

2009 Flexible Packaging Summit

**Consumer Packaging Solutions for Barrier
Performance Course**

Why Choose Blown, Cast or Lamination Processes to achieve Barrier Properties?

Presented by:

Benjamin Prinsen

US Sales Manager

**Macro Engineering & Technology
Inc.**

Extrusion Processes

- Blown Film
- Cast Film
- Extrusion Laminations:
 - A) onto a substrate
 - B) 2 separate webs

Other Extrusion Processes

- Water bath cast
- MDO films
- Biaxially Oriented Films:
 - A) Blown, double or triple bubble
 - B) Cast, tentered

The “Why” Question

- Flexible barrier package to meet market needs
- Optimum film properties from coextruded multilayer structures
- High value added film for the best Return On Investment

Real Consideration

- Film properties and barrier required versus cost of the film structure and competing alternatives
- Must be price effective in the marketplace

How do we choose one type of film and its machinery?

- Packaging needs/end market application
- Available films, competing alternatives
- Choice of resins
- Machinery and investment
- Recyclability

Specialty Film to meet Market Needs:

- Barrier – Oxygen, Moisture, Gas, Oil and Aroma
- Optical – High clarity, low haze
- Mechanical – Stiffness, Strength (Tensile, Tear, and Impact)
- Sealability – Wide range and means
- Printability
- High and Low Temperature applications

Choice of Resins:

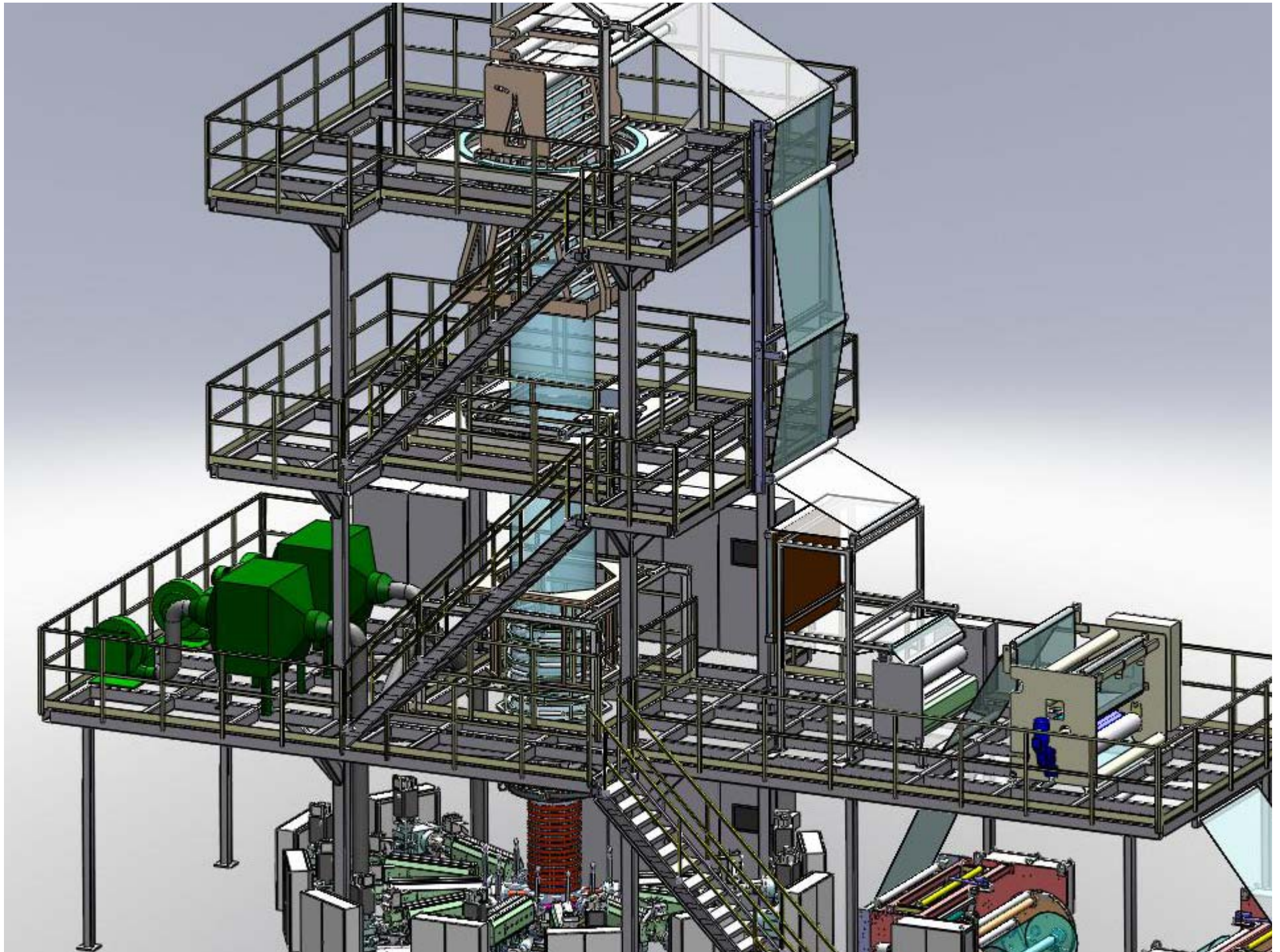
- Different polymers have varying properties
- Need to choose polymer materials that are compatible (tie resins)
- Need to assess alternative films or barrier materials. Must be cost/price effective in the marketplace

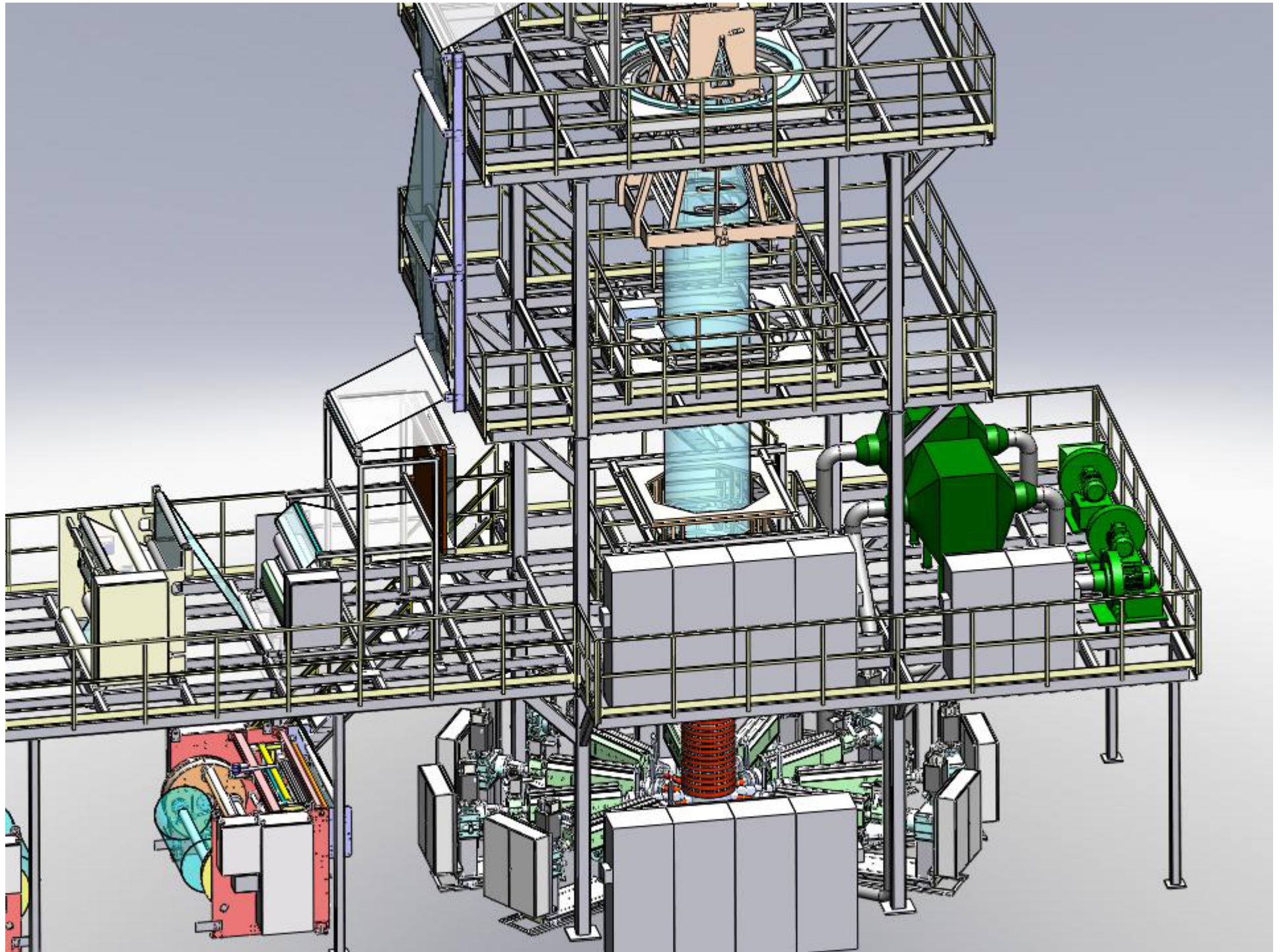
Resins continued:

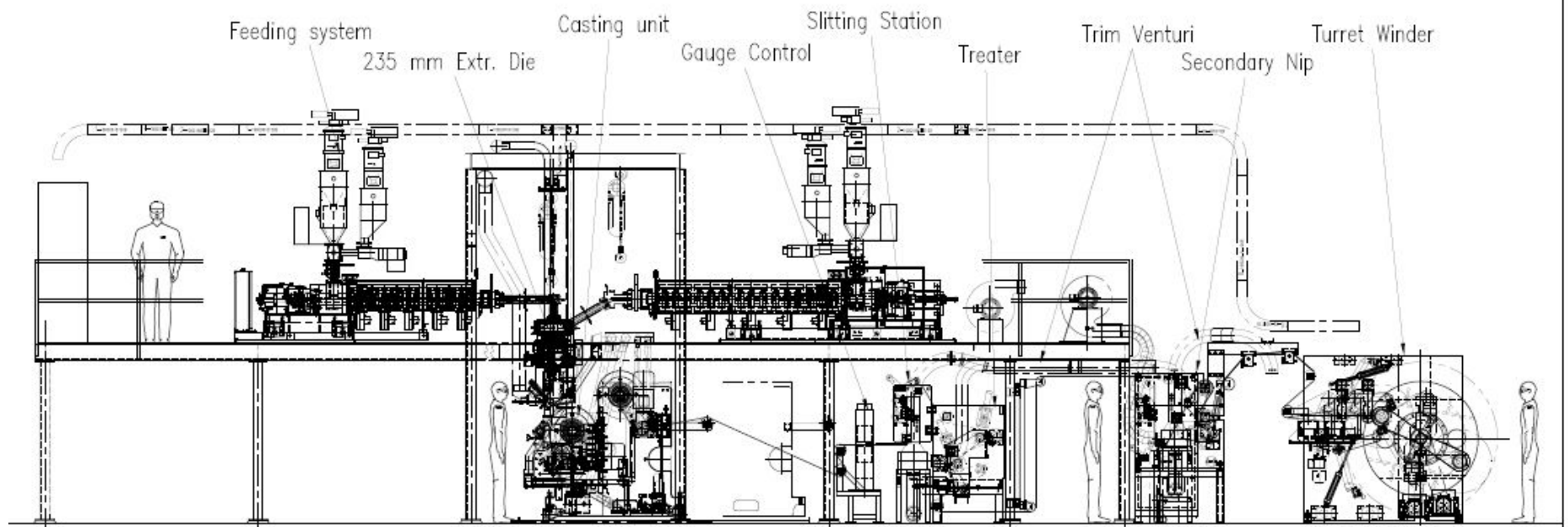
- Need to know end use of film, i.e., stand up pouch, deep draw, thermoforming, refrigeration, metallizing, outdoor, etc.
- Are FDA approvals for direct food contact required?
- Master Drug Files?

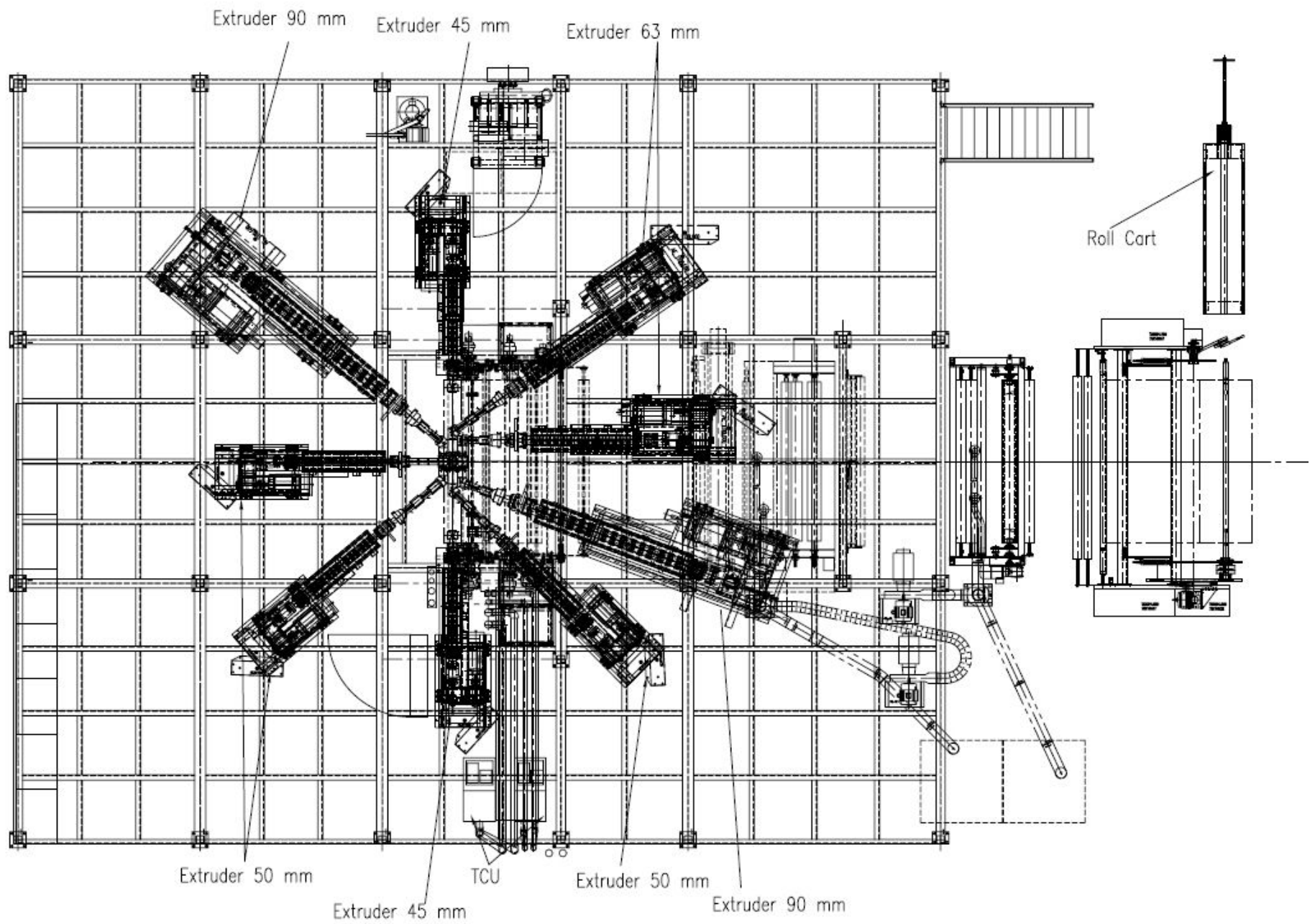
Machinery Choices

