sup>  
Coating Machinery GmbH  
**Zimmer**  
AUSTRIA

**20. Hofer Vliesstofftage 2005**  
**9. / 10. November 2005**  
**Hof, Deutschland**

## Ko-operation für Ihren Vorteil

- Zwei Marktführer bieten gemeinsam die größte mögliche Auswahl an Beschichtungssystemen an
- Über 40 verschiedene Auftragssysteme sind verfügbar
- Ein Trockner-Spannrahmen in revolutionärem Design betreffend die Luftverteilung für Spezialbeschichtungen
- Synchronisierte Prozesssteuerung aller Antriebssysteme
- Komplette Beschichtungslinien in Arbeitsbreiten von bis zu 5.400 mm für alle Arten technischer Textilien
- Jahrzehntelange Erfahrung beider Firmen auf dem Gebiet Beschichtung und Laminierung technischer Textilien
- Vier eigene Entwicklungszentren in Dormagen, Klagenfurt, Kufstein und Taipei mit ähnlicher Maschinenausstattung und über 15 Anwendungstechnikern für Kundenversuche und Entwicklung
- Weltweites lokales Service Netzwerk

**Coatema & Zimmer**

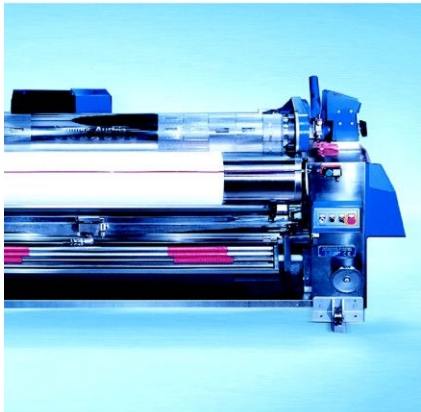
**The Innovation and product development**

The Coatema dryer and stenter frame has been developed especially for the full surface coatings with pastes, foam and liquids, that are of major importance with Magnoroll, TwinCoat, Variopress and MiniRoll machines from Zimmer. Coatema & Zimmer provide state of the art process and control systems out of one hand for the complete coating line.

- ▶ Two market leading companies provide you with over 40 different coating systems.
- ▶ The process control systems of both Coatema and Zimmer have been streamlined to one process solution.
- ▶ Complete coating lines in working widths of up

- to 5.200 mm can be supplied out of one hand.
- ▶ The Coatema Coating dryer and stenter frame is especially developed with a revolutionary design of the air conducts, guaranteeing perfect uniformity of air amount and temperature over any working width.

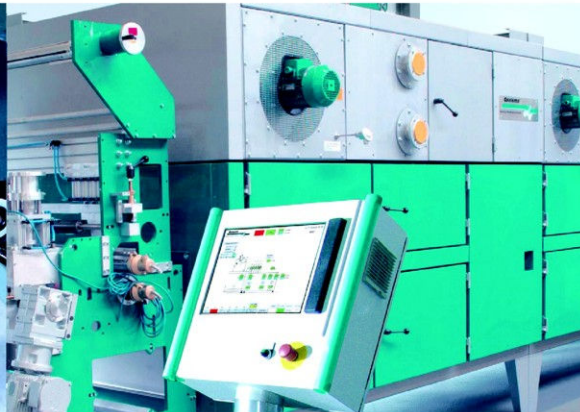
- ▶ Thanks to this uniform air distribution and to the special air exhaust system based on airplane-wing-design, any sort of pinhole effects in coated goods can be avoided. ▶ Bypass control and air amount control are electronically controlled.



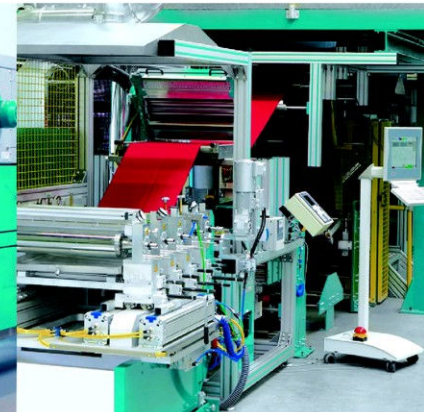
Zimmer Magnoroll Multipurpose coating machine



Zimmer Variopress foam coating system

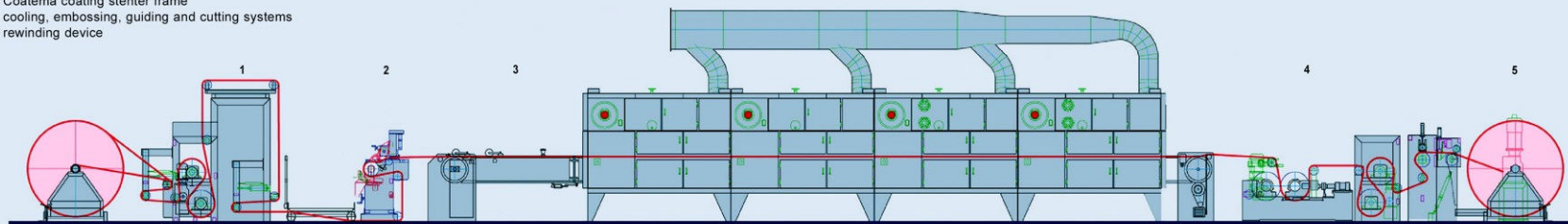


Process control system and Coatema Coating dryer and stenter frame



Coatema Hotmelt coating and laminating

- 1) Unwinding device
- 2) Coating Machine
- 3) Coatema coating stenter frame
- 4) cooling, embossing, guiding and cutting systems
- 5) rewinding device



## ITMA Asia 05

Companies	Coating and Laminating Solutions	Markets		Technologies	
Coatema Coating Machinery GmbH	Application & Laminating Systems	Agrotech	Medtech	Knife Systems.	Roller Systems.
J. Zimmer Maschinenbau GmbH.	Coating & Laminating Plants.	Buildtech	Mobiltech	Hotmelt Systems	Magnetic Systems.
	Dryers & Stenter frames	Clothtech	Oekotech	Closed Systems.	Screen Systems.
Variopress Movie.	Custom Made	Geotech	Packtech	Multifunctional Systems.	Foam Systems.
TY.	Auxiliary Equipment	Homotech	Protech	Flock Systems	Nano Systems
Common information.	Research & Development.	Indutech	Sporttech	Impregnation Systems.	Double-Side Coatings

# Originality matters

since 1874

Quality since 1874



1874 Foundation by Franz Zimmer in Warnsdorf  
 1950 Re-foundation by Johannes & Peter Zimmer in Kufstein  
 Since 1957 in Klagenfurt: History, Milestones, and Managing Directors



**Franz Zimmer**  
Managing Director MD  
1874 - 1893

**Julia Zimmer**  
MD 1893 - 1915

**Heinrich Zimmer**  
MD 1915 - 1953

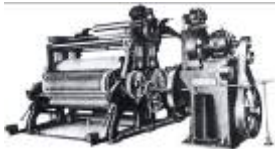
**Johannes Zimmer**  
MD 1952 - 2001

**Peter Zimmer**  
MD 1953 - 1980

**Dr. Gerhard Fresacher**  
MD since 2000

**DI Dieter Kühnen**  
MD since 2005

**Johannes P.M. Zimmer**  
MD since 2002



**Roller Printing Machines**  
around 1900



**Duplex Printing Machine**  
around 1930



**Rotascreen 1955**



**Chromojet Inkjet 1975**



**Chromojet MP Mat Printer**



**Rotascreen Printing Machine**



**Rotary Screen Carpet Printing**



**Magnoprint Flat Screen Printing Machine**



**Magnoroll Coating Machine**

**Distribution network  
for service and sales  
in more than 60 countries**



*Headquarters Klagenfurt, Austria*



*R&D department Klagenfurt, Austria*



*Pre-installation department Klagenfurt*



*Kufstein, Austria*



*Mittlern, Austria*



*Spartanburg, USA*



*Hongkong, China*



*Shanghai, China*



## Production Programme



## Rotary screen printing machines

with closed bearing system  
and open bearing system





## Production Programme



### Flat screen printing machines

Squeegee stroke in warp direction  
Squeegee stroke in weft direction  
Magnetic roll rod and  
rubber blade squeegee

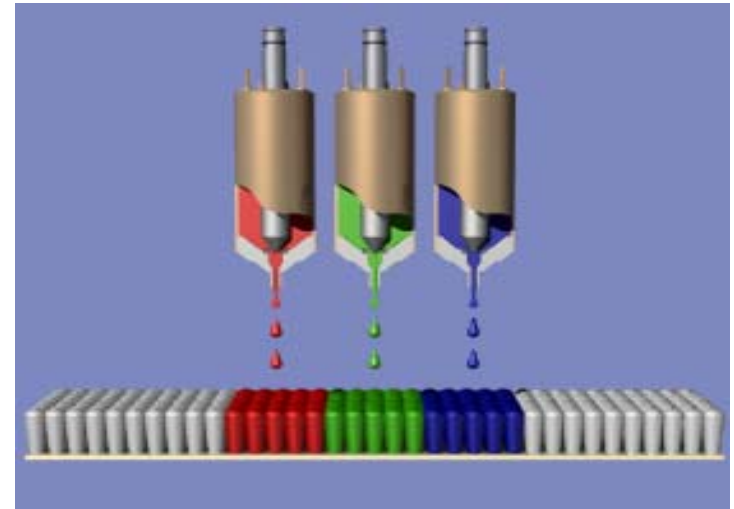


## Production Programme



## Digital jet printing machines

Jet printing of carpets, mats, blankets and textiles

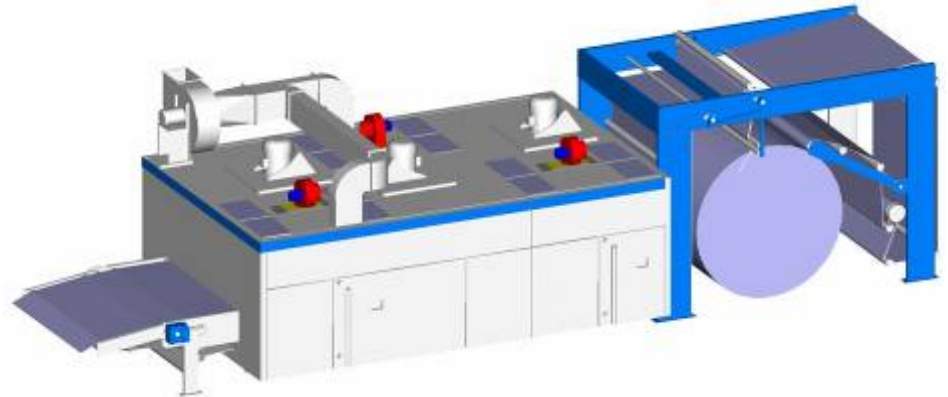
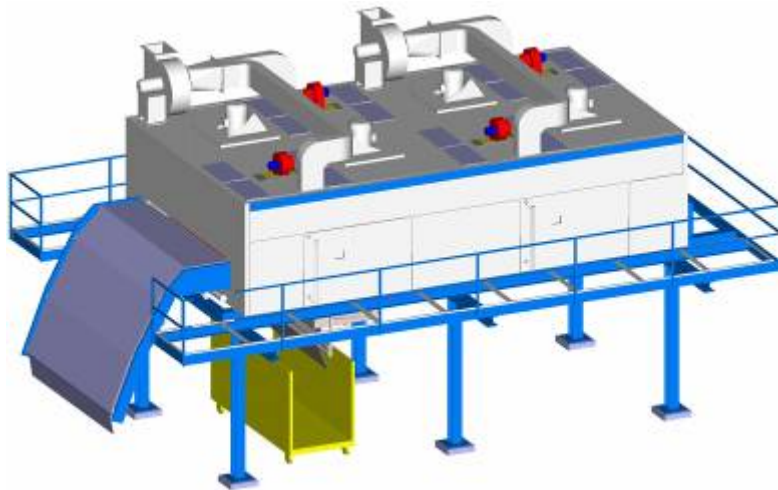


## Production Programme

**thermoCURE**  
DRYING STEAMING CURING SYSTEM

### Hot air jet dryers

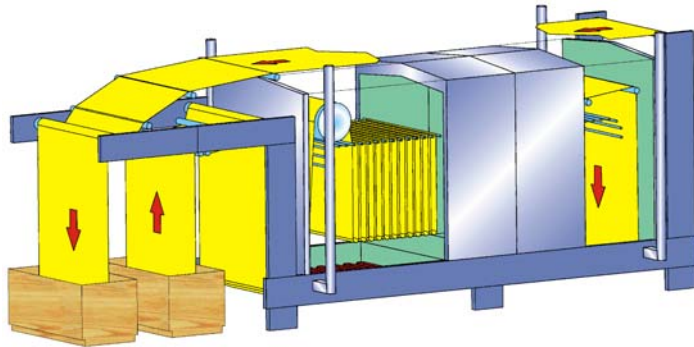
Available in various sizes and layouts and  
for various heating media





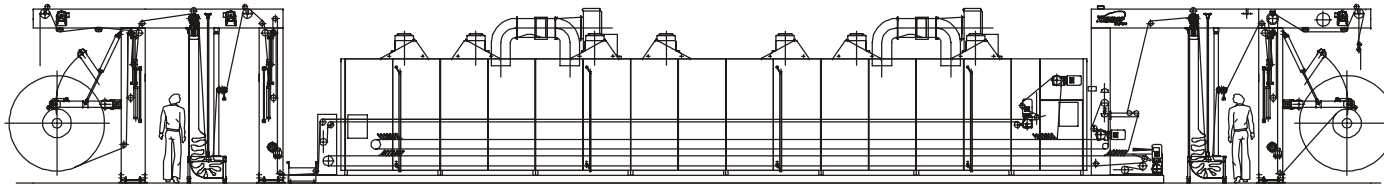
## Production Programme

**thermoCURE**  
DRYING STEAMING CURING SYSTEM



## Steamers and Polymerizing systems

Loop steamers, piece goods steamers,  
polymerizers

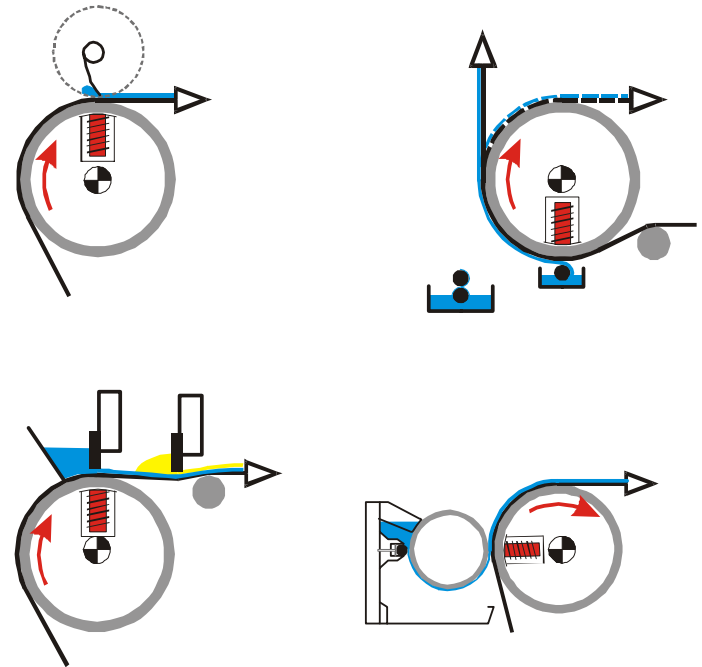


## Production Programme



## Coating machines

Screen coating,  
GMA (low add-on) roller coating,  
knife coating, transfer roller coating

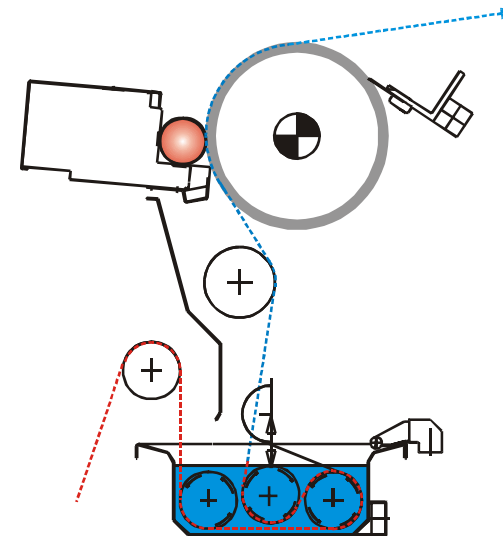


## Production Programme



## Dyeing machines

KKV pad batch reactive dyeing  
and chemical applications



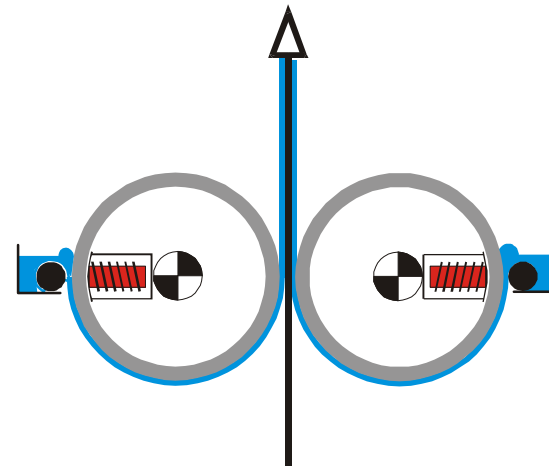


## Production Programme



## Coating machines

Coating and lacquering  
simultaneously on both sides  
of the substrates

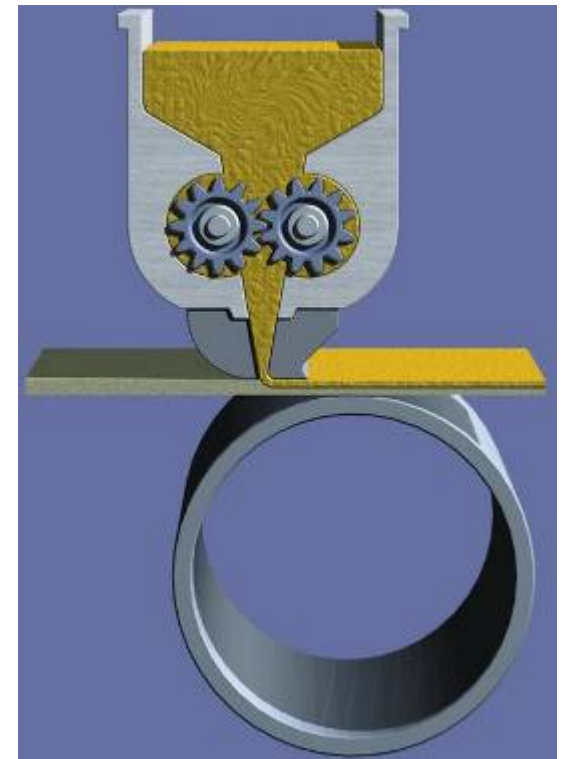


## Production Programme



## Coating machines

Foam and paste coating system



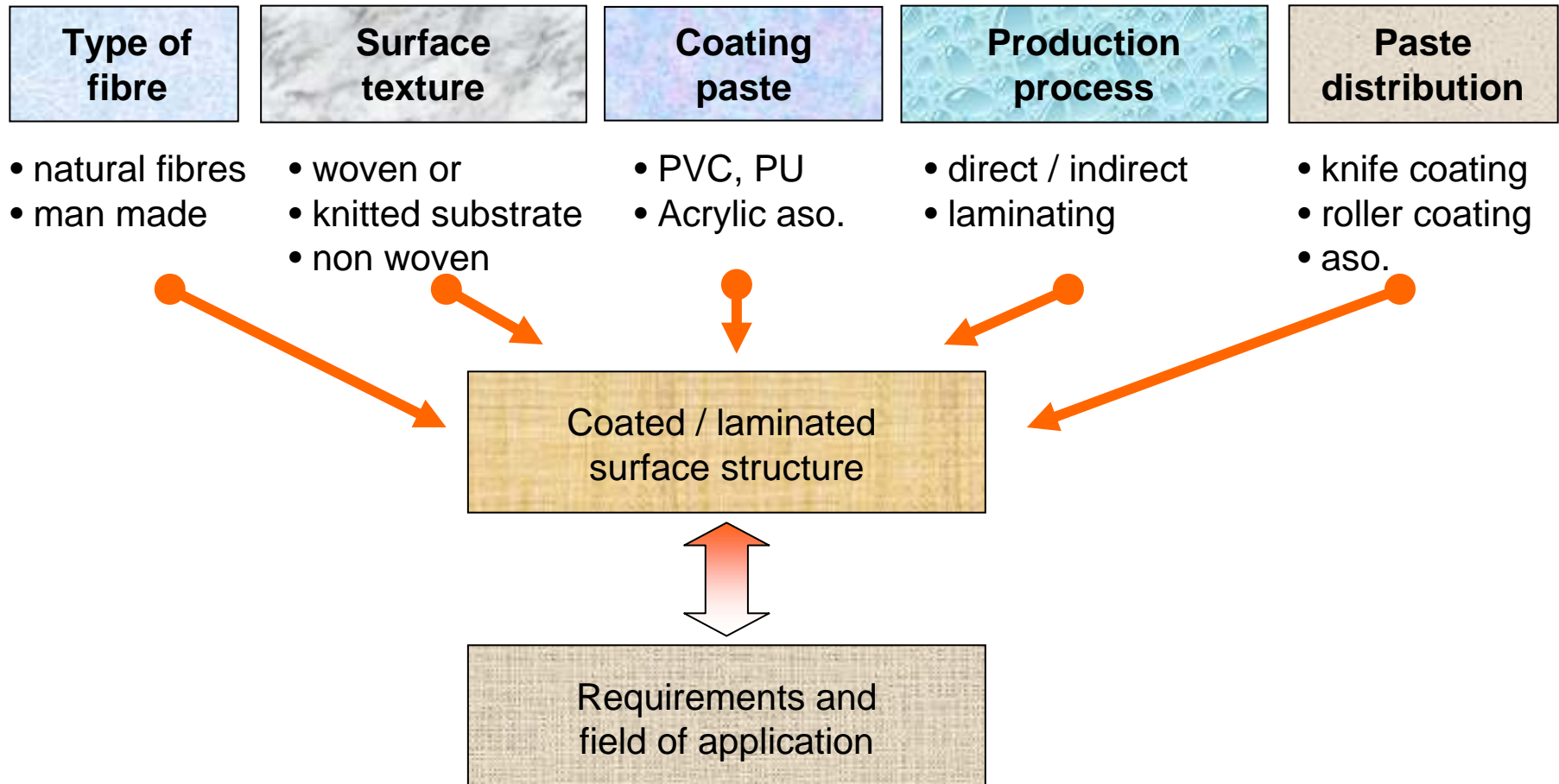
The background of the slide is a composite of two images. The left side shows a large industrial facility with a yellow overhead crane labeled '10000 kg'. In the foreground, there is a complex piece of machinery with several rollers, and two workers in white lab coats are standing nearby. The right side shows a different part of the factory, featuring a long conveyor belt system with multiple rollers and a worker in a green uniform. The overall scene is a busy industrial environment.

***Common information  
on coating***





# Coating parameters





## *What is the purpose of coating?*

**“Giving added value to substrate  
and this leads to a  
higher profit for the fabric producer”**

### Substrate

Metal

Wood

Glass

Paper

Films

Textiles

### Target

corrosion protection, colour, ...

protection, colour, ...

IR- and heat protection, ...

paper treatment, colour, ...

colour improvement, better adhesion, ...

better touch

softness, flexibility, ...

### Influences on function

hydrophilic, hydrophobic, oleophobic,

breathability, water density,

UV protection, flame retardant, ...



## ***Selecting a coating method – Basic considerations***

None of the basic families of coating techniques can be applied for all purposes.

The coating result is influenced by:

- different coating weights
- solvents
- viscosity
- substrate

Usually, more than one method can meet the requirements. But one of them may represent the “best” method.





## ***Selecting a coating method – Basic considerations***

Selecting a coating method involve listing of properties of the coating fluid(s) and the desired properties of the coating and the coater.

These independent key variables tend to determine the best coating method.

- number of layers
- wet layer thickness
- viscosity (and viscoelasticity - function of shear rates)
- coating accuracy required
- coating support or web (substrate)
- coating speed

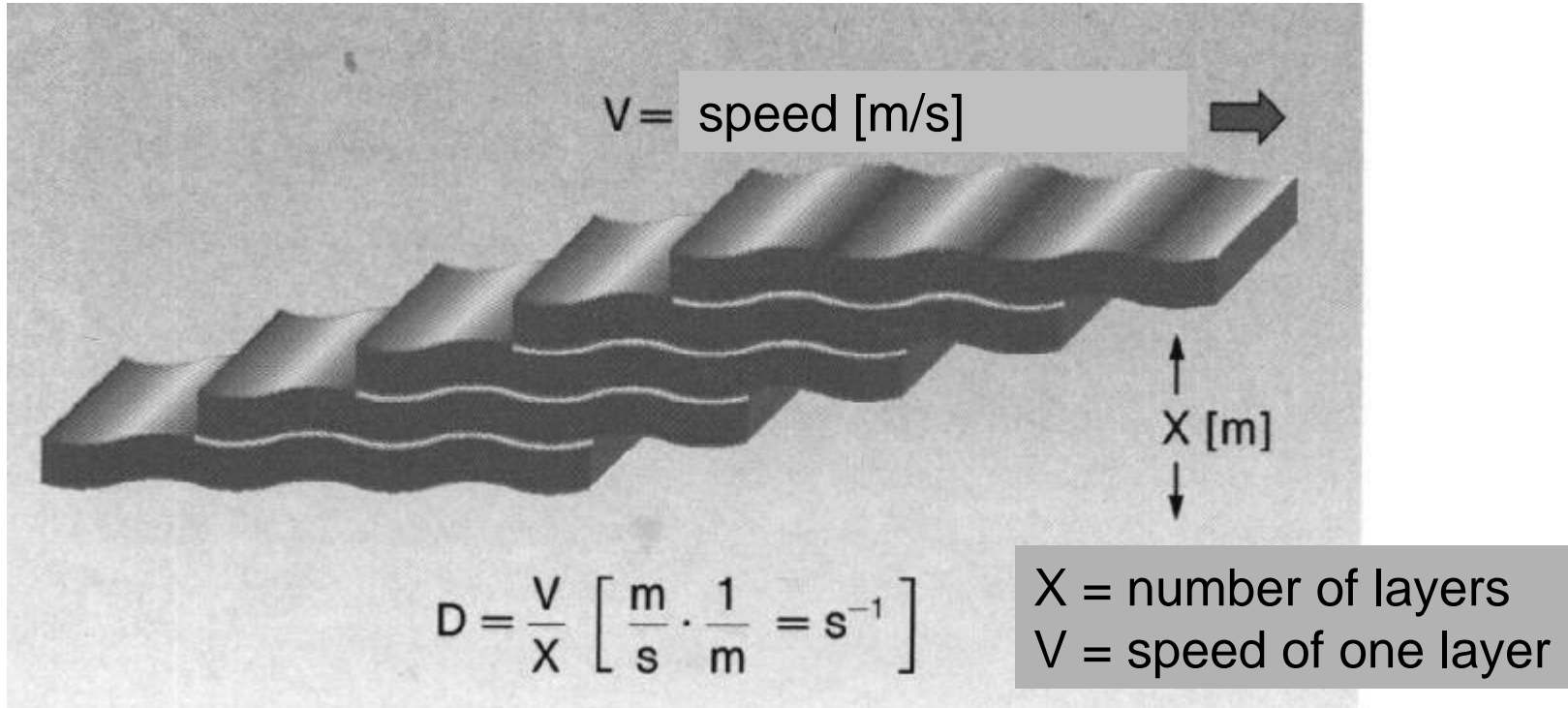


## ***Selecting a coating method – Basic considerations***

Other factors that also can play a role in determining the coating method include:

- dried layer coating weight
- solvent system
- viscosity response to temperature
- preferred coating temperature
- binder system
- solids loading
- surface treatment
- surface tension (coating liquid must be lower than the surface energy of the web)

## Viscosity and shearing speed



$D$  = shearing speed at which different layers will be moved against each other



## ***Definition: Shearing speed***

$$D = v / h \text{ (speed / height of layers)}$$

### **Coating plant:**

$$v = 0,5 \text{ m/s} \quad \text{height of the knife } h = 2\text{mm}$$

$$D = \frac{0,5 \text{ m/s}}{0,002 \text{ m}}$$

$$\text{Shearing speed } D = 250 \text{ s}^{-1}$$

$$\text{Doubling of shearing speed } D = 500 \text{ s}^{-1}$$



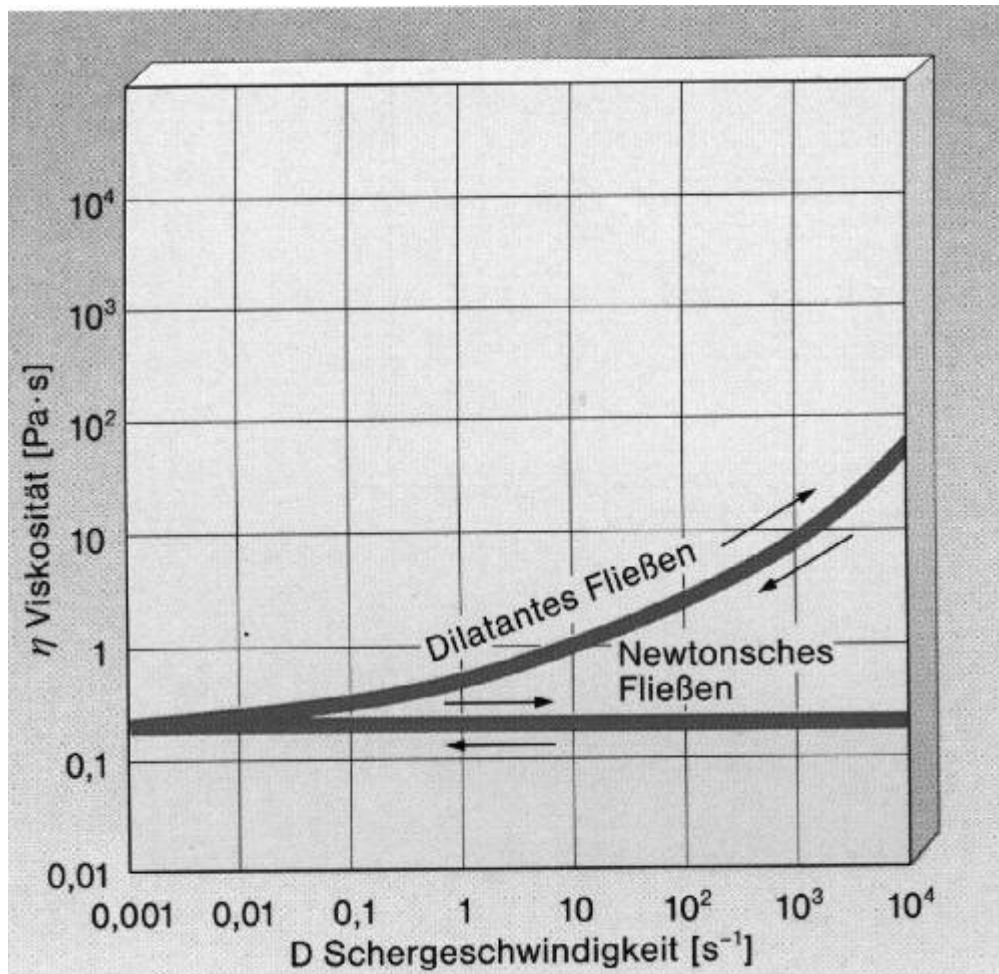


## Definition: Shearing speed

Process	Shearing speed $D$ [ $s^{-1}$ ]	Samples
Sedimentation of fine particle in fine suspensions	$10^{-6} \dots 10^{-4}$	Paints and lacquers
Sedimentation of large particles in suspensions	$10^{-4} \dots 10^{-1}$	Ceramic suspension
Bleeding as a result of surface tension	$10^{-2} \dots 10^{-1}$	Paint, printing paint
Drop of under the influence of gravity	$10^{-2} \dots 10^{-1}$	Paint, coatings
Current in tubes	$10^0 \dots 10^2$	Pumping of fluids
Mixing, paddle	$10^1 \dots 10^3$	Process technology
Spreading, spraying, blading	$10^3 \dots 10^6$	Coatings
Rolling	$10^4 \dots 10^6$	Printing paints, coatings
High speed coating	$10^5 \dots 10^6$	Paper printing machines



## Viscosity behaviour



### Dilatant

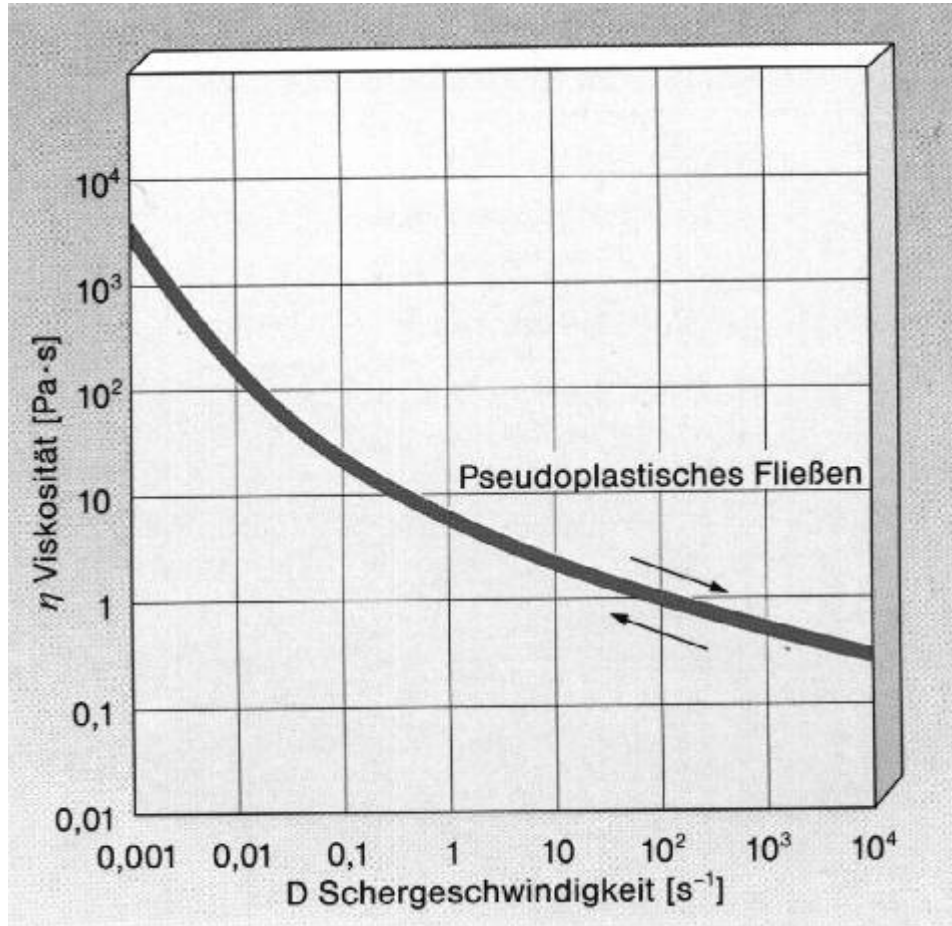
Viscosity increases with increasing shearing speed  
e.g. starch

### Newtonic

Viscosity constant, independent of the shearing speed



## Viscosity behaviour



### Pseudo plastic

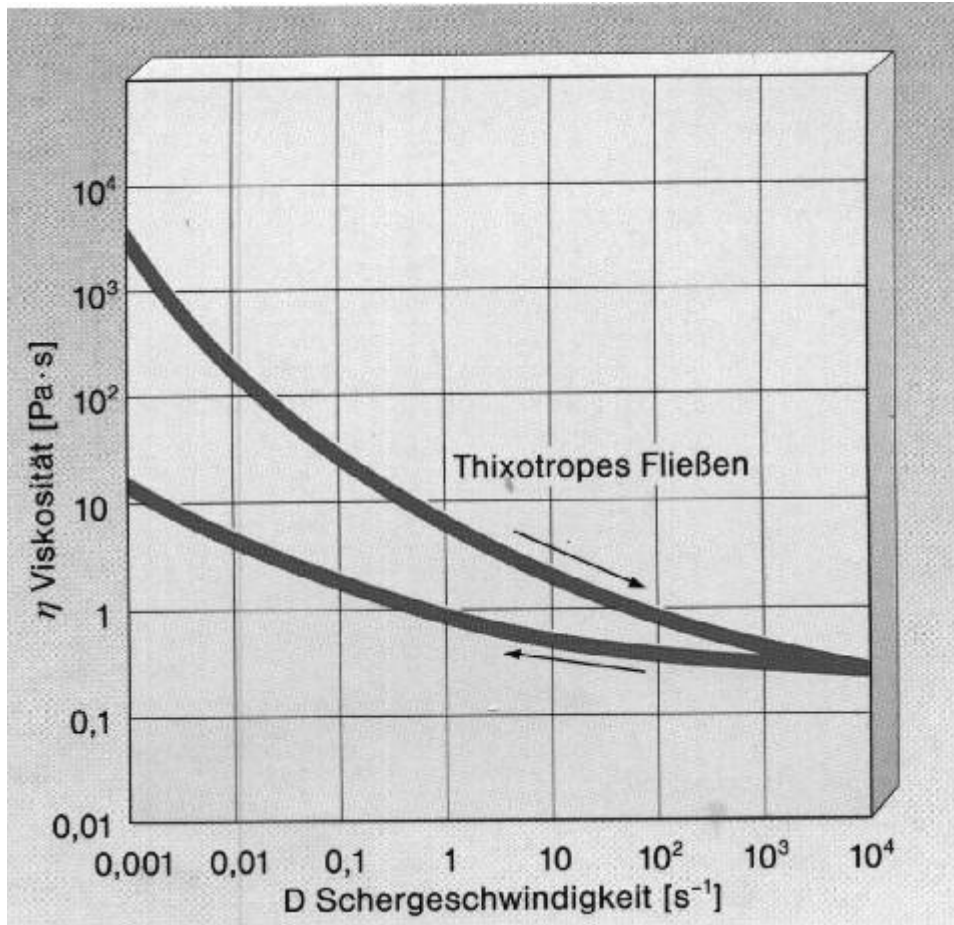
Viscosity decreases with increasing shearing speed

Process is reversible, viscosity increasing with decreasing shearing speed

e.g. dispersion paints



## Viscosity behaviour



### Thixotropic

Viscosity decrease with increasing shearing speed

With decreasing shearing speed the viscosity increases but not at the same time period

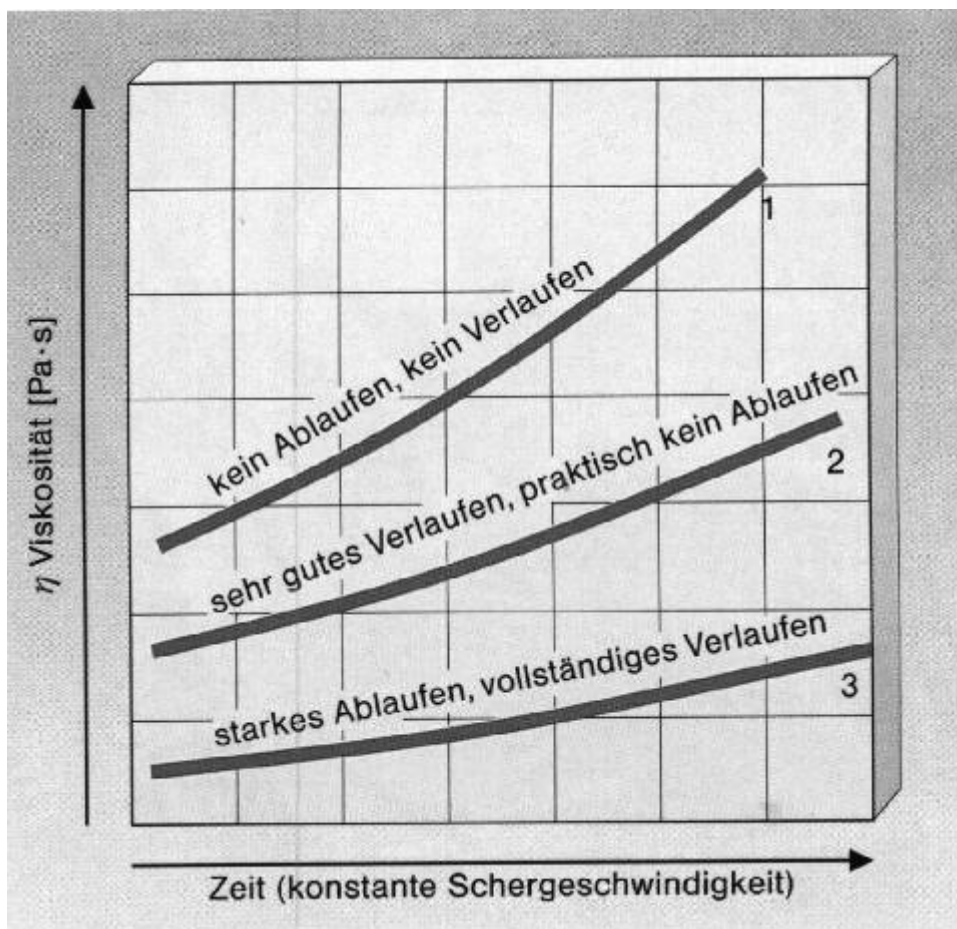
Viscosity depends from time and shearing speed

e.g. gels, pastes, lacquer, ketchup, yoghurt





## Viscosity behaviour



### Optimal viscosity

Bleed and drain off of coatings are effective opposite

Low viscosity

-paste bleeds good but can drain off to the extreme

High viscosity

-paste can not drain off but bleeds bad

Optimum viscosity

- good bleed, practically no drain off



## Samples of viscosity

Material (Temperature) at T = 20 °C	Dynamic Viscosity $\eta$ [mPas]
Air	0,018
Acetone	0,32
Benzene	0,54 bis 0,65
Water 20 °C	1,00
0 °C	1,79
40 °C	0,65
Ethanol, Alcohol	1,2
Milk, cream	5 - 10
Motor oil	100 - 500
Rhizinus oil	Ca. 1000
Honey	Ca. 10.000
Syrup	Ca. 1.000 - 10.000
Synthetic melting solutions	$10^4 - 10^8$
Silicon caoutchouc	$10^5 - 10^8$
Glass melting solution	$10^{15}$



## Samples of viscosity and coating methods

<b>Viscosity [mPas]</b>	<b>Coating method</b>
1 – 10 000	Roller application with chromium plated surface
1 – 15 000	Roller application with engraved surface
1 – 30 000	Slot die application
(1000) 100 – 50 000	Knife coating method paste
10 000 – 25 000	Knife coating method foam
10 000 – 80 000	Screen technology paste
10 000 – 25 000	Screen technology foam
10 000 – 500 000	Hotmelt slot die application

## Summary of some coating methods

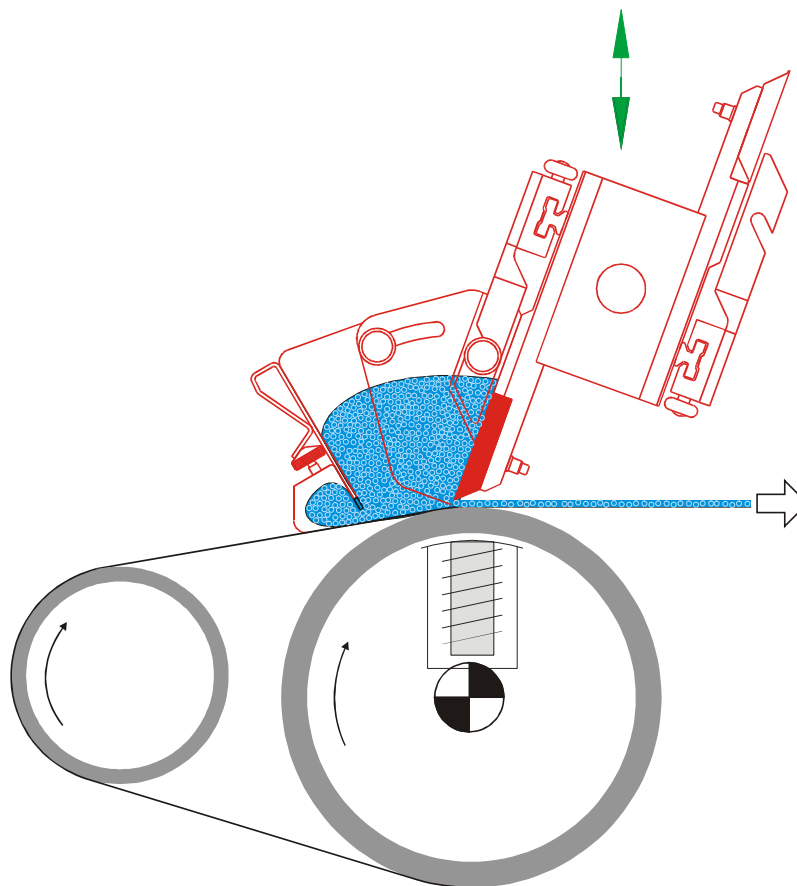
Process	Viscosity range [mPas = cP]	Wet thickness [µm]	Effect of substrate roughness
Air knife	5 - 1000	2 - 40 (60)	Large
Knife over roll	100 - 50000	10 - 750	Large
Chromium roller	1 - 10000	1 - 50	Slight
Gravure roller	1 - 15000	1 - 25 (100)	Slight
Slot	5 - 20000 (1 - 30000)	15 - 250	Slight
Extrusion	10000 - 500000	15 - 750	Slight
Reverse Roll	100 - 50000	5 - 400	Slight
Forward Roll (Kiss)	20 - 1000 (10000)	10 - 200	Slight
Mayer bar	200 - 1000	5 - 50	Large

1 µm = 1 g/m<sup>2</sup> for a  
density of 1 g/m<sup>3</sup>



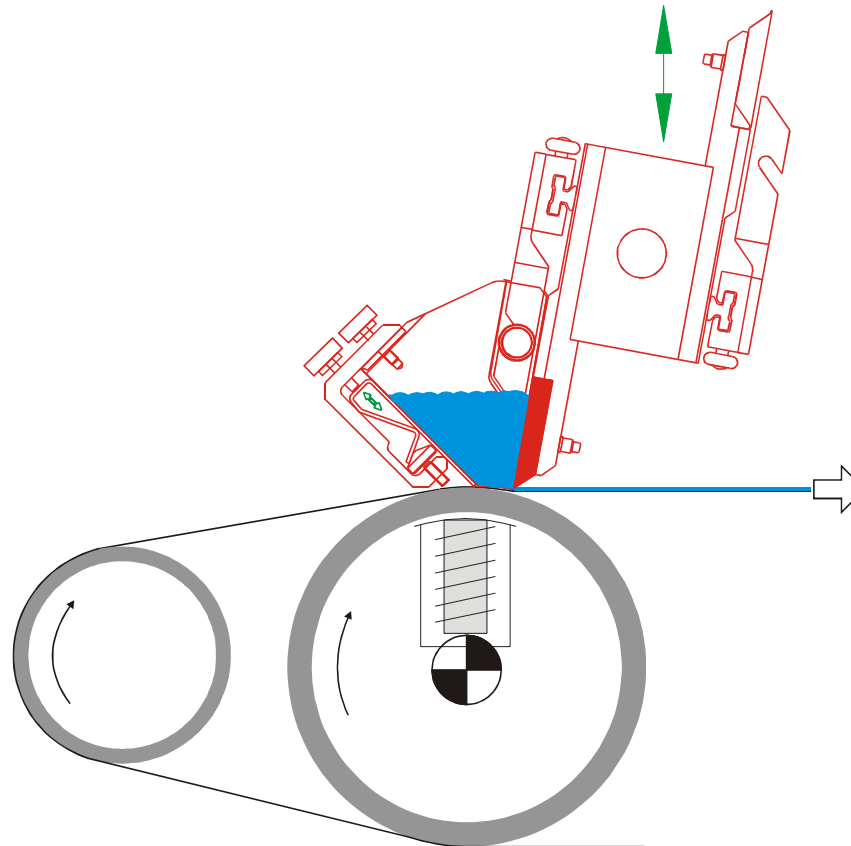
# Training illustrations

## Magnoknife foam application with trough



# Training illustrations

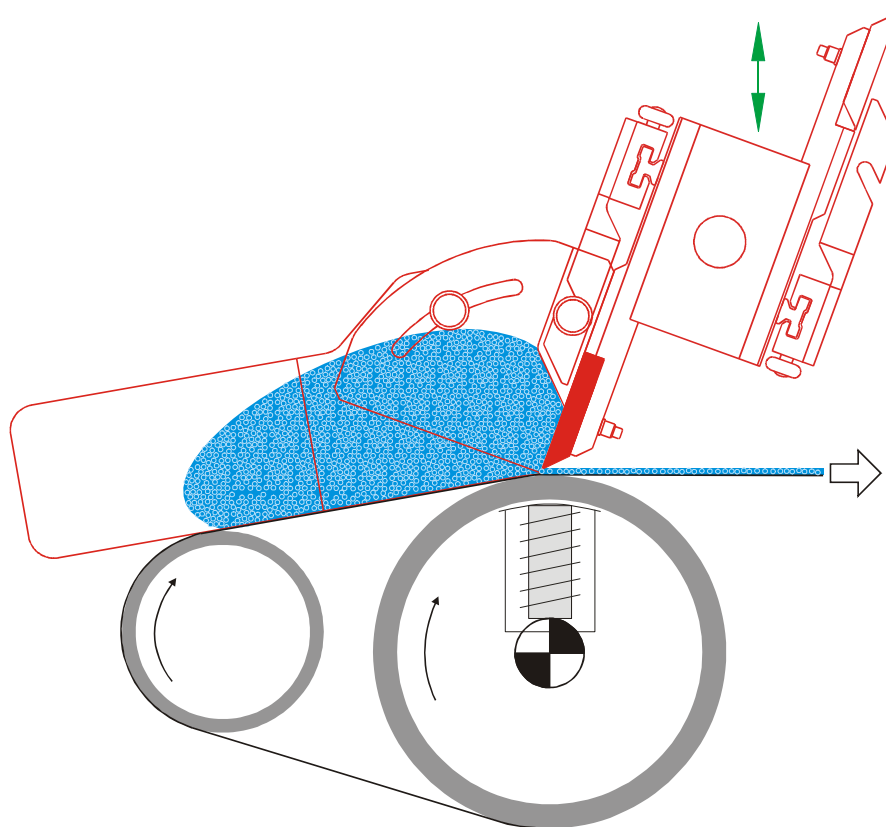
## Magnoknife paste application with trough





# Training illustrations

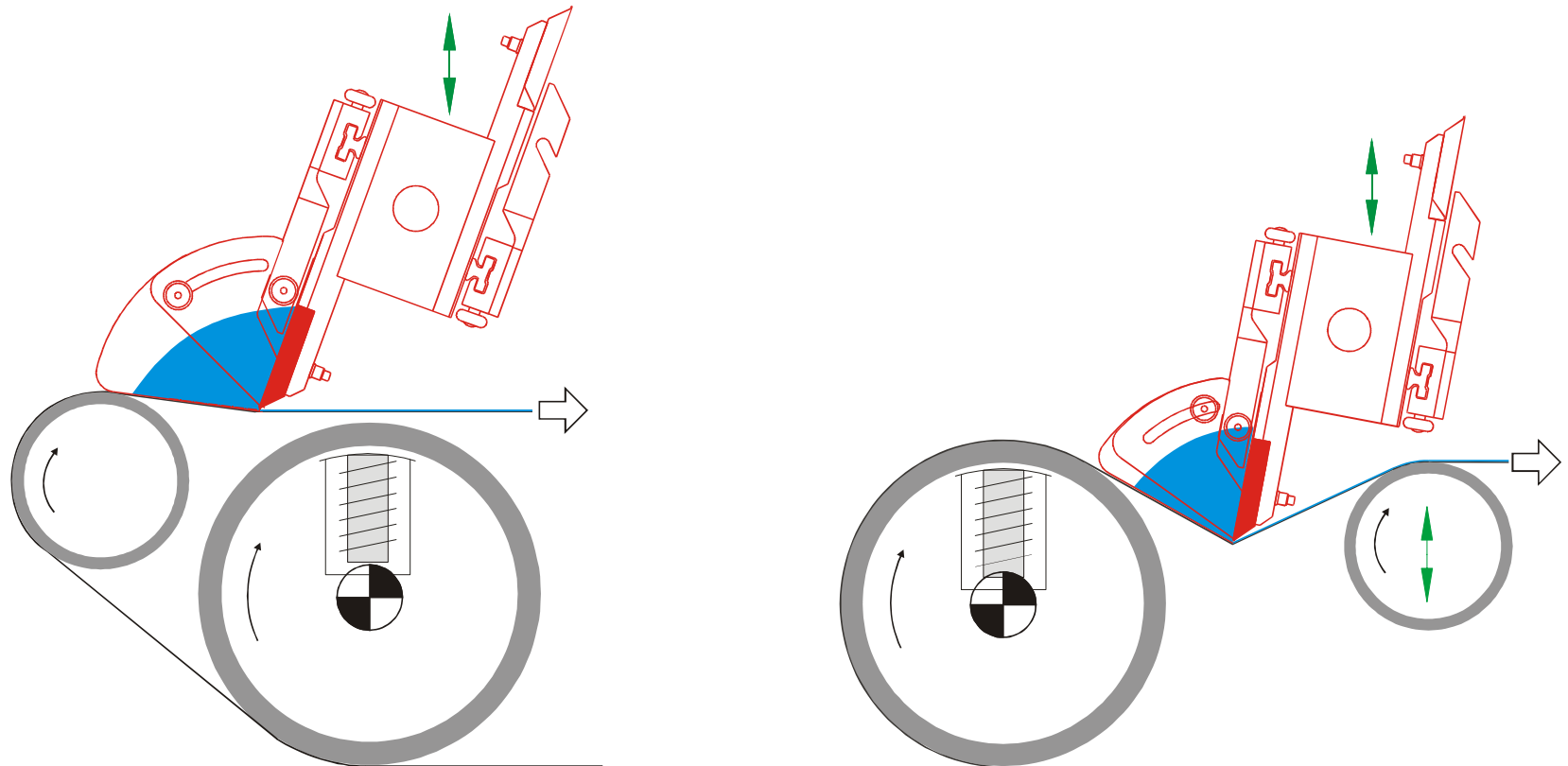
## Magnoknife foam application with adjustable limiters





# Training illustrations

Magnoknife paste application  
with adjustable paste limiter

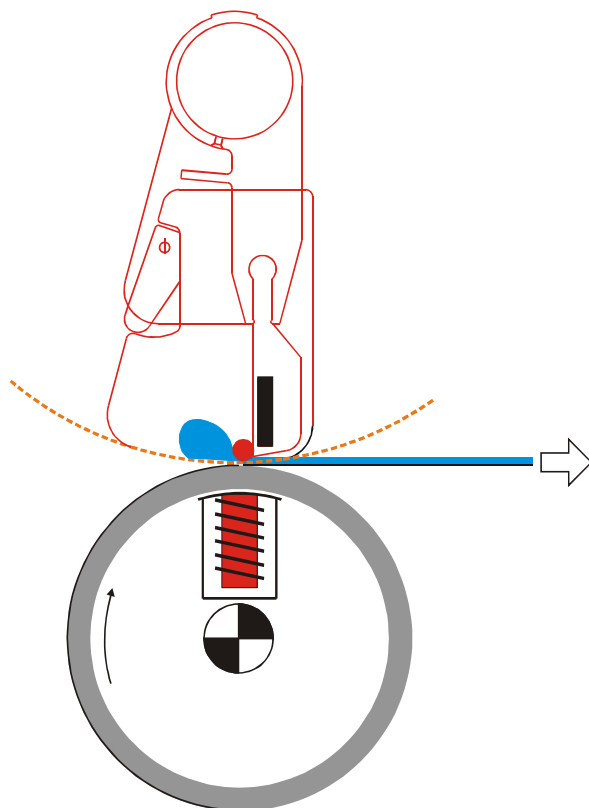




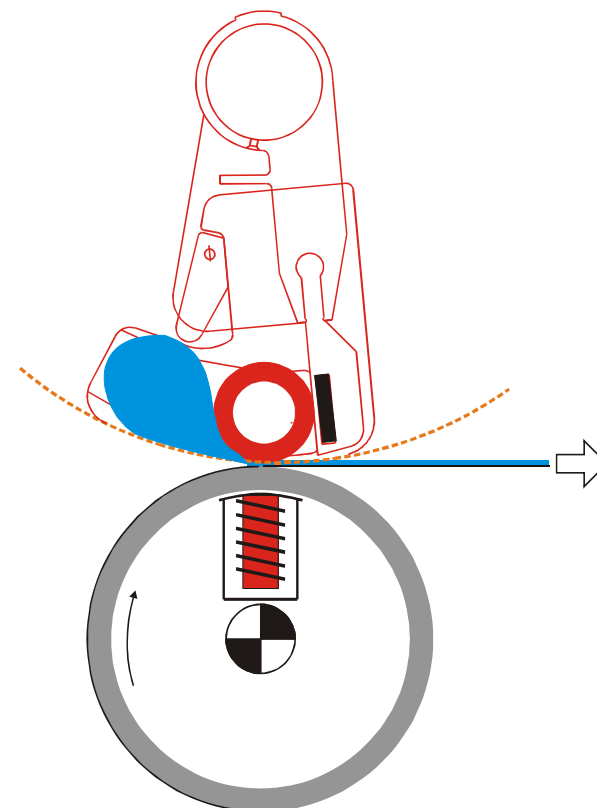
# Training illustrations

## Kombiroll application

roll rod Ø 6 - 10 mm



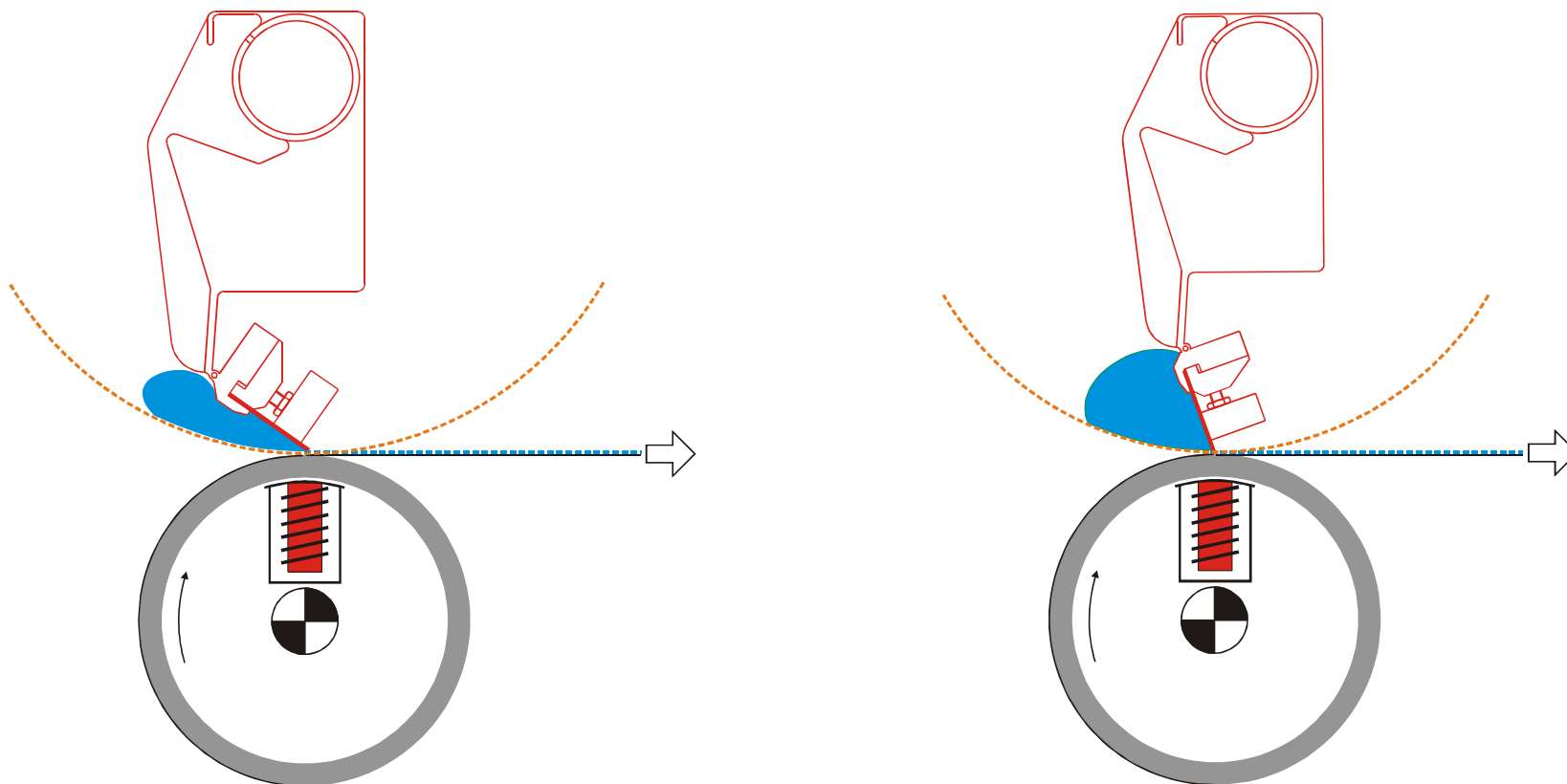
roll rod Ø 12 - 30 mm





# Training illustrations

Variocolor blade squeegee  
with angle adjustment



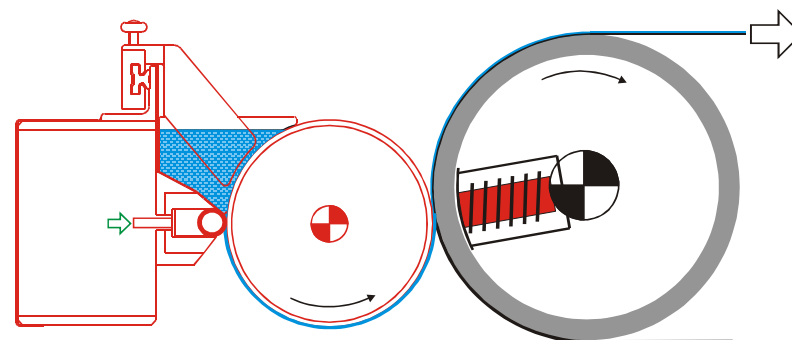
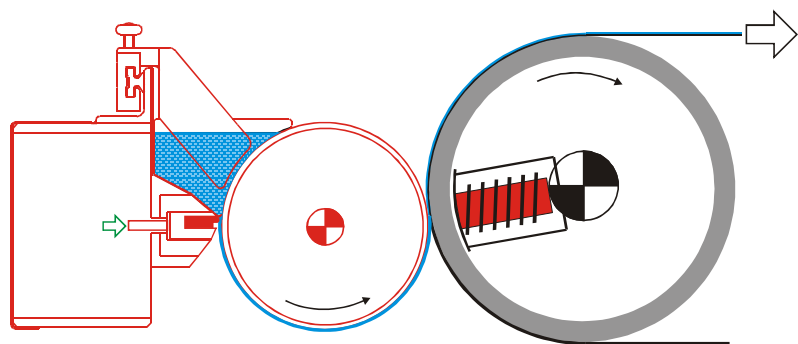


# Training illustrations

## Transfer coating

Coating with knife

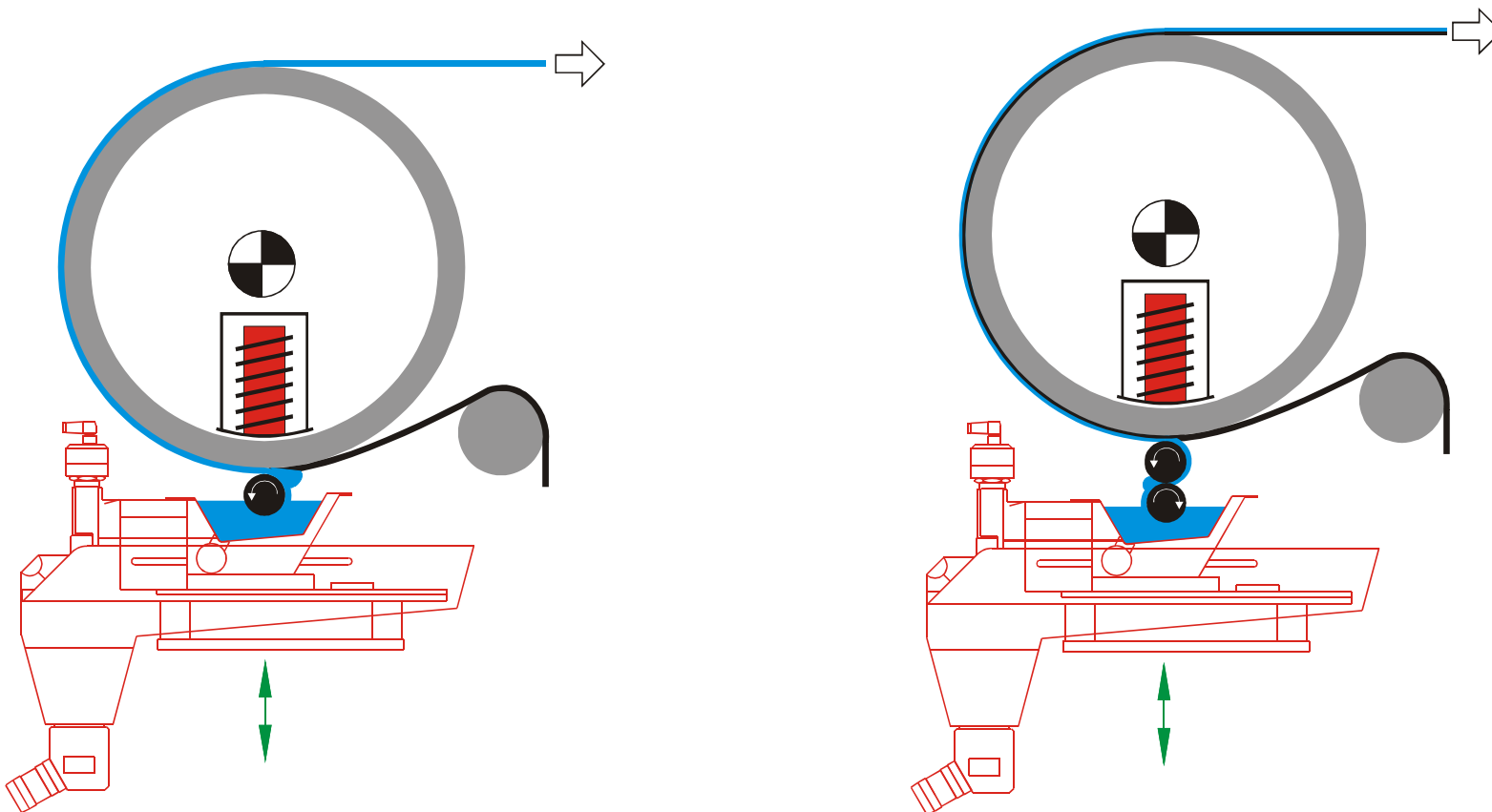
Coating with roll Ø 25 mm





# Training illustrations

GMA Low add-on system  
with one or two application rollers

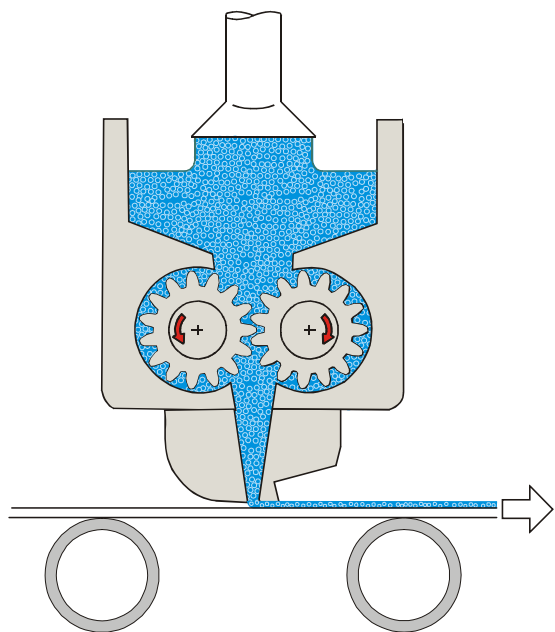




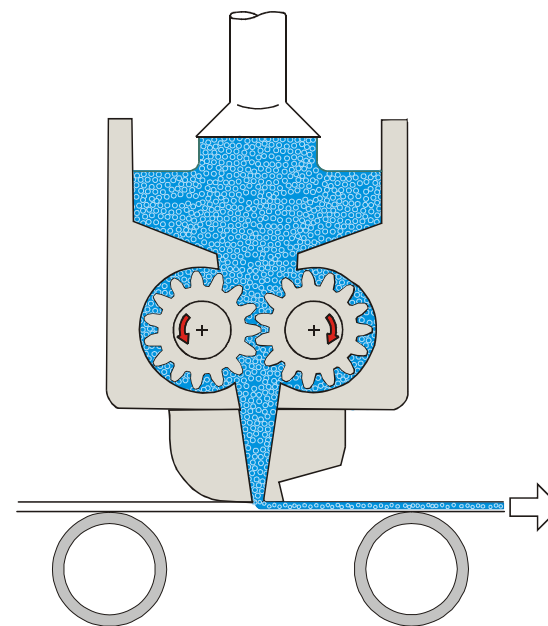
## Training illustrations

### VARIOPRESS coating system with two supporting bars

Foam layer on the fabric



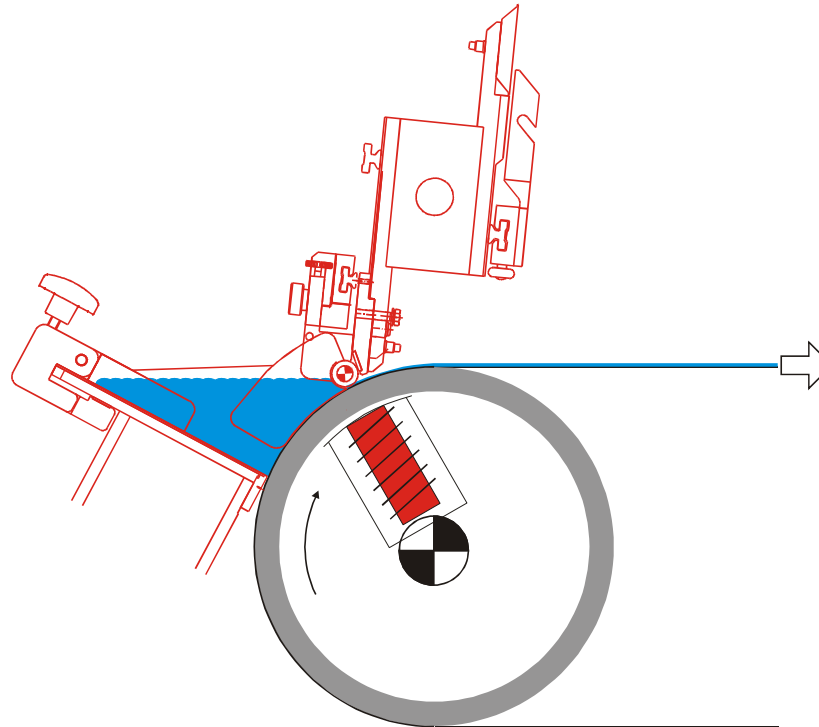
Foam penetration into the fabric





# Training illustrations

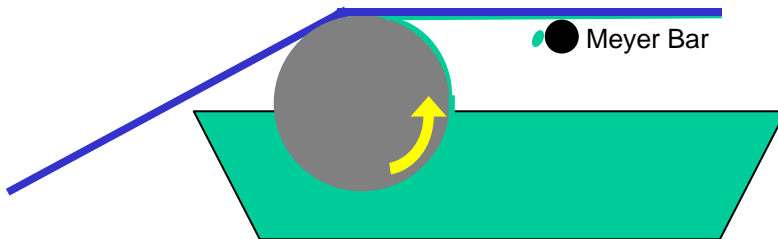
Magnet roller in 11 o'clock position



# *Roller systems*

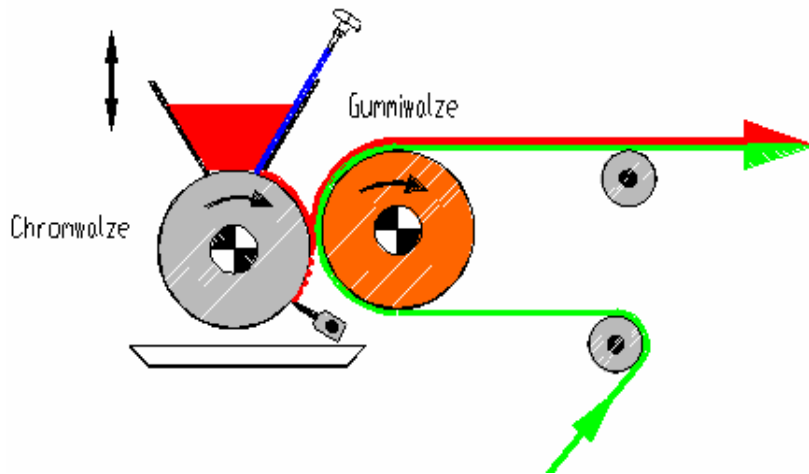


## Meyer bar coater



- For foil coatings or LCD-displays etc.
- Coating weight:  
min cw 5 g/m<sup>2</sup> max. cw 100 g/m<sup>2</sup>  
(depending on the bar design)
- Coating weight depending on viscosity  
and substrate surface

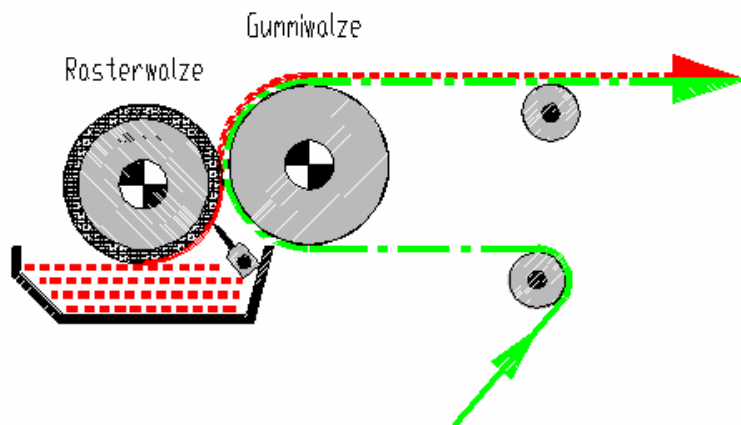
## Case knife coater



- Coating weight:  
min cw 5 g/m<sup>2</sup> max. cw 500 g/m<sup>2</sup>
- Consisting of one dipping roller and one rubber coated counter roller, the dipping roller is equipped with a paste basin
- Coating weight depending on viscosity and substrate surface

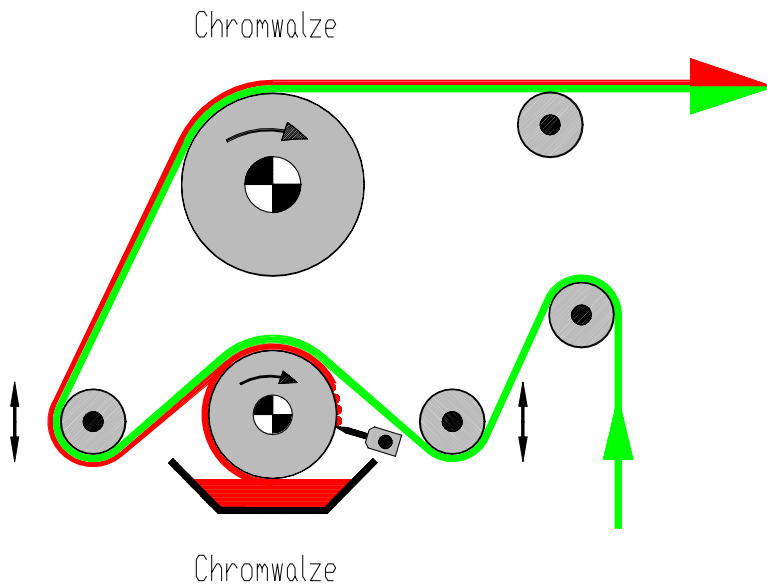


## Engraved roller coater



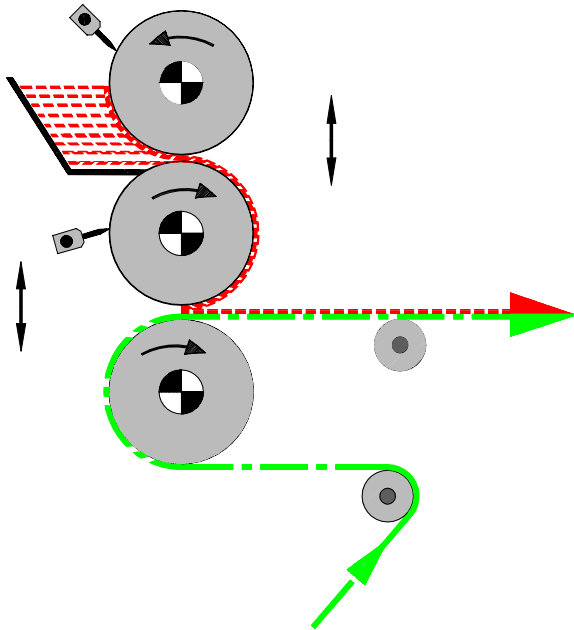
- Coating weight:  
min cw 2 g/m<sup>2</sup> max. cw 200 g/m<sup>2</sup>
- For direct coating
- Lacquering of coated substrates,  
nanocoatings, thin coatings of nonwovens
- Coating weight depending on viscosity  
and substrate surface

## Micro roller



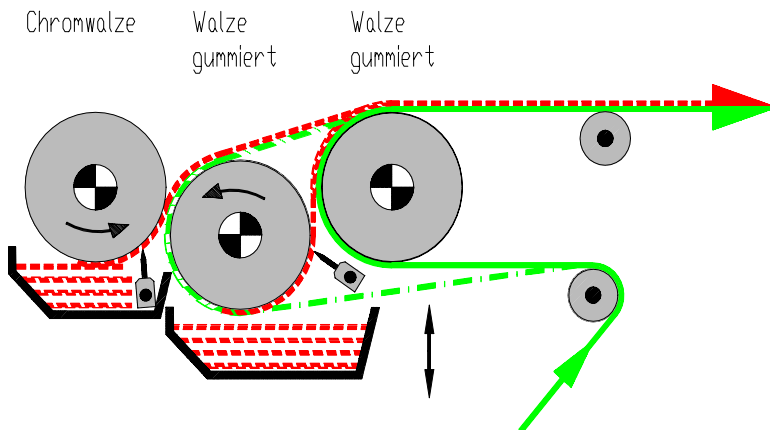
- Roll Coater: roller system placed under the substrate
- The roll coater consists of one plain roller, working as dipping as well as applicator roller
- Coating weight:  
min cw 2 g/m<sup>2</sup> max. cw 100 g/m<sup>2</sup>
- Coating weight depending on viscosity and substrate surface
- For thin coatings, upholstery, nonwovens, sol gel applications

## RRC reverse roll coater



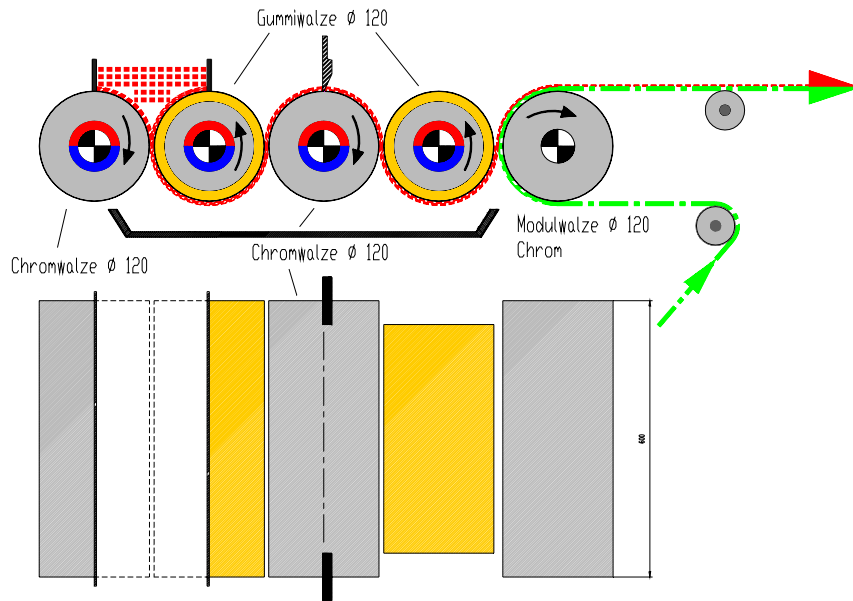
- Consisting of three independently driven steel roller, variably adjustable in speed and direction
- Paste application via paste basin which is placed at top roller, the second roller is used as a counter roller
- Three drive system
- For high viscosity
- Coating weight:  
min cw 5 g/m<sup>2</sup> max. cw 300 g/m<sup>2</sup>
- Coating weight depending on viscosity and substrate surface

## Engraved roller coater: Three roller coater



- Coating weight:  
min cw 2 g/m<sup>2</sup> max. cw 500 g/m<sup>2</sup>
- For indirect coating, using a transfer roller
- Coating weight depending on viscosity and substrate surface

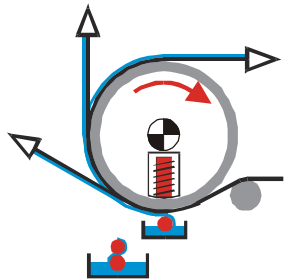
## Engraved roller coater: Five roller coater



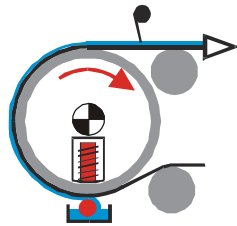
- Coating weight:  
min cw 0,3 g/m<sup>2</sup> max. cw 500 g/m<sup>2</sup>
- For indirect coating, using transfer rollers
- Five roller system, five drives
- Application:  
thin silicon coatings for transfer paper
- Coating weight depending on viscosity  
and substrate surface



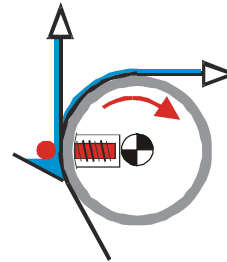
# Low add-on coating „GMA“



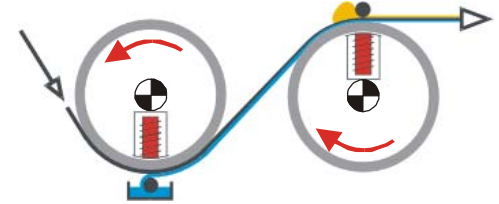
GMA low add-on system  
with 1 or 2 dosing rollers  
at 06:00 position



GMA low add-on system  
at 06:00 position  
and additional whisper blade  
with supporting roller

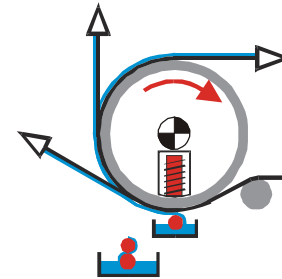
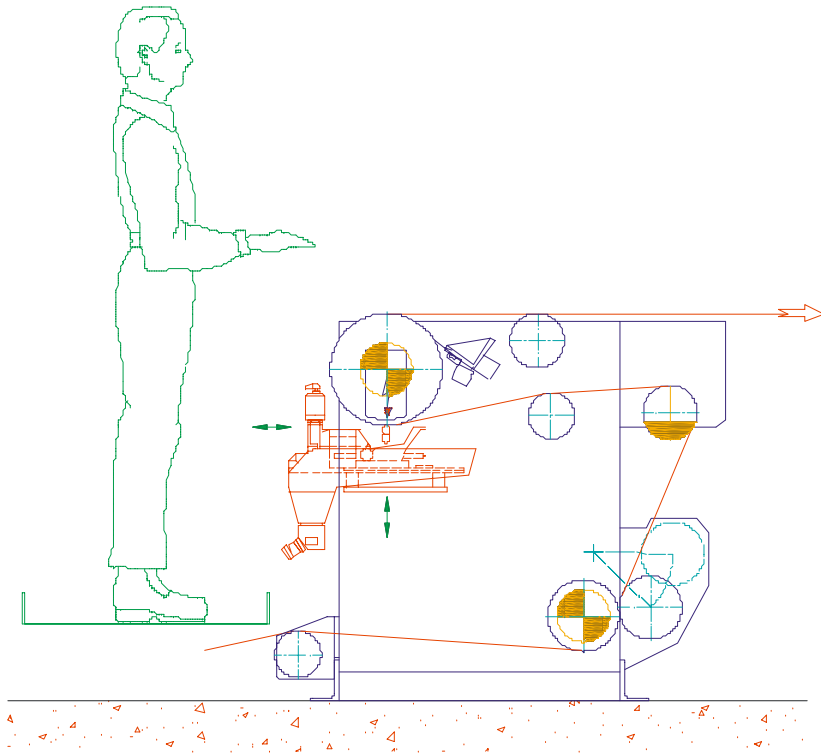


Uniform roller application  
at 09:00 position



GMA low add-on system  
at 06:00 position  
and roller application  
at 12:00 position

## Low add-on coating „GMA“



Lacquering of PVC tarpaulin,  
front-lits, back-lits, tents and foils  
with the **Magnoroll RMR-GMA-1RU**  
low-add-on-system  
in working width: 5,200 mm

cloth guiding after the application  
can be vertical or horizontal

## Low add-on coating „GMA“



## Low add-on coating „GMA“

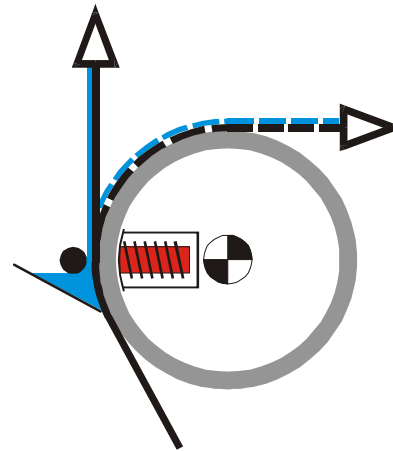
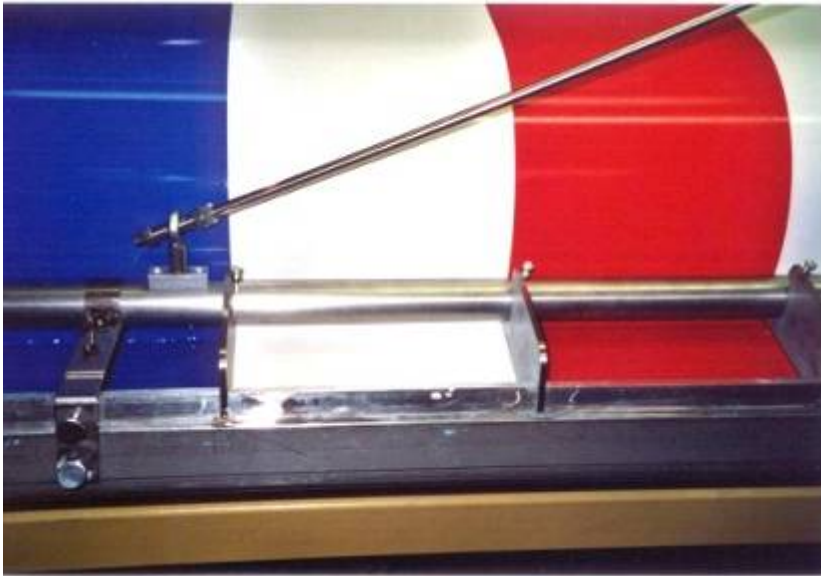


Selection of dosing rollers



Top coating application  
with additional whisper blade

## Uniform roller application

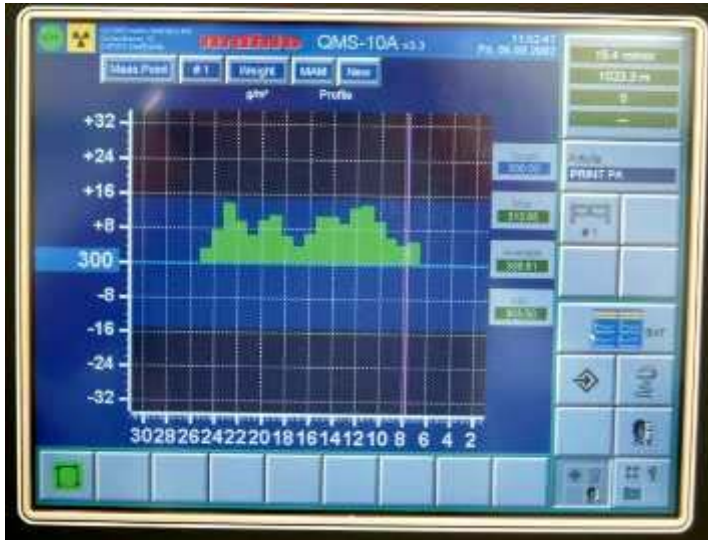


**Magnoroll direct magnet roller  
for top coating with tinted PVC**



# Direct coating systems

## Perfect fine adjustment options



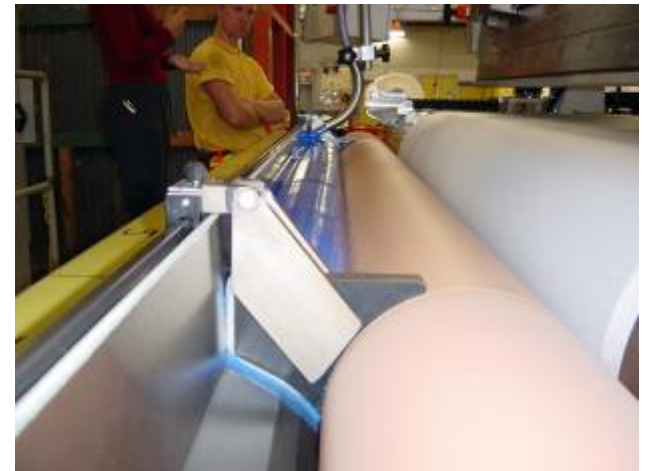
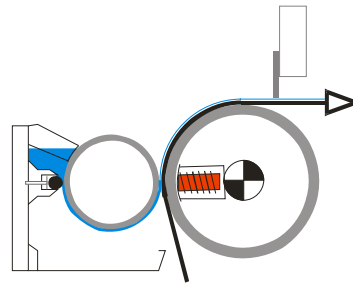
Trave Magnetica 1

01: 0%	09: 44%	17: 44%	25: 26%
02: 0%	10: 36%	18: 38%	26: 0%
03: 0%	11: 31%	19: 0%	27: 0%
04: 0%	12: 42%	20: 0%	28: 0%
05: 0%	13: 20%	21: 3%	29: 0%
06: 0%	14: 27%	22: 20%	30: 0%
07: 28%	15: 25%	23: 48%	31: 0%
08: 33%	16: 55%	24: 26%	

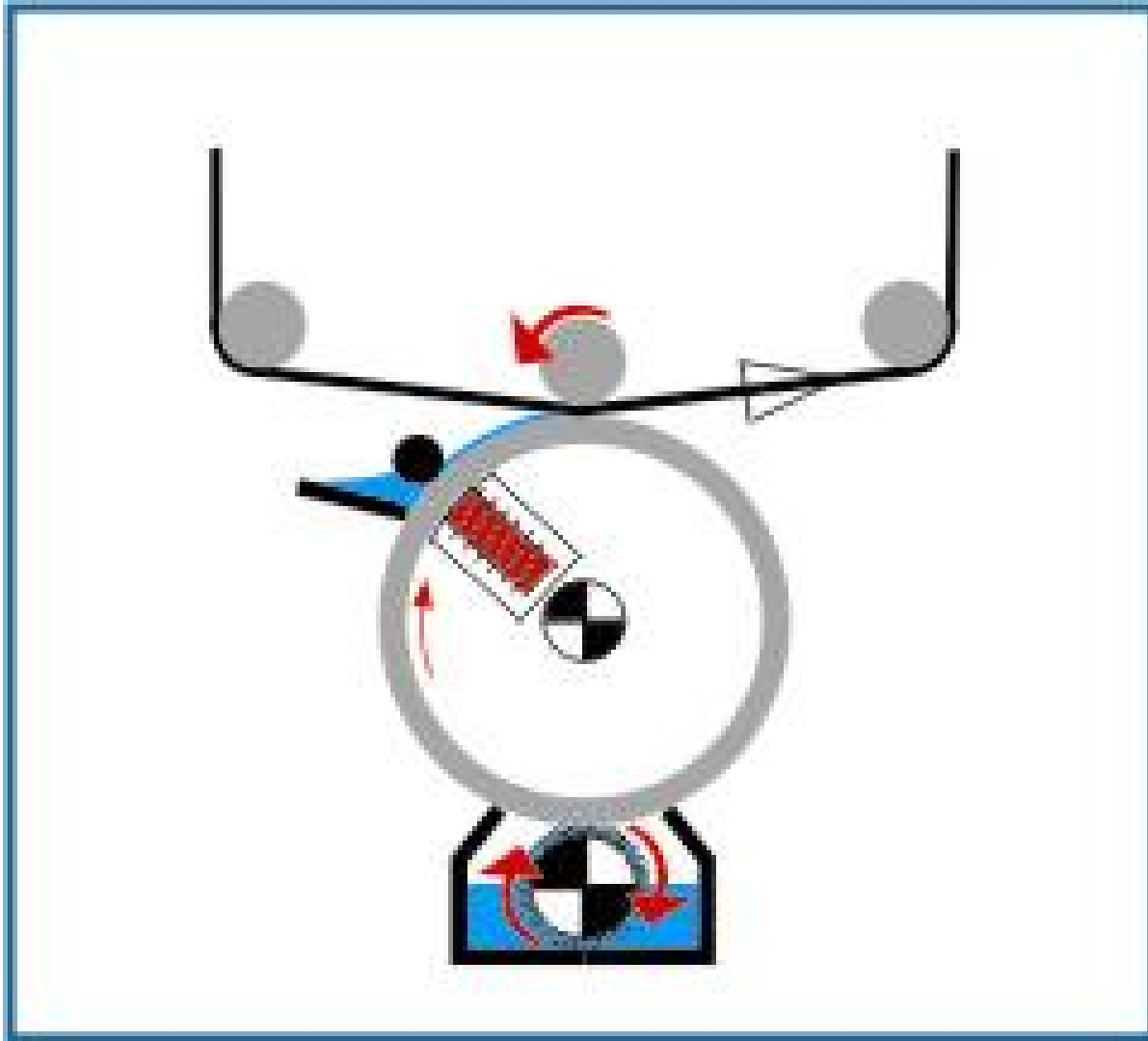
### Magnet power zone adjustment

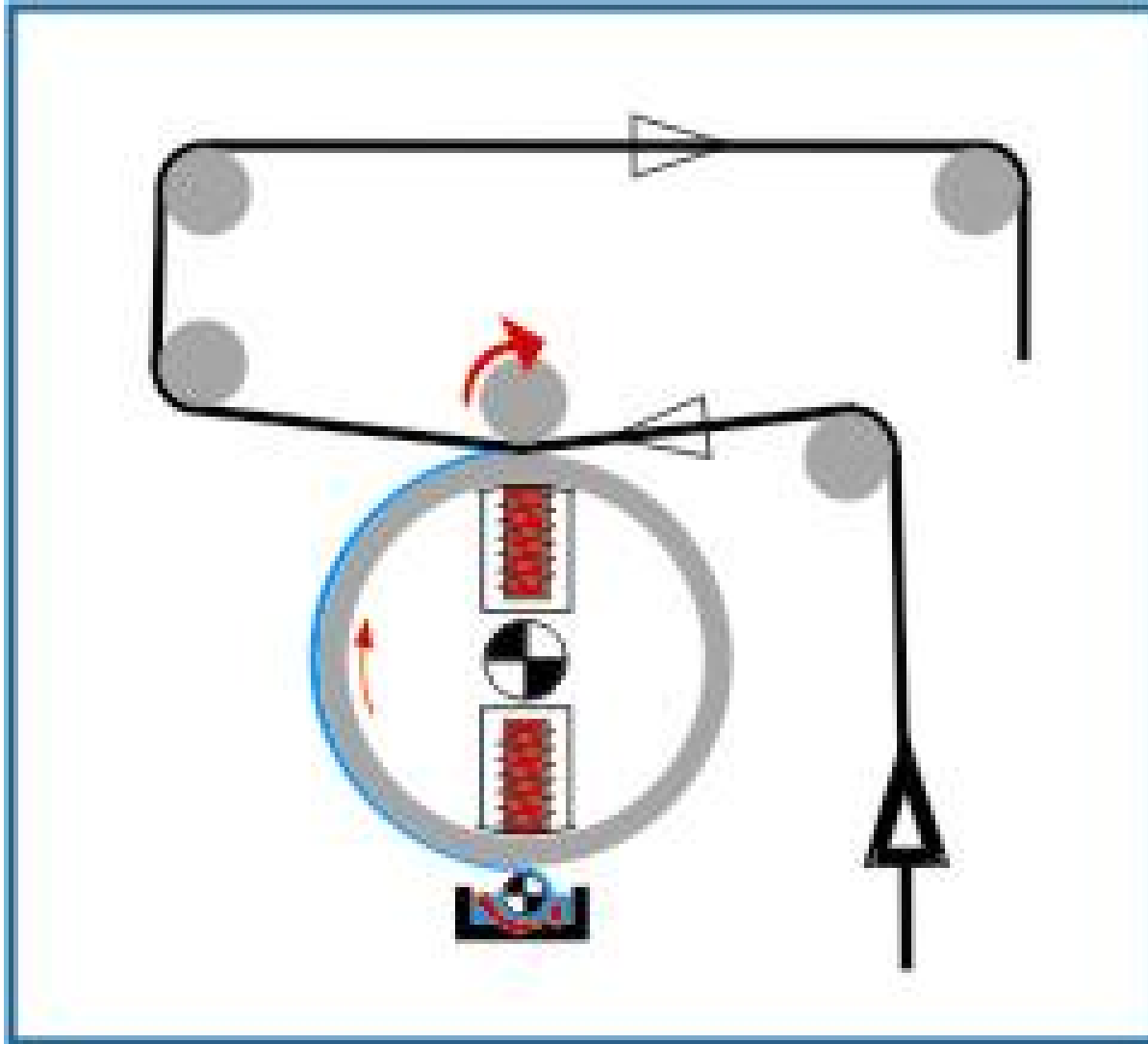
in combination with automatic thickness measuring device

## Transfer coating systems



**Transfer coating system** roller – roller  
direct application with smoothing squeegee





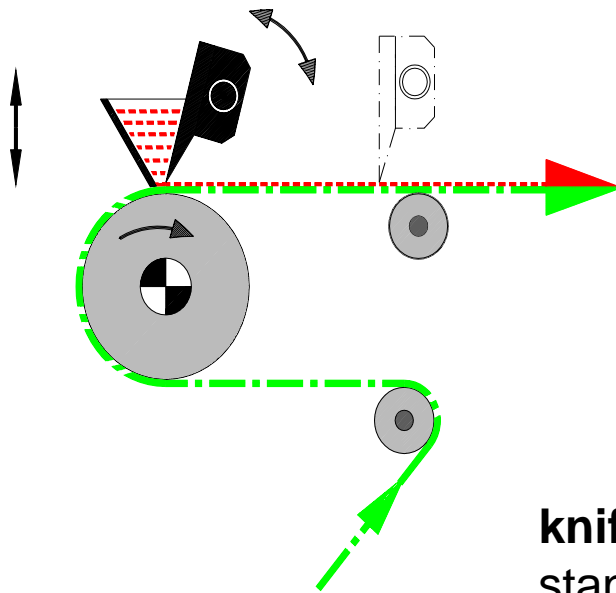
***Foam systems***





# Knife over Roll / Air Knife

- suitable for knife over roll and air knife
- universal coating system, used for a wide range of coating materials
- gap and angle of the knife are easy to adjust
- Coating weight:  
knife over roll: min cw 10 g/m<sup>2</sup>, max. cw 1,250 g/m<sup>2</sup>  
airknife: min cw 5 g/m<sup>2</sup>, max. cw 80 g/m<sup>2</sup>



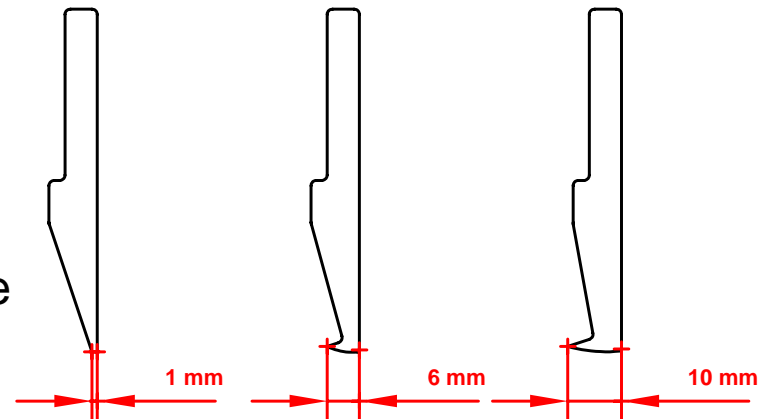
## knife designs

standard

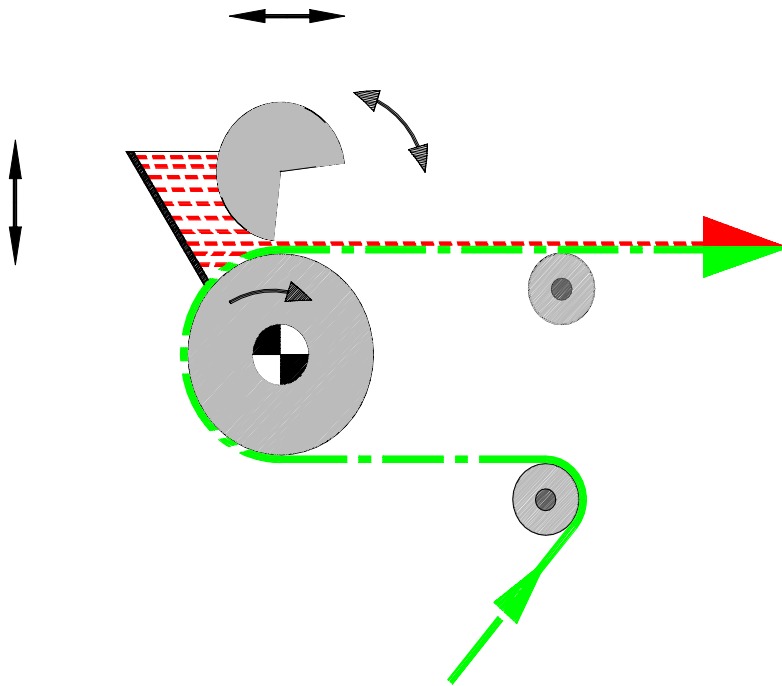
1 mm for air knife

6 mm for PU/Acrylate

10 mm for PVC



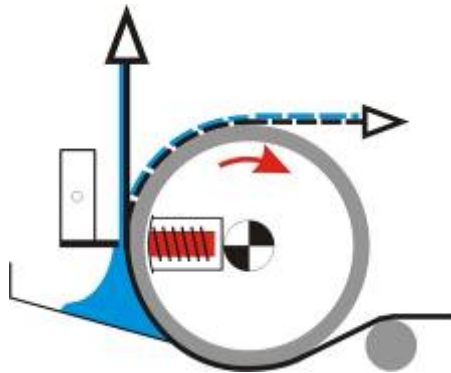
## Commabar coater



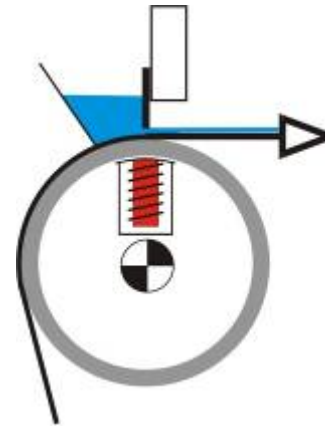
- The comma bar roller has a 45° cut out and is suitable for special coatings
- Used for batteries or fuel cells, f.e.
- Coating weight:  
min cw 5 g/m<sup>2</sup>, max. cw 1,250 g/m<sup>2</sup>

# Magnoknife coating

## Available layouts with knives



Knife over roll system:  
foam coating  
at 09:00 position



Knife on air system:  
foam coating  
at 12:00 position

# Magnoknife coating

## Knife coating examples

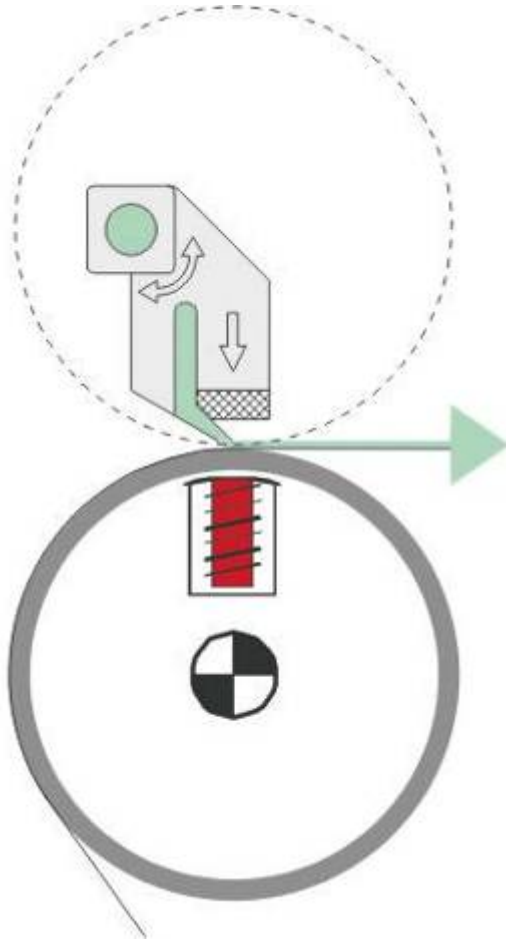


# Magnoknife coating

## Knife coating examples



## Magnojet coating with screen



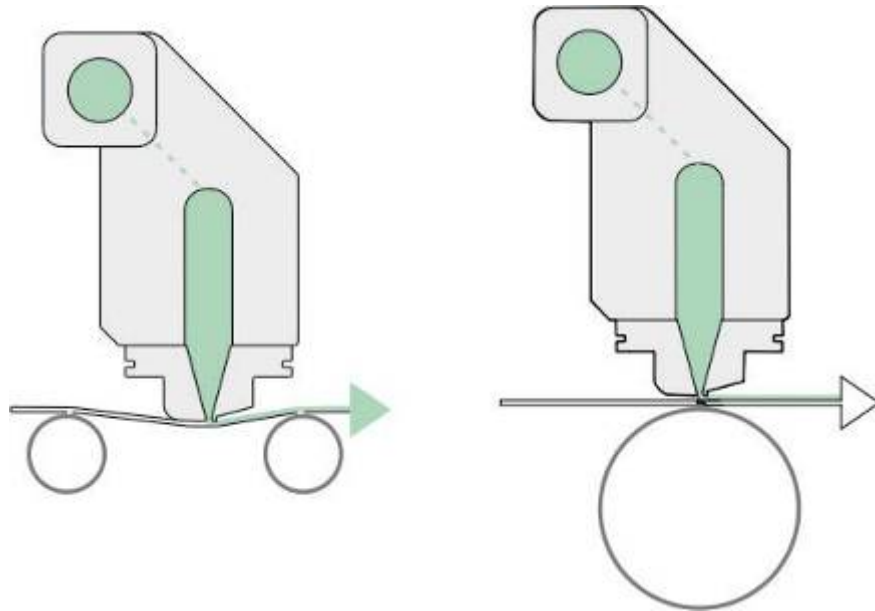
Closed foam application system

Pump, nozzle and **Magnojet** angle provide the required quantity of foam

With the rotary screen you may create any pattern on the foil



## Magnojet coating without screen

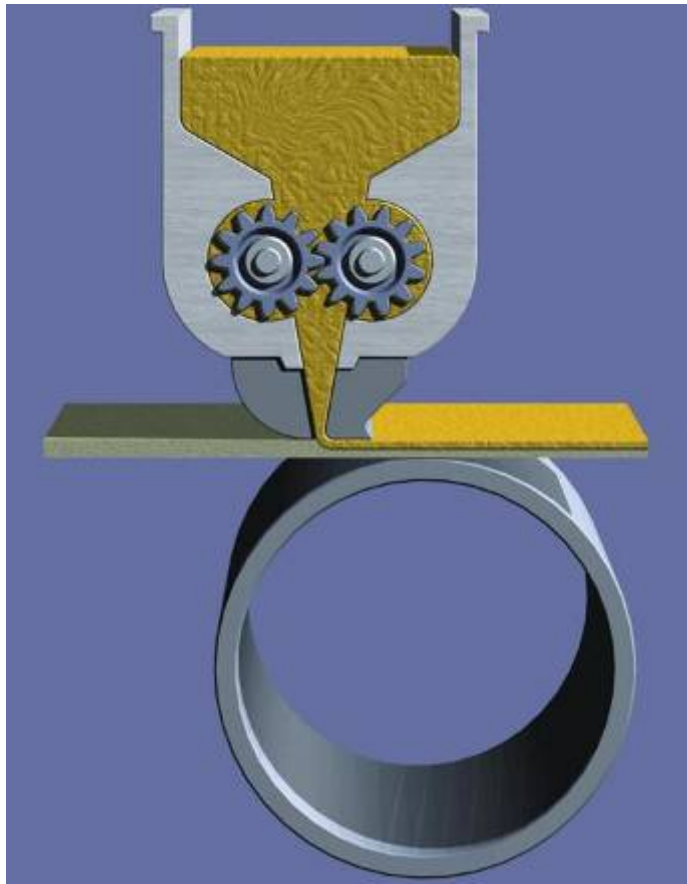


Closed foam application system

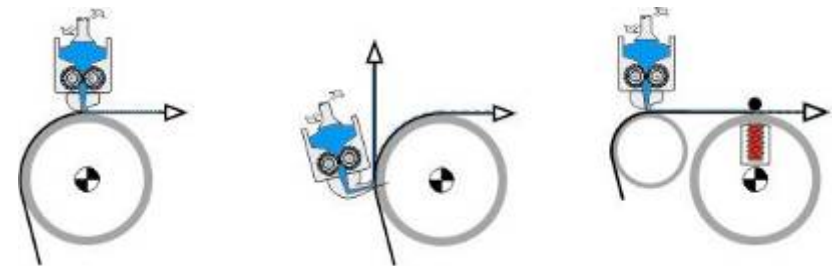
Pump, nozzle and **Magnojet** angle provide the required quantity of foam

Application may be executed either „on air“ or „over roll“

## Variopress coating



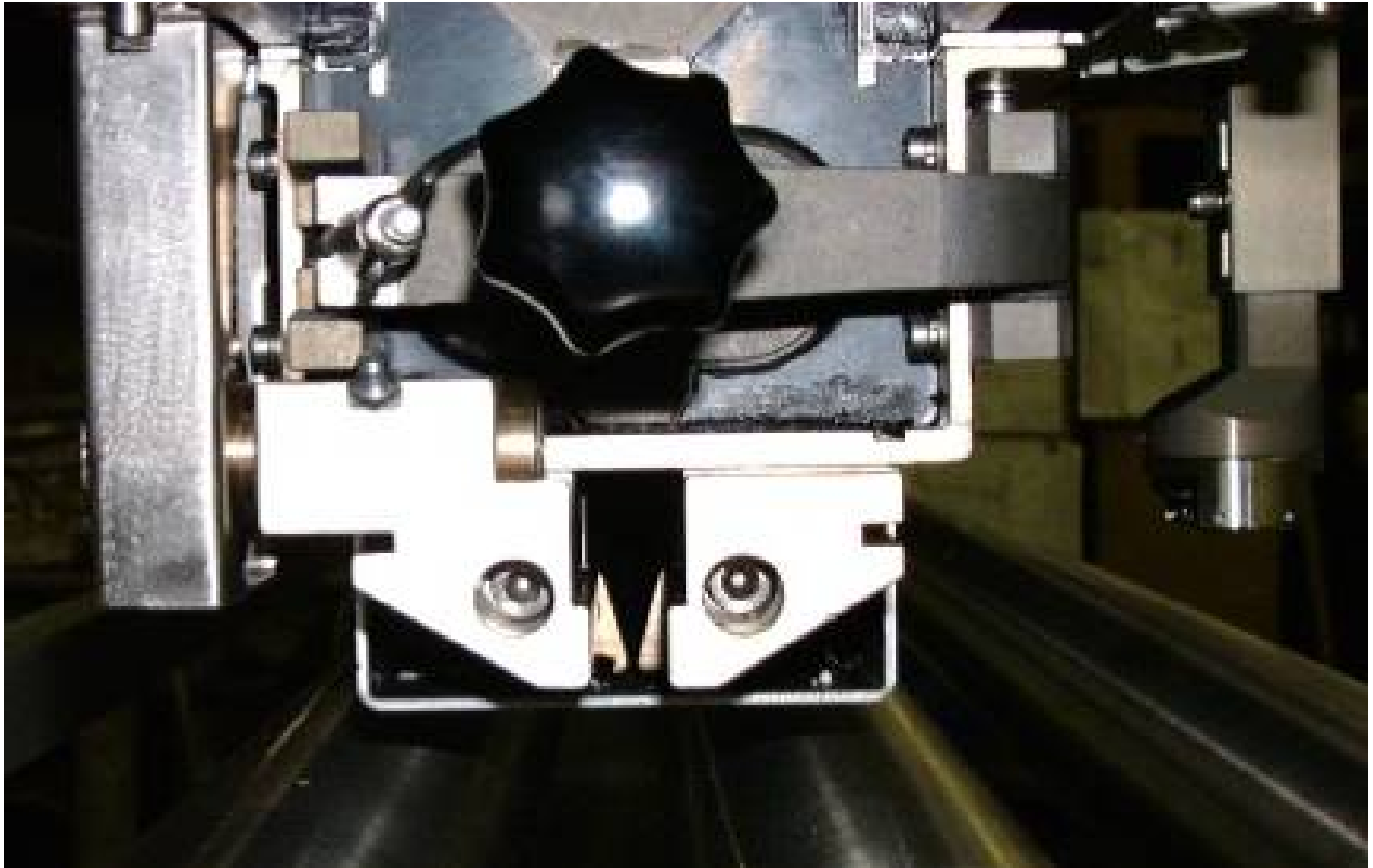
The **Variopress** toothed-roller application device for stable foam or pastes is ideal for contactless or exactly penetrating application





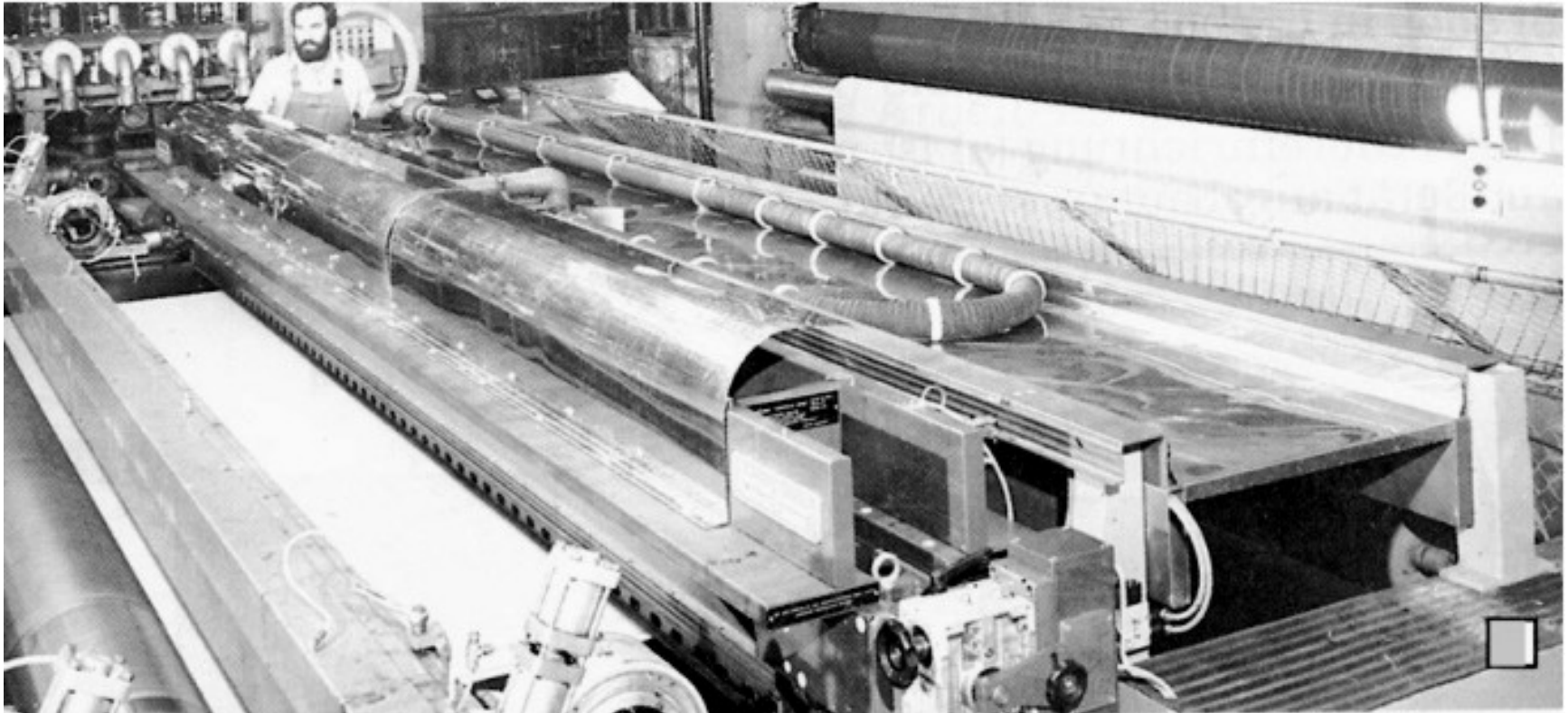
## Variopress coating





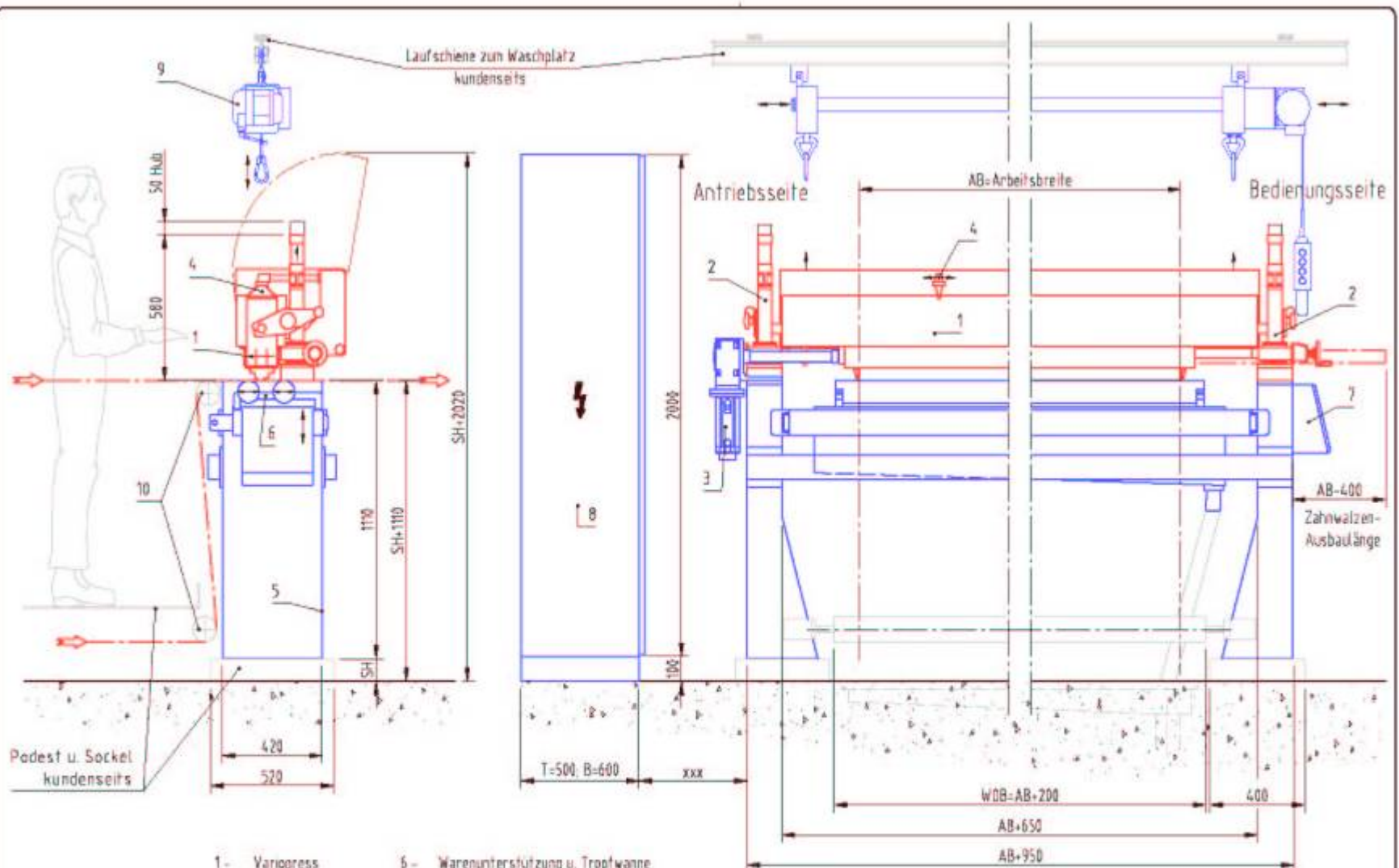


## Variopress coating



**Variopress** in 500 cm working width for fond-dyeing with foam  
in front of a rotary screen carpet printing machine





- 1 - Variopress
- 2 - Säulenhalterung
- 3 - Antrieb
- 4 - Schaumzuführung
- 5 - Maschinengerüst
- 6 - Warenunterstützung u. Tropfwanne
- 7 - Bedienpult
- 8 - Schaltschrank
- 9 - Ausbebe- u. Transporteinrichtung
- 10 - Warenlenkwalzen (Option)

Technische Änderungen vorbehalten  
subject to technical alterations

Alle Maße in "mm"  
all measures in "mm"

Datum: 18.08.2003	Zeichn. Nr.: 219820-001-3	Maßstab: 1:1	Bearbeiter:
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Schaum-Beschichtungsmaschine  
Type VARIOPRESS

Gebr. BN  
INTERNATIONAL BV  
Holland

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WITHOUT OUR PERMISSION

Datum: 18.08.2003  
 Proj. Nr.:  
 Name: G. Scherlau  
 Geprüft:



















