Blown Film Internals

D.R. Joseph, Inc. Blown Film Process Systems & Consulting

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Time Flies

A lot changes between what seems like breaths, but in reality, is more like months. This is no different with D. R. Joseph. We have moved, released two significant IBC product versions, and begun building a blown film R&D lab in our new facility. Each action has a specific purpose in our business model which is to provide our industry with solutions not just answers.

Our industry is struggling between the constraints of higher material costs, lower margins, lower volumes, less workforce expertise, and government regulations that either affect us indirectly when considering energy and labor policies, or directly when considering material or product bans. It sounds somewhat dismal, but it is a challenge we all need to embrace. How do we build a sustainable venture under the adverse circumstances? Hopefully what you read in this newsletter will inspire you in the areas of strategic planning and tactical actions. They say Rome wasn't built in a day and when I visited the Coliseum I can attest that statement is indeed true. They did, however, see a need and made some fairly spectacular plans to fill the need. Our industry can also make and execute grand plans, if we properly see the needs.

What is everyone else doing? We really need to pay attention to how the industry winds are blowing – what others are doing – at least to the extent that we might use that information as part of our own plan to move forward. So, what are folks doing to combat the economic malaise we are all enduring?

Not surprisingly, with the higher resin costs, people are moving toward getting more out of their extruders per unit time. They are doing that with thicker products. The oil and gas mining industries are consuming large amounts of specialized materials for barrier applications. They are making bigger bubbles, adding more layers, and finding new high value applications (energy extraction and storage applications are both great examples).

Resin producers and other energy intensive manufacturers are building new facilities in the United States to gain the significant advantage of the lowest global natural gas costs. New resin producing reactors are being built to produce plastics with natural gas as the major feedstock. This should both stabilize the material costs and more importantly reduce the dependency on volatile oil prices.

Overall I see an upward shift in delivered product value by the blown film industry. Those who choose to continue producing commodity products must work diligently toward improving efficiencies. Either choice requires developing new skills that likely involve costly learning curves. However, with the right technology investments, these costs can be managed. One way to get a jump start on using the new tools is to join and participate with our trade organizations (SPI, SPE, TAPPI, ANTEC). These groups are all working different angles to the sustainability issues we face.◆

Table of Contents

Conferences & Shows 2

25th Anniversary 2

Tech Tip - Sizing Cage 3

Inline Width 4

New Lab Line 4

New IBC Technology 5

Last Word 6

8 bit End of Life 6

Conferences & Shows

Chinaplas

D.R. Joseph exhibited at the Chinaplas 2013 show this year in Guangzhou. Our thanks to General Extrusion Technology (GET) for providing the opportunity to exhibit in the film technology zone.

This year's Chinaplas show marked the largest attendance ever for the show which switches locations from Guangzhou to Shanghai each year. Part of this we know has to do with a growing middle class in Asia who boosts the regions internal packaging demand, thus the demand for flexible packing is continuing its significant upward trend in Asia.

With that being said, what was clear at the show this year, is that there is a trend toward more sophisticated and technologically advanced blown film lines to fill the need for the new higher-end film demand in Asia. More film producers require IBC and gauging solutions to meet market demands.

It was therefore an important show for D. R. Joseph to attend, allowing us to showcase our latest 3rd generation IBC control system to the Asian market.

K-2013

As with past K shows, we elect not to have a booth, but instead support the equipment various OEMs have running at the show by having our key personnel present during the entire show. This show, Daniel Joseph will be available for meetings from Wednesday October 16th through Monday October 21st. Trevor Grossklaus will be available for meetings Saturday October 19th through Thursday October 24th.

The equipment running will be the 3rd Generation IBC systems with fully automatic valve calibration, automatic blower balance, layflat and cage control. We hope to be able to visit all our OEM friends and customers that are at the show. Contact our office if you are interested in arranging a meeting at the K-Show. We will send out an email with local contact phone numbers once we get closer to the show.◆

D.R. Joseph Celebrates 25 Years in Business!

D.R. Joseph, Inc. is celebrating a quarter century in business this year. While initially the company started in the blown film consulting business during the early years, the first Internal Bubble Cooling (IBC) Control System made its appearance in the blown film industry in 1989. In working with a few OEMs, the functionality and integrity of the system became known by many, and the word spread amongst producers.

Since then, we have grown to be the world leader in IBC Control Systems, and are working with numerous OEM's and end-customers throughout the globe. Part of that is due to the fact that we listen to our customers, and on numerous occasions, add functionality to the systems to accommodate for a specific customers request. In part, customer feedback on the system is part of what makes us a success.

A big milestone that we hit back in December 2011 was the shipment of our 1000th IBC Control System. We have come quite a long way from our humble beginning in the family garage in 1989.

D.R. Joseph has been and remains a technology driven company and new control features are constantly being developed to benefit our customers. That being said, we will look forward to working with and serving you the next 25 years!◆

TECH TIP

Sizing Cage Design and Maintenance

One of the more critical and under appreciated components of the blown film line is the sizing cage. If you think about how the sizing cage is supposed to stabilize the film over the air ring without creating lines, scratches or haze, you realize a low quality cage will reduce your ability to take the fullest advantage of the IBC system.

A good sizing cage keeps the bubble properly centered over the air ring and manages changes in the bubble diameter. Even a good sizing cage will not perform these basic functions if not properly maintained.

Part of the problem rests with old technology, namely segmented Teflon rollers (see figure 1). In many cases these rollers get dirty and sticky with buildup and eventually clog. In turn they start to drag on the film, and create imperfections such as scratches and even tears.

Figure 1: Outdated Technology - Segmented Teflon Rollers

Either because of time restrictions (a good day's job changing the rollers) or because of cost (a Teflon roller set is roughly 1/3 the cost of the whole sizing cage), maintenance departments tend to procrastinate on proper periodic maintenance. Operators resort to moving the cage away from the bubble to avoid film marks from the Teflon rollers. With the cage away from the bubble, there is no support, which then requires production slowdowns.

Another requirement of a good sizing cage is smooth and consistent open/close movement. This is required to ensure optimum accuracy of our automatic cage control system.

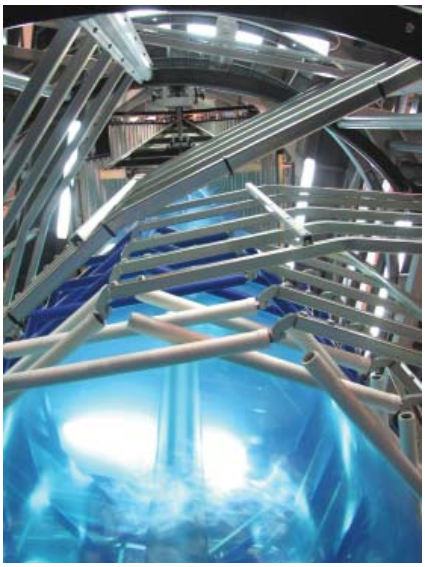


Figure 2: Gammatec Sizing Cage

A good solution is investing in one of several soft touch roller style sizing cages, such as the Gammatec Sizing Cage that DRJ offers. These cages use similar Iris style arms, but instead have paint roller style soft rollers that gently hold the bubble in place (see figure 2). With better protected bearings, and no sharp edges, you will be able to run cage contact at a proper set point to hold the bubble tighter for higher IBC air exchanges.

For a single cage, segmented rollers can number in the thousands. The job of replacing the individual rollers is very time consuming, often taking an entire shift to complete the job. In comparison, even if the job were to replace all the roller assemblies, the entire process could be completed in less than two hours as there are only forty rollers to replace on a standard five level, eight armed cage.

Gammatec provides different roller covers customized to work with different film types. For example, very hot films work best with the wool/felt rollers, where certain food grade films must use FDA approved silicone rollers. For very sticky films, Gammatec also offers carbon fiber Extreme No Stick rollers with a very low surface coefficient.

The sizing cage is a great place to start when looking at improving output, quality and reducing order change times.

Bonus Tech Tip

Cage alignment plays a big part in the way the rest of your line will handle bubble processing. It is good practice to start from the ground up and ensure that everything is level from the die to the nip. If the floor is not level, it could be the case that the coupler between the extruder and die could develop a leak over time. If the haul off is not centered over the die, it will pull the bubble off center and could lead to uneven cooling and bubble instability.

Right in the center of the equation is the cage. If it is off center, not only will it affect the gauge, but it will also affect the IBC process and create other problems as it feeds an off center bubble into the nip. That could in turn be the start of wrinkles in your film developing downstream, bubble breathing and other processing issues.

Dropping a plumb bob from the center of the upper nip roller to the die is a good start. However, laser alignment is the best method for aligning rollers which is a great way to reduce wrinkle issues. Once the die is centered to the haul-off (make sure the die and the adapter pipes are heated to production temperature), center the outer frame to the die using the optional X-Y adjust that DRJ always includes on every sizing cage we sell.

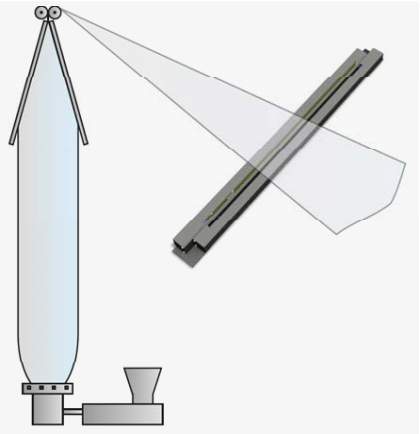
Make sure you compare apples to apples when getting sizing cage quotes. Our competitors often leave off the "X-Y adjust" option, that when missing, makes cage position maintenance almost impossible without a cutting torch.

D. R. Joseph is the North American representative for Gammatec sizing cages and accessories. We ensure that you will receive the best cage to match your requirements and we handle all of the importing details for you.◆

Inline Width Measurement Technology

Kundig FE-8 Measurement Bar

The 3rd Generation IBC Controller can now be integrated with Kundig's FE-7 and the latest FE-8 Layflat Measurement Bar.



The latest FE-8 works as a modular non-contact measurement bar using two infrared sensors. The modular design is comprised of two separate bars that join at user selected points to accommodate different sized web widths. This newer simple design not only provides a clean installation, but also a much lower price point than the FE-7.

The advantage of this integration is that operators can now easily see the real world layflat as measured at the winder to facilitate calibrating the IBC Control System and review real world layflat after film shrinkage as it travels down the line. With this data visible on the DRJ touch screen, life is made easier by turning a two person operation into a one person "click and calibrate" operation. It also makes calibration a safer operation by keeping a tape measure from getting caught in the winder.

As the North American Representative of Kundig Control Systems, D.R. Joseph runs Kundig International from our location in Arlington, TX. This being said, you can count on the same high level of sales and service support that you are used to with D.R. Joseph products.◆

Research and Development: D.R. Joseph Lab Line

We are currently building a dedicated 800 square foot R&D lab for producing and testing blown film structures and formulations. The lab will be used for operational training of blown film lines, showing how various pieces of equipment affect the process, and diagnostic training for those wanting to learn how to work on DRJ or Kundig equipment.

We are currently assembling our new 3 layer line which will include many of the features found on a full scale line. Here are the basic features of the line:

- 50 mm 3 layer blown film die
- Dual lip air ring with chilled air
- Oscillating Haul-Off
- Web Guide
- Surface Contact Winder
- D.R. Joseph IBC/non IBC control
- D.R. Joseph Machine Direction Sealing
- Kundig FE8 Width Bar
- Kundig Thickness Gauge

We will have an array of off-line equipment to allow immediate testing of produced film. We are looking for customer feedback on selecting which off-line tests are most important so we can prioritize our purchases (please send your testing equipment recommendations to danielj@drjosephinc.com).

Our goal is to provide a one-stop testing facility for those wanting to run and test new 1-3 layer structures at a much more economical rate of 20-40 lbs per hour instead of 500-1000 lbs per hour. Not to mention, eliminating the need to break into production lines to run trials.

The air conditioned lab runs on a dedicated and metered utilities system which allows us to lease the lab for several days or several weeks at a time and keep track of all resources. It will also have a dedicated and isolated Ethernet network. Internet access will be provided from an isolated broadband device keeping it 100% disconnected from our company Internet and networks. The room will also have a projection system to accommodate training sessions.

In keeping with our history of production innovation, the lab represents a step forward in blown film control development, so that we can better address the needs of a changing industry.◆

D.R. Joseph Labex in progress

New IBC Technology for High-End Extrusion Lines

Since the last newsletter, there have been quite a number of significant developments and changes to the IBC Control System as well as our non IBC Controller, the LF-Sizer.

Many features are born out of customer demand and are a result of the changing industry requirements for higher-end extrusion lines that require more flexibility. Other improvements have been put into place to make life easier on the operators. Let's take a look at the new features for 2013.

Dual-Mode Control System

Many companies will run different products on the same line, and in some cases IBC will disrupt the processing conditions of the inner layer (being cooled too quickly). For these situations, we now provide the Dual Mode Control System. We made it as simple as the touch of a button on the single operator touch screen in our combined unit to switch from IBC control to LF-Sizer non IBC layflat control. A pneumatic generator is provided with the system to control layflat width in non IBC mode. Now, width control improves rolls whether you are running IBC or not.

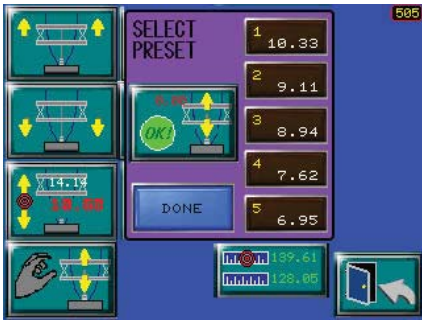
Tri-Mode Control System

Adding on to IBC and non IBC control on the Dual-Mode System, the Tri-Mode adds Geo / Ag IBC Control. For large, heavy gauge geo membrane films (1000-2500 microns), the configuration and control algorithms are different than normal processing conditions. Because of low line speeds, special geo sensors are placed slightly above the air ring to get quick feedback on the bubble layflat, and to better control changes on bubbles with BURs from 1:1 to 1:5:1.

Cage Height Management

This feature provides single touch management of the cage height – a feature particularly important for high stalk bubbles but also useful when the standard operation procedure requires a specific cage height position. In some cases it can be difficult to judge the correct cage height, particularly when it's 8-12 feet overhead. The cage height feature includes five different user defined cage heights (Figure 2), the ability to set height based on an entered cage height, and a maintenance position for one touch positioning of the cage to the highest position. These features will help reduce setup time and improve the operator's efficiency.

DRJ recently commissioned an IBC Controller, capable of controlling Geo film production as well as Ag film production. Note the newly featured Geo film sensors mounted on the air ring



(Figure 2) Cage Height Management

Temperature Control

We have completely redesigned the optional cooling temperature control feature, eliminating the analog interface previously required and replacing it with Ethernet based temperature controllers. The IBC system includes the ability to manage up to two different temperature controllers; normally the IBC and air ring.

Neck Height Control

We have brought back optional neck height control for high stalk bubbles. This feature works in conjunction with the air ring or a temperature control device to manage the neck height.

Improved Touch Screens

All of our touch screens are now twice as fast, have more memory, and can support two touch screens on the same system, making remote control stations up to 300 feet away a possibility. We have also added popup guidance windows for seldom performed maintenance tasks. Another new feature is the ability to selectively hide individual sensor trend lines. This makes it easier to determine which sensor is causing an issue, particularly when the sensor trend lines are drawn directly over one another.

Dual, Triple & Quad Die Support

It may seem strange to run multiple dies from a single large extruder, but it helps increase throughput on small diameter tubing products. Adding IBC increases output even more. DRJ supports these configurations with a synchronizing touch screen that allows the operators to perform coordinated startups with a single button such as blowers on, position cages, start outlet blowers, and change layflat, all at the same time. Each line can also be worked on individually as well.

Sensor Brackets

Even sensor brackets get our attention as we look to improve the operation of our systems. Using 3D printing technology, our layflat sensor brackets now support thermal isolation and acoustic decoupling (fancy terms that mean a more stable layflat signal in harsh blown film environments).

The good news is that all 3G IBC systems are upgradable. Operational and job wise conditions, change, and continued refinement are big reasons customers continue to select solutions from DRJ. We listen to problems that are reported to us and we continue working toward highly profitable solutions.◆

The Last Word

By Daniel Joseph

Steady as She Goes

Strength in specialty markets and softness in commodity markets means many are moving to diversify their film production capability. Mono-layer lines are being upgraded to 3 layer, 3 layers upgraded to 5, 7, and sometimes even 9 layers. Nