The Frugal Coater

Coating Equipment for the Real World
I am not a coating snob!

We often run into industry experts that always espouse “World Class” coating speeds and widths. I am a realist when it comes to these attributes. Thus; for this presentation we will be dealing in the realm of the “Common Class” of coating technology.
New or Used

Who should buy new equipment

- Have guaranteed volume - growth and projections dictate the need for a specific capacity and performance level. (the spreadsheet works).
- Special technical needs - novel coating technique needed, tight tolerances, unique curing or drying requirements.
- Mechanical needs: width, speed, tension, multiple coating layers.
- Unique physical needs: cleanliness, space constraints, energy requirements.
- A large multi-national company that has billions in the bank (Ordering a new line is the safe solution - no one gets fired for buying new equipment)
New or Used

Pricing of new equipment

- New Coater Costs
  - Thermal coater 63” wide 95’ oven 1000fpm, $2-3MM
  - UV coater 72” @ 1200 fpm, $1.5MM
  - 8 Coating Stations, 8 dryers, 63” width (European) $15MM
  - 80” thermal silicone coater 2000fpm, $6-8MM
  - A three roll Coating Station, 64” (USA) $500K
  - How about an 82’ Rewind Station with transfer (USA) 1500fpm, $1MM

- New slitter costs from N America and Europe are high, but the technology and reliability are also high.
  - Duplex center winder for film, Deacro, 1600mm width, 800mm rewind, 600M/min, est. $400,000
  - Shafted Gobel Raped D1 1600mm, 1000mm rewind dia, 500M/min, est. $500,000.
New or Used

Used equipment Opportunities and Pitfalls

- Cost differential for the used machine - Large potential savings!
  - Examples from current dealer inventory
    - Polytype $15mm new now $1.2mm
    - Dusenbery 635AL, 62” 1980’s vintage, now $40k
    - Worldwide Slot Die Coating Station, 62”, 1992, (no die) $25k (Margot)
    - Used 66” shimmed slot die - new $125k, now $20k (Margot)

- Performance differential - can you live with the reduced performance of an older machine?
  - Slower speeds
  - Narrower widths
  - Smaller roll diameters
  - Limited tension control (issues for problem substrates)

- Can you install, refurbish and maintain? In-house machine shop? Do you understand the technology?
- Old drive systems may not be supported. Service and spare part issues can result
- There is now a trend of larger companies scraping older machines which means that the used machine inventory is low.
Build Your Own Machinery

- Is it really cost affective?
- Yes, it can be. (Our latest line $850k vs $2.5MM+)
- Start with a smaller project and work your way up.....
Build Your Own Machinery

- Potential Challenges:
  - Do you want to own machine 1 of 1?
  - Do you have the time? It might take 1 - 2 years to build a complex coater in house.
  - Do you have the knowledge?
    - You might be able to hire an engineer to oversee the project and future developments.
    - You could work with a consulting engineer.
  - Don’t forget to count all the costs (I do an initial estimate and then add 50%).
Build Your Own Machinery

- The machine can be based on the retrofitting of an existing machine or a new machine based on a few key used components
  - Upgrade an older line with new drives and controls
  - Combine used parts with new components.
  - Start with a new coating head and build from there.
Build Your Own Machinery

- What components lend themselves to in-house manufacture
  - Items that are unique to your process.
  - Trim winders.
  - Simple Mayer rod coating stations.
  - Chill Roll stacks.
  - Simplex unwind and rewind stations.
- In-House can also mean:
  - Designed in house and made at a local machine shop.
  - Have the parts made outside and assemble in-house.
  - Waterjet is your friend.....
Buy a full drive package from an experienced automation outfit

- Every city has numerous industrial automation shops that can sell you drives and PLC’s. Don’t make the mistake of using a shop with little or no experience with web machinery.
- Use an experienced web line shop and the results will most likely yield:
  - Much faster development.
  - Advice on your machine layout.
  - A machine that is up and running very quickly.
  - Improved functionality and performance.
  - AIMCAL has member companies you can use.
The Chinese Temptation

- Examples of current Chinese machines

APFE Shanghai
May 2016
The Chinese Temptation

- The state of the Chinese coating industry
  - It is **booming**! Hundreds of small coating companies and machinery builders.
  - Release Liner Industry
    - 80 - 100 coating companies (average 2 lines) (N.A. = 14 companies)
    - Widths typically 1000 - 1600mm
    - Coating machine speeds typically slower than US standards (100 - 150 MPM)
  - Tape and PSA
    - Lots of small coating companies (1-2 lines typical)
    - Web widths narrow 1M and 1.2M typical
    - Dozens (hundreds?) of coating machinery suppliers
    - Slow speeds and limited QC
The Chinese Temptation

Why is it tempting?

- Low cost
- Lots of variety with hundreds of companies (some offering the same machines)
- There are now only a limited number of North American companies that are making coating equipment.
- Did I mention - Low Cost?
The Chinese Temptation

- Pitfalls and warnings about Chinese machines
  - No application help: The Texas misapplication example! *(center surface, min gap, no differential, small rewind diameter)*
  - What do you do when it breaks? Asian standard components are not US standard.
    - Motors not NEMA
    - Drives?
    - Spare parts availability?
    - Knife systems (wear parts)!
    - What about the PLC crashing. Do you have the program? Is it in English? Wiring diagram?
The Chinese Temptation

Examples of Chinese converting products that might make sense to purchase.

- Lathe Slitters
- Log roll winders
- Bare coating components (unwinds, coating heads)
- Specialized Hardware - Safety Chucks, air shafts, brakes, core chucks.
- Electrical components: IR bulbs, static bars
- Thermal ovens
Hybrid Solutions

Hybrid machines are Chinese machines offered from western companies. These machines are engineered, and supported in the west, but manufactured in the east.

(I’ll use slitters for the purpose of this example, but the same would apply to coating equipment.)

- SRC & Kampf, Deacro? maybe others.. (UK/China & Germany/China)
- Promise of western technology with Asian low cost manufacturing.
- A lower cost solution with support.
  - Kampf StarSlit - Duplex Centerwinder 1600mm, 600M/min, 610mm rewind, cost = $200k
  - SRC 810 - Duplex Centerwinder, 1600mm, 500M/min, 800mm rewind dia, Cost = $190k
- Some components are still “Asian Standard” so their availability could be an issue.
- I am not seeing this solution for coating machinery, but I expect is only a matter of time.
Hybrid Solutions

SRC Systems 410 Turret

Kampf Starslit
Simple Low Cost Solutions

Use ingenuity and common materials

- Make your own.
  - Mixers
  - Trim Winders
  - IR web dryers
  - Simplex unwind stations.
- Discrete tension control for basic coating lines.
- Simple technology from the past:
  - Dynamatic motor/Clutch units
  - Mayer Rod Coating heads
  - Pneumatic brakes

Get started with the simple stuff, and before you know it you will be building complete coating lines!
Simple Low Cost Solutions

Mixers - make your own

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>½ HP Motor</td>
<td>$100</td>
</tr>
<tr>
<td>AC Drive</td>
<td>$117</td>
</tr>
<tr>
<td>19:1 Gear Reducer</td>
<td>$360</td>
</tr>
<tr>
<td>16&quot; Turbine Prop:</td>
<td>$332</td>
</tr>
<tr>
<td>Enclosure</td>
<td>$41</td>
</tr>
<tr>
<td>Shaft</td>
<td>$35</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$985</strong></td>
</tr>
</tbody>
</table>
Simple Low Cost Solutions

Trim Winders

1/3HP DC

KBTC125
Simple Low Cost Solutions

IR bulbs for web drying, pre drying, and flexo ink drying.

1650mm Twin Tube (carbon bulbs for water based coatings):
- Germany: $1200 each
- China: $178 each

Phase angle fired SCR power supply
Simple Low Cost Solutions

Discrete tension control for basic coating lines are a simple solution that avoids the need of a PLC, PLC programming or buying a full automation package. They are easy to install and simple to run. Standardize on a model and keep controllers and load cells on hand for maintenance or the next project.

Magpowr Cygnus                             Montalvo Z4
Simple Low Cost Solutions

- Simple technology from the past

Dynamatic AC Motor / Eddy Current Clutch

Mayer Rod Coating Head
• Coating company based in Minnesota
  • Started in 1954
  • 2 factories
  • 50 employees
• Silicone release coating
  • 3 lines (60” - 72” wide)
  • All coating types
• PSA coating
  • 2 Thermal lines
  • 2 hot melt lines
• Slitting, sheeting, etc.....
• www.rayven.com