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CONVERTING FLEXIBLE PACKAGING

- Slitting and slitting requirements
- In-line lamination – solventless, wax, wet and dry
- Understanding coefficient of friction/slip
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FLEXIBLE PACKAGING FILM FUNCTIONS

- 1) Decoration/Information/Marketing (color, touch and feel, visibility, VDP etc.)
- 2) Packaging forming (sealing)
- 3) Product Transport (mechanical resistance, flexibility, elasticity etc.)
- 4) Product Availability (shelf, box, self-standing shapes, minimal space requirement etc.)
- 5) Product Protection/Safety (punching, rubbing, steaming/cooking/retort)
- 6) Consumer convenience (opening-closing, add-on, tearing, squeezing etc.)
- 7) Product Recyclability/Sustainability



FLEXIBLE PACKAGING PROCESSES

- 1) Printing
- 2) Coating (varnishes, primers)
- 3) Laminating
- 4) Inspecting/Slitting/Rewinding
- 5) Forming – Filling - Sealing



FLEXIBLE PACKAGING TYPICAL FLOWS

- 1) Print/Slit/Rewind (all-in-one-pass)
- 2) Print/**UV Laminate**/Slit/Rewind (all-in-one-pass)
- 3) Print/Laminate **8 to 24 hours storage** Slit/Rewind
- 4) Print Laminate **8 to 24 hours storage** Slit/Rewind



LAMINATION ADHESIVES

- 1) Solventless
- 2) UV Curable
- 3) Solvent

60% of the market
New
30% of the market

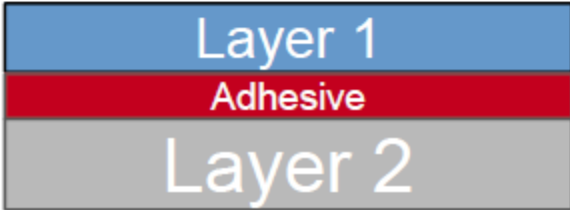
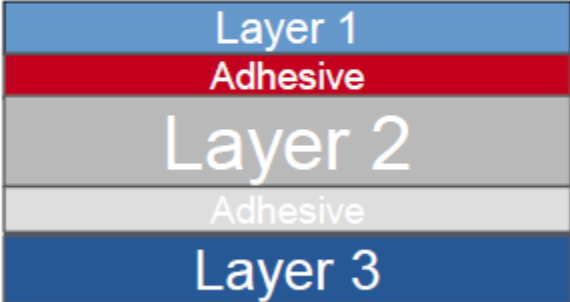
Easy / Less energy
Needs primer / Immediate cure
High speed

Average Bond Values
Average Bond Values
High Bond Values



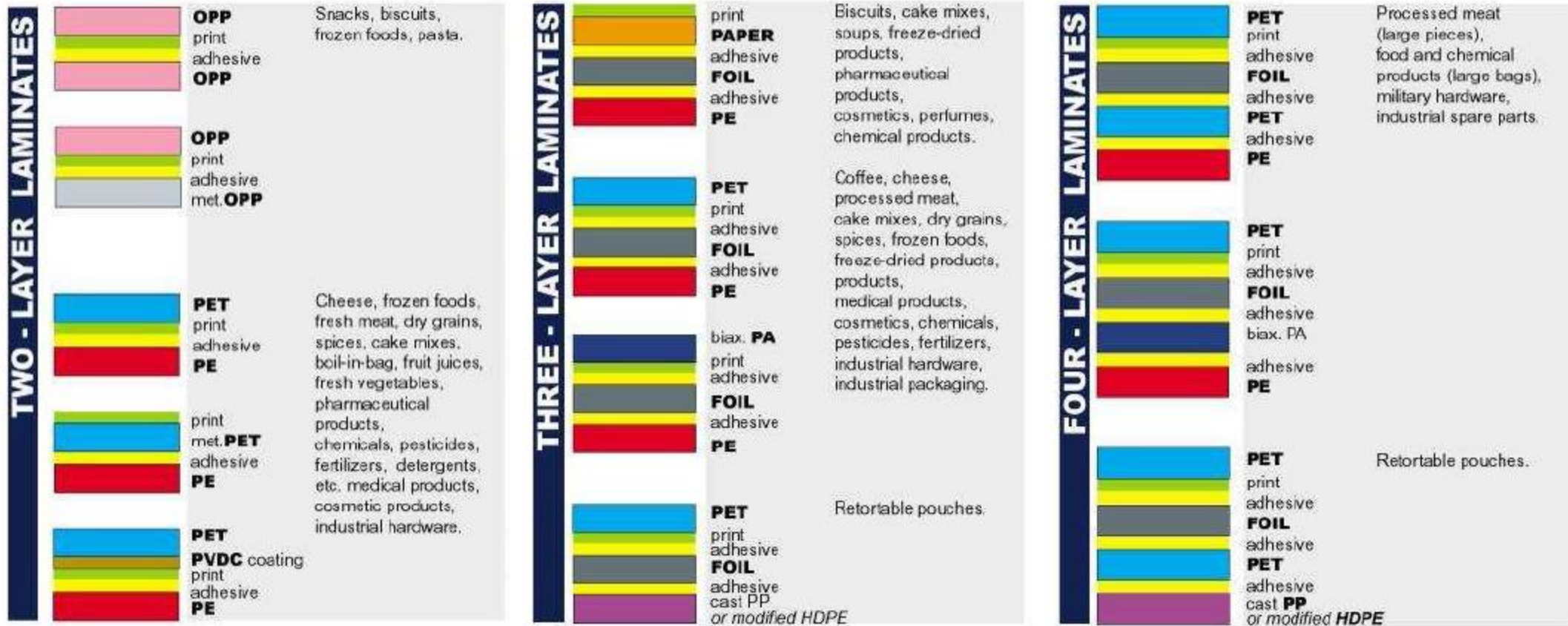
Converted webs for packaging

Multilayers

	<p>Two layers laminated products:</p> <p>DUPLEX</p>
	<p>Three layers laminated products:</p> <p>TRIPLEX</p>

Main end-users of converted webs

Laminates (examples)



Duplex lamination

Example: lamination of two substrates

Dry lamination

Packaging	Compound	Adhesive
Snacks, Pasta	Film/Film, Film/Foil	Solventless
Spices, Granulate for soups	Film/Foil	Solventless
Frozen food	Paper/Film, Paper/Foil	Solvent-based
Biscuits	Film/Foil	Solvent-based
Meat, sausages, cheese, Washing powder, Fresh fruit, Fish	Film/Film	Solvent-based / Solventless
Pharma products	Film/Film, Film/Foil	Solvent-based / Solventless
Blister for Pharma products	Film/Film, Film/Foil	Water-based / Solvent-based
Fruit juice	Film/Paper	Solvent-based
Cosmetic products, Blister for precooked food, Cremes	Film/Foil	Water-based

Duplex lamination

Example: lamination of two substrates

Wet lamination

Packaging	Compound	Adhesive
Cigarettes (inside wrap)	Paper/Foil	Water-based
Cigarettes (outside pack)	Paper/Film	Water-based
Chewing-gum	Paper/Foil	Water-based

DUPLEX LAMINATING MACHINE

CL 850D



Technical data

• Web width	650 to 1350 mm
• Mechanical speed	450 m/min
• Heating zone	3
• Winders reel diam.	max. 1000 mm
• Web preconditioning	

Available coating equipment:

- Rotogravure trolley
- Rotogravure trolley with chamber doctor blade
- Solventless trolley
- Solvent-based flexo trolley
- Smoothing bar
- Pressurized chamber doctor blade

Applications:

- **Solvent-based** and **water-based**
- **Solventless**
- **Insetter** (print/coating or pre-printed material)
- **High barrier** coating applications
- **Cold Seal**
- Coating on **thin aluminium**

COMPACT LAMINATOR

CL 750D



Available coating equipment:

Rotogravure trolley
Solventless trolley
Smoothing bar

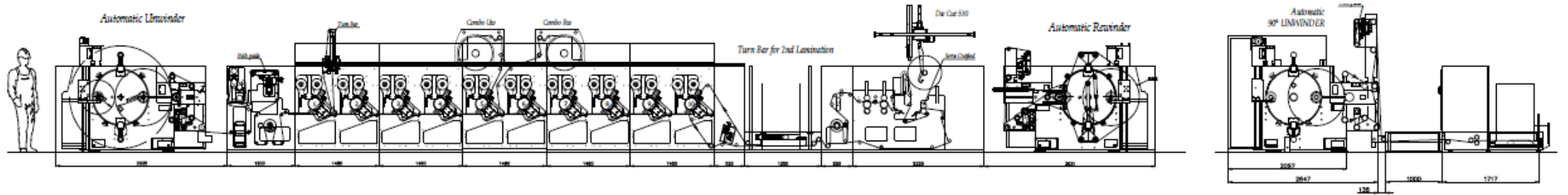
Applications:

- **Solvent-based** and **water-based**
- **Solventless**
- **Insetter** (print/coating or pre-printed material)
- **High barrier** coating applications
- **Cold Seal**

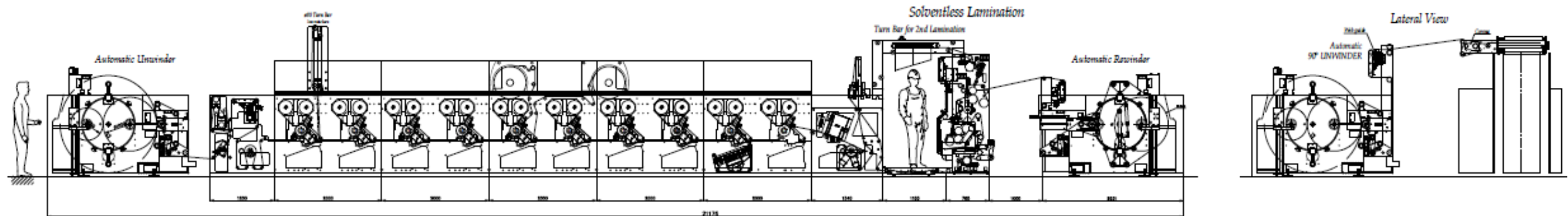
Technical data

• Web width	400 to 1350 mm
• Mechanical speed	450 m/min
• Heating zone	3
• Winders reel diam.	max. 1000 mm
• Web preconditioning	

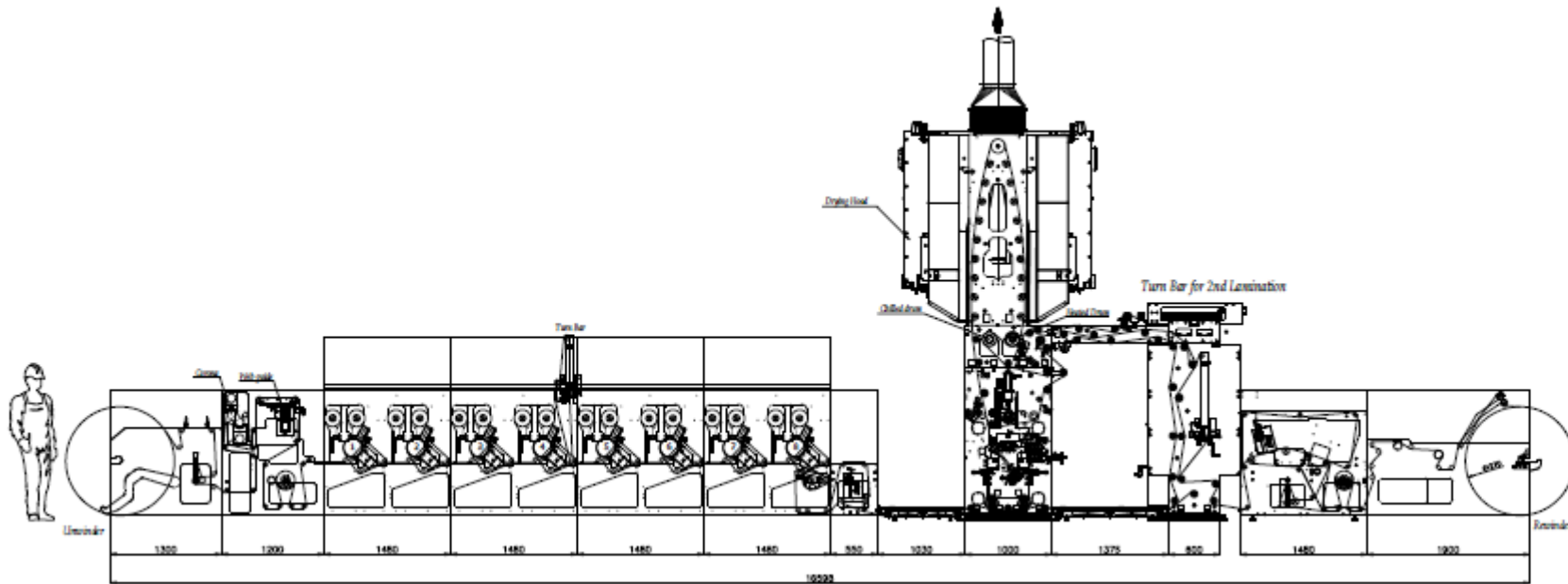
In-Line Lamination UV



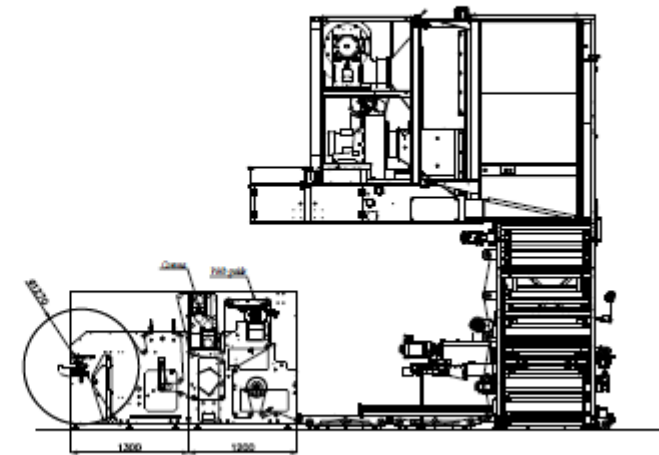
In-Line Lamination Solventless



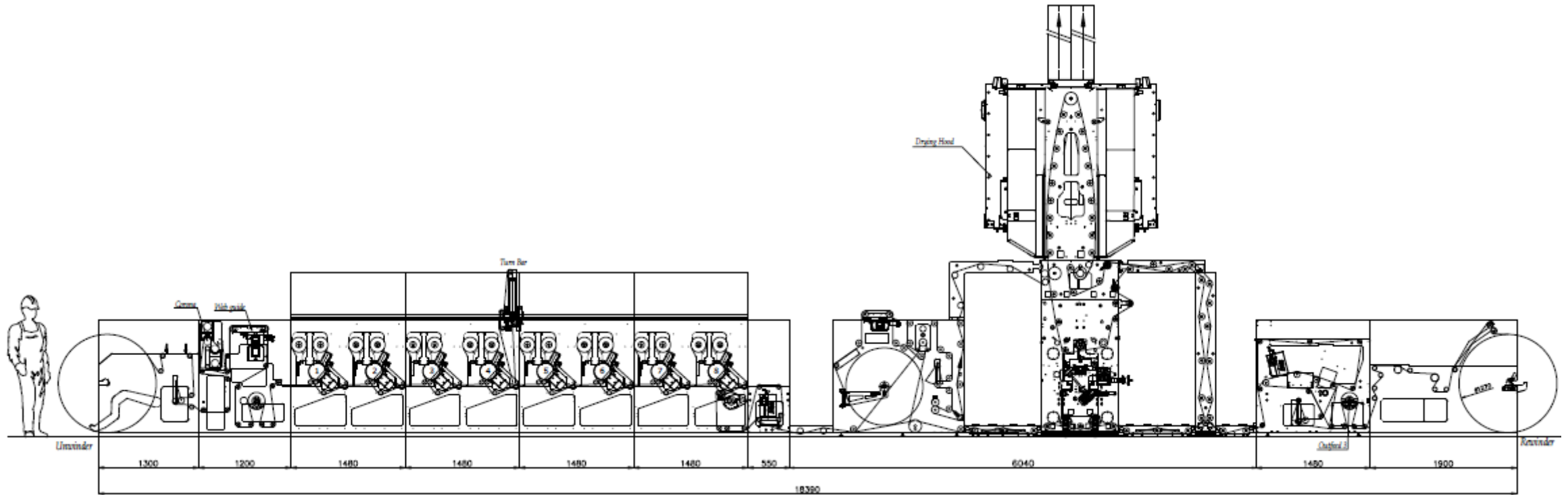
In-Line Lamination Dry (gravure)



Lateral View



In-Line Lamination Wet (gravure)



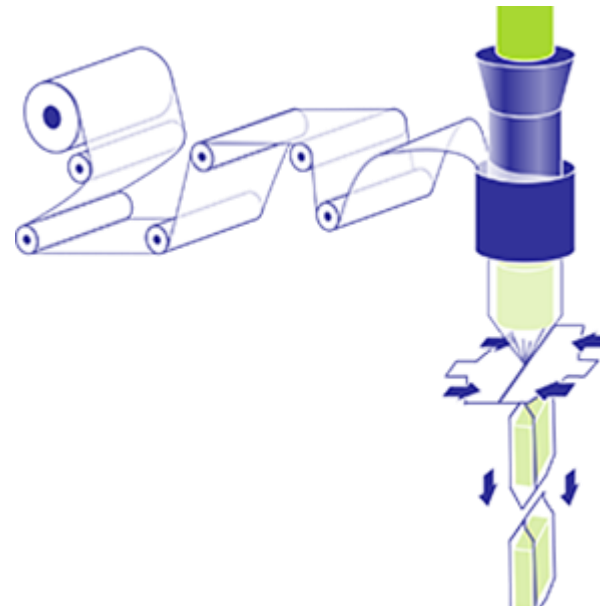
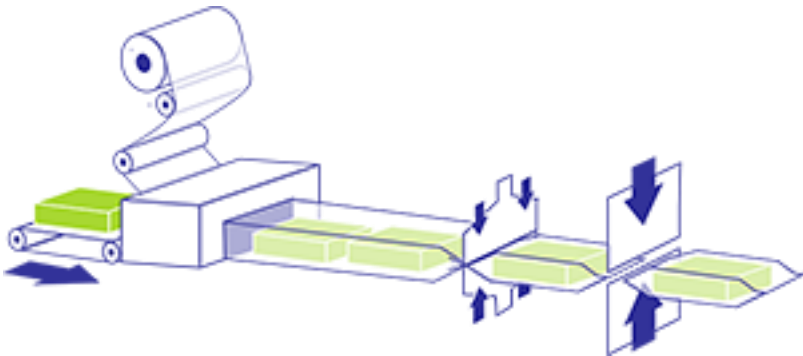
HFFS vs VFFS Machines (Horizontal or Vertical Form-Fill-Seal)

There are two types of FFS machines for flexible packaging: horizontal and vertical (HFFS and VFFS respectively).

The main difference between the two is how the machines dispense contents into the flexible packaging. Due to their different structures, HFFS and VFFS machines are tailored towards certain product types – see which machine will work best with the product of your customer

HFFS: (belt) Best suited for solid, single-item products that are easily contained and handled like candy bars, small toys, bar soaps, etc.

VFFS: (gravity) Vertical filling is best for products that are loose, granulated, mushy, or difficult to handle manually. VFFS machines work great for sugar, salt, liquids, chips, creams, oils, and gels.



Coefficient of Friction (COF)

Coefficient of Friction – “COF”

Controlling COF gives processors the ability to optimize performance and avoid problems in forming, transporting, and storing of packages.

- In HFFS (horizontal form fill and seal) systems, too much friction of the sealant side of the film can lead to film dragging or jamming as it passes over metal plates.
- In VFFS (vertical form fill and seal) systems, too much friction of the sealant side of the film can cause poor film feeding over metal forming collars, inconsistent package sizes, and squealing.
- In either system, too much friction can result in lateral slipping that leads to poor seals (leakers).
- Too little friction on the outside can cause packages to slip or fall-off-of inclined conveyor belts.
- Too much friction on the outside can slow packages' progress down delivery chutes.
- Too little friction on the outside can result in packages sliding off of stacks or pallets.

COF values range from 0.00-1.00, with lower COF values indicating lesser resistance to sliding, or higher “slip.”

- COF < 0.25 is considered LOW COF, HIGH-SLIP**
- COF > 0.45 indicates HIGH COF, LOW/NON-SLIP**

COF is reported in two values: static (μ_s) - the force needed to begin movement, and kinetic (μ_k) – the force required to maintain movement. Generally, Kinetic COF is used for roll films. Static COF is of greater concern for stacked or palletized items.

Customized COF's are achieved by adding a “slip agent” to a film resin during production. This is incompatible with the film resin, and will migrate to the surface of the film over time.

COF can be affected by a number of factors including antiblock additives, corona treatment, antistats, inks, varnishes, adhesives.

If you did not have enough.....

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THANK YOU VERY MUCH !