The Frugal Coater

Not every company can afford to pay top dollar for the latest state of the art coating and converting equipment, so we will look at what other options are available. The advantages, disadvantages and tradeoffs of other solutions will be covered. We will look at subject from the perspective of a coater/converter and not as a machinery manufacturer.

Some topics addressed will be: New or pre-owned? What performance level do you really need? Should you build your own? Plus, the Chinese temptation.

An added bonus will be simple low cost ideas that almost any coater and converter can use.

I don’t work for a machine company, so I will address the subject as a coater and converter. This presentation is based on my recent research and long term observations.

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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 Equipment

Should you consider buying new coating equipment? This depends on a number of factors.

If you have a product or project with a guaranteed volume, then you can easily calculate the return on the cost of the new machine. Also, growth projections may dictate the need for specific capacity and output levels. You might need a 1000MPM machine that is not available on the used market. In other words, if the spreadsheet works, then go ahead and buy a new machine.

If your product has special technical coating needs such as a novel coating technique, tight tolerances, a unique curing method or nonstandard drying requirements, then you may have to buy new custom designed equipment.

You might have unique mechanical needs such as wide width, high speed, low tension, multiple coating layers, etc. that might only be met with a new machine. (Many used machines are narrow and slow.)

You might have unique physical needs such as; cleanliness, space constraints, or energy requirements. I have seen many coating lines that were custom designed so that would fit into an existing building. Not everyone has a large high ceiling space perfectly suited for a coating line...

Finally, you might be a large multi-national company that has billions in the bank. So ordering a new multi-million dollar line would be about as stressful as ordering lunch at Pizza Hut. Everyone in a large company knows that ordering a new line is the safe solution, and it is hard to get fired for buying new equipment.

Pricing of new equipment

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

b) New slitter costs from N America and Europe are high, but their technology and reliability are also high.
   i) Duplex center winder for film, Deacro, 1600mm width, 800mm rewind, 600M/min, est. $400,000
   ii) Shafted Gobel Raped D1 1600mm, 1000mm rewind dia, 500M/min, est. $500,000.
Used equipment
Opportunities and Pitfalls

The cost differential between new and used machines is vast. Many are attracted to the relative bargains offered by used equipment. Here are a few examples taken from the current inventory of used equipment dealers:

- Polytype Coating Line (8 coating heads – 8 dryers) $15mm new, now $1.2mm
- Dusenbery 635AL Slitter, 62” 1980’s vintage, now $40k
- Worldwide Slot Die Coating Station, 62”, 1992, (no die), $250k new, now $25k
- Used 66” shimmed slot die – new cost $125k, now $20k

You can save a lot of money with used equipment, but can you live with the reduced performance of an older machine? You can expect slower speeds from the older designs, but they may be more than acceptable for your product.

Many older lines are narrower than current standards. A 55” line was common in the 1980’s, but now most lines are in the 61 – 73” range with others in the 2 meter range (80”).

Current lines will handle large OD rolls: 72” diameter for paper and 50” for film lines. Older film lines are often found with 36” diameter limitations (some smaller). Make sure the line will handle the substrates that you would like to run or you might face upcharges for small diameter input rolls.

Older lines often have limited tension controls, so if your project is highly tension sensitive you may need to look elsewhere.

Old lines will often have old DC drives that may not be supported anymore. It can be difficult to find service and the spare parts for these units. You may be better served by scrapping the old drives and purchasing a new drive package.

In order to tackle the project of installing a used coater you will need to have a good understanding of coating and web handling technology. After the old machine is installed it will need to be maintained, so having an in-house machine shop is helpful.

You might not be able to find many good used coating lines because there a trend with larger companies scraping older machines instead of selling them.

Build your own machines

Our latest project was a 65” thermal line that we build “in house” at a savings of 65% over retail.

It can be very cost affective to build your own coating line if you have the technical and mechanical abilities. I would recommend that someone starts with smaller projects or components prior to attempting an entire line. You should have an engineer on staff to oversee the project as well as future developments. If you do not want to own an engineer, you may be able to work with a consulting engineer on a project and/or retainer basis.
Along with the rewards, there are a number of pitfalls of building your own machine. Aside from having the knowledge to attempt the project you also need to have the time to do it. I would plan on one to two years to build a complex coating line in-house with 2 or 3 dedicated employees (or longer).

When you finish your project you will have a unique machine (one of one). Hopefully your machine will meet your performance design parameters, because it will have limited value on the used market.