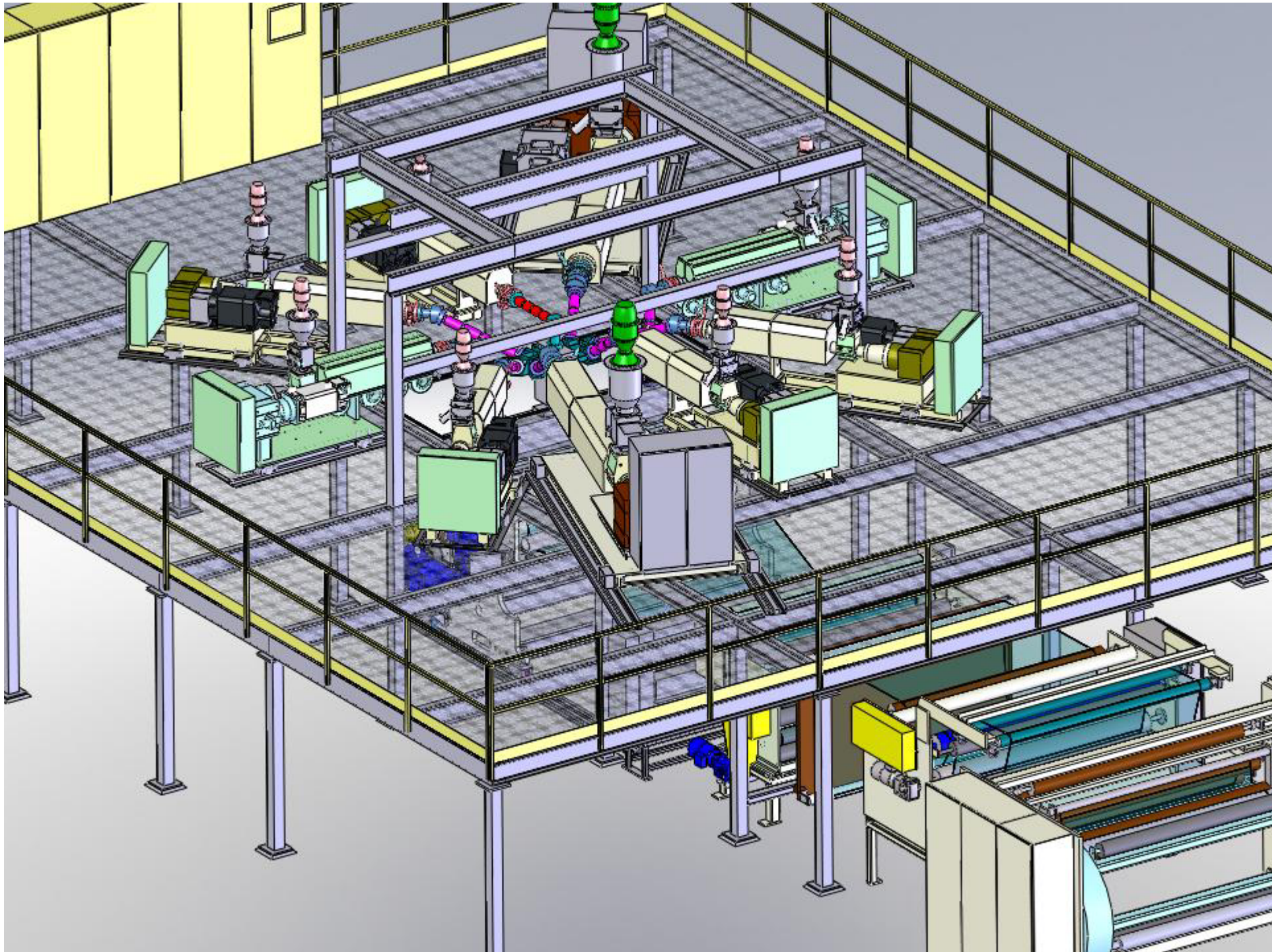
- Blown Film
- Cast Film
- Extrusion Lamination





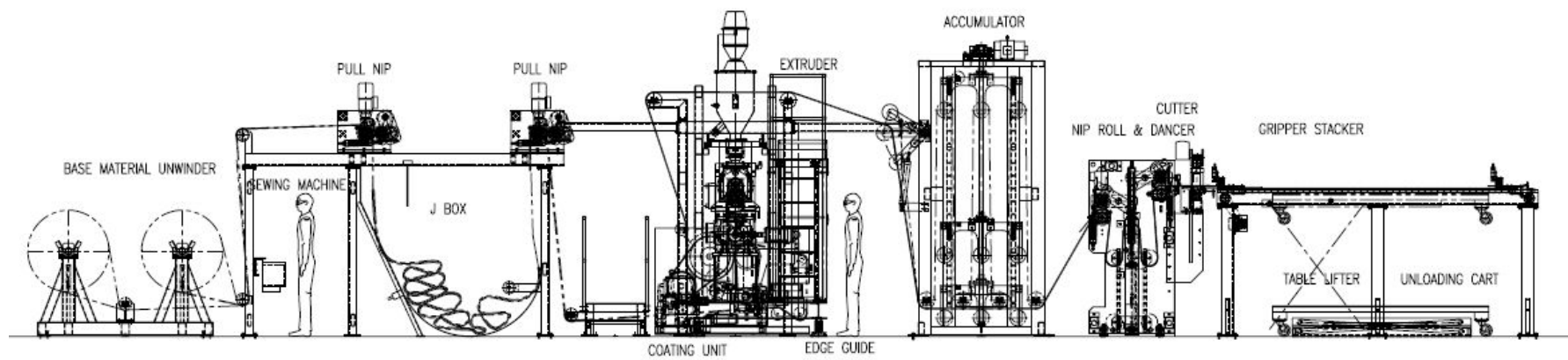


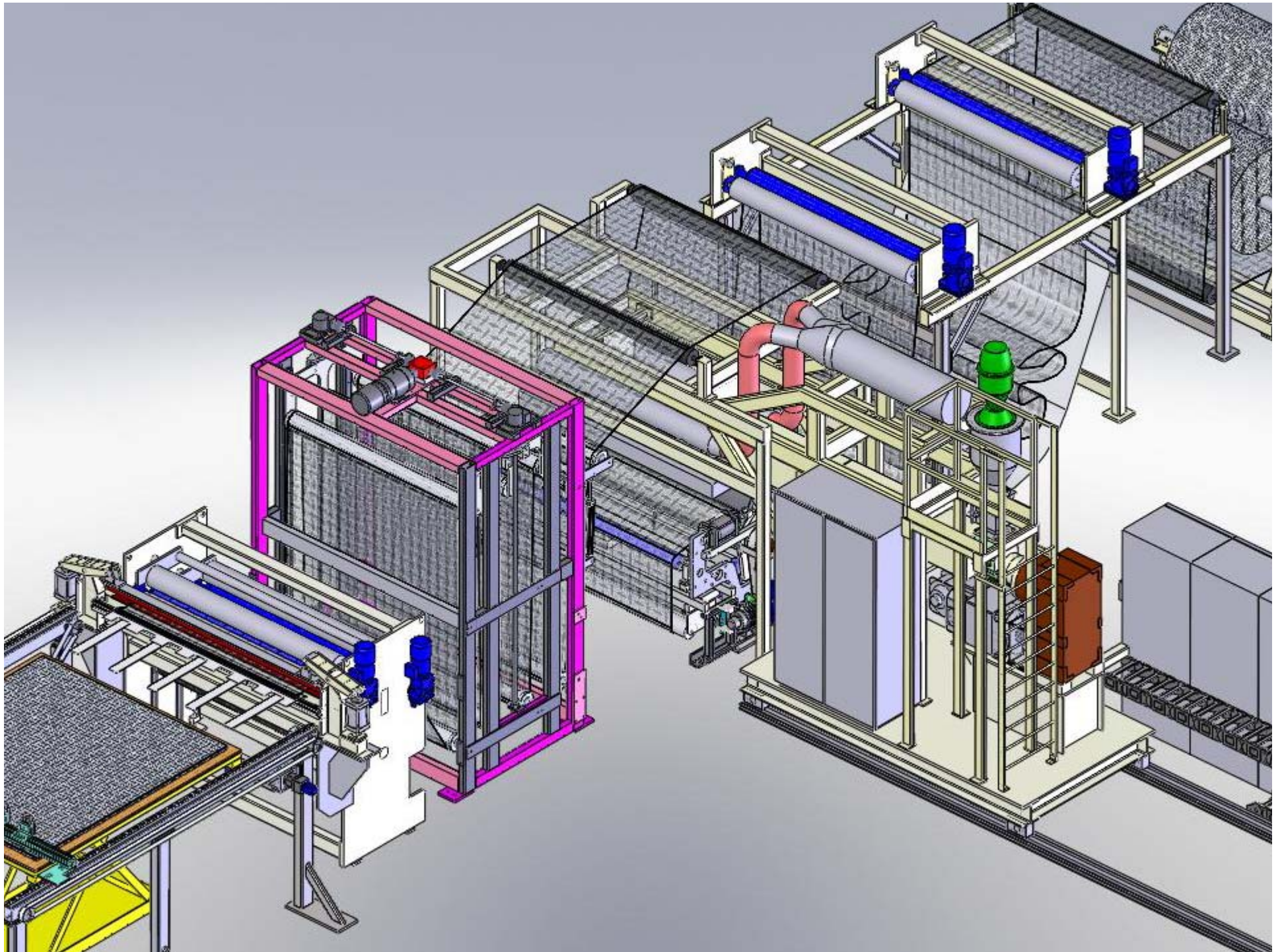




Lamination Possibilities:

- May use a substrate and extrude onto this or extrude 2 separate webs (may be with interleaf scrim)
- Substrate may simply be carrier for embossed film
- Reverse print for stand up pouch





Comparison of Processes

- In this section we will look at various film properties or characteristics and compare them across the three processes; blown, cast and extrusion lamination.

Mechanical Properties:

- Blown – more balanced MD & TD orientation. Blow up ratio dependent.
- Cast – uniaxial drawdown, web neck in
- Lamination – like Cast. However, if extruded onto a substrate, the properties of the substrate affect the overall properties.
- Choices of substrates include: blown, cast, sheet, biaxially oriented film, paper, foil, etc.

Crystallization and Optical Properties:

- Blown – more because of slower air cooling
- Creates denser, stiffer, better barrier, higher haze
- Cast – less because of faster contact, water cooling
- Creates glossier film with less haze. It is less dense, softer (soft drapeable film).
- Lamination – like Cast. Substrate dependent.

Gauge and its uniformity:

- Blown – thinner 0.5 – 10 mils, less uniformity +/- 5 – 10% or more
- Cast – better uniformity +/- 2% or better, no restrictions on thickness
- Lamination – Like Cast.

Control Systems & Auto Profile:

- Blown – Lower speed, less sophisticated.
- Auto Profile with die or air ring.
- Cast – Higher speed, more sophisticated.
- Auto Profile die only.
- Lamination – highest sophistication.
- Auto Profile die only. Gauge substrate & webs (if required).

Outputs:

- Blown – from 5-24+ lbs./circumferential inch of die
- Cast – higher, 15-30+ lbs/hr/web inch
- Lamination – like Cast.

Web Variability:

- Blown – bubble (web) size adjustable
- Less trim, changeover and scrap
- Cast – Faster speed, fixed web width
- More trim, neck-in
- Lamination – like Cast. More scrap/trim than Blown.

Resins & Processing:

- Blown – Higher MI and melt strength
- Lower process temperatures (190°C, 375°F)
- Cast – Lower MI and melt strength
- Higher temperatures (245 °C, 475 °F)
- Lamination – like Cast.
- Independent temperature, put dissimilar materials together.

End Market Applications:

- Blown – less quality requirement & tech support
- Cast – Higher quality product & more tech support
- Lamination – Highest quality product & most tech support. Unlimited flexibility.

Capital Investment:

- Blown – less original capital investment.
- Cast – more than Blown.
- Lamination – Highest capital investment cost.

Recyclability:

- In all applications, multilayer structures with different materials present issues.
- Online recycling possible with monolayer films and coextruded structures with similar materials.

Conclusions

- Blown Film has strengths in markets where gauge uniformity is less critical, flexibility in processing widths is required, shorter production runs and changeovers are necessary, and balanced film properties are required (MD/TD orientation).

Conclusions continued:

- Cast Film provides greater outputs, better gauge uniformity, improved clarity and optical properties, as well as no limitations to film thickness. Longer production runs are required.

Conclusions continued:

- Extrusion Lamination offers the greatest flexibility in potential film structures. Dissimilar materials can be used, reverse printing to protect graphics is possible, can extrude onto a substrate or make 2 separate webs and laminate.
- This is the most complex and expensive solution, but adds the highest value added.

QUESTIONS

www.tappiplace.org



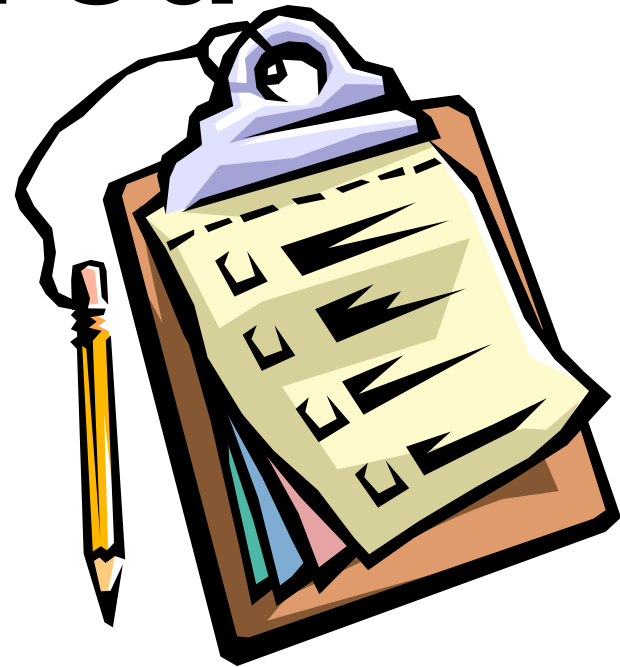
2009 Flexible Packaging Summit

Consumer Packaging Solutions for Barrier Performance Course

Thank You

PRESENTED BY

Benjamin Prinsen
US Sales Manager
Macro Engineering &
Technology Inc.
bprinsen@macroeng.com



*Please remember to turn
in your evaluation sheet...*