When considering to build your own machine, don’t forget to count all the costs. I will do an initial estimate and then add 50%.

Start Small

Your in-house project can be based on the retrofitting of an existing machine or building a new machine based on a few key “used” components. Some coating components have not changed functionally in over 30 years, so a used rod head or direct gravure might be perfect for your project.

You can start with a key component, a coating head, oven, or rewind stand, then build from there. New components can be combined with used components and the whole project can be tied together with a new drive package.

If the mechanical capabilities of a used line meet your specifications then it is often advisable to improve its functionality and reliability by adding a complete drive package. Use drives that are optimized for web applications and a shop that has experience with web lines. Do not make the common mistake of using a local automation shop that has little web experience that may try to use generic industrial drives. It might work, but the learning curve could take years... (Trust me on this.)

Many coating and converting components lend themselves to in-house manufacture. These are typically simple designs that have survived the test of time in the industry. Some examples are:

- Trim winders
- Simple Mayer rod coating stations
- Chill Roll stacks
- Simplex unwind and rewind stations

The Chinese Temptation

Even a casual survey of the Chinese coating and converting machine industry will tell you that the industry is booming. There are a good number of larger machine manufacturers and literally hundreds of smaller builders.

The level of technology and quality varies greatly, but a number of companies are offering viable options for the coater and converter.

The reason that the coating machine industry is booming is that the domestic market for the machines is huge. For example, the release liner market in China has somewhere between 80 and 100 coating companies (not including in house release coating or tandem coaters). This compares with only 14 companies in North America.

While there are many coating companies in operation, the speeds and widths of their machines are not at the levels of similar companies in the USA. Common coater widths are in the 1M – 1.5M range and
speeds in the 100 – 150 MPM range (silicone). I have also noted that there is limited functionality on most of the Chinese machines that I have seen running.

While the prices for Chinese machines are tempting there are a number of potential pitfalls. In most cases you are buying a machine built to Chinese standards with no factory support. After you buy the machine, you are on your own. There is often no application help during the pre-buy and little after.


- Motors not NEMA – where do you get replacements?
- Drives are probably standard Asian units, and you might be able to get spares. But?
- The availability of spare parts such as knife systems and other wear parts might not be optimal.
- What about the PLC crashing. Do you have the program? Is it in English?

There are a few Chinese converting machines that might make sense to purchase in North America. They are:

- 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**

A great option to purchase Chinese machines might to buy a hybrid machine. These machines are engineered and supported in the west by legitimate experienced companies, but manufactured in the east. The cost of this solution is understandably somewhere more expensive than buying direct from China, but still a reasonable savings over western machines. I will list a few slitter examples, but I expect that there is hybrid coating machinery available as well.

- Kamf StarSlit Duplex Centerwinder 1600mm, 600M/min, 610mm rewind, cost = $200k (+ $8,200 for roll push) this is about 28% less cost than a similar than Deacro machine.
- SRC 810 Duplex Centerwinder, 1600mm, 500M/min, 800mm rewind dia, Cost = $190k, 37% less a North American made machine.

Some components are still “Asian Standard” so their availability could be an issue.

**Simple Low Cost Ideas**

Try to use ingenuity and common materials to engineer and manufacture your own machines and components. Here are a few examples of the smaller items that we routinely make ourselves at a substantial savings.

- Mixers – make your own using a heavy duty parallel gearbox, AC motor, drive, and stainless propeller.
• Trim Winders. If you get only one take away from this presentation it should be the DC torque drive (KBTC-125). This little inexpensive drive will run a standard fractional DC motor in torque mode (not speed) making it perfect for trim winding applications.

• Simple IR web dryers based on Chinese carbon filament bulbs and a simple SCR power controller.

• You can always use discrete tension control for basic coating lines (Magpowr Cygnus, Montalvo Z4). This can often yield a simple solution that avoids the need of a complex PLC and a full automation package. They are easy use and maintain. In our factories we have dozens of them in various roles. We keep a few spare Cygnus units in stock for quick replacement if one gown down – which is seldom. I do recommend that you standardize on one unit and use it throughout your facility.

Simple technology from the past

Do not be afraid to use simple technology for simple applications. I like Dynamatic motor/Clutch units for rewind applications. They are very robust and simple, yet very “old school”.

We also like to use Pneumatic brakes. They are simple and typically a robust solution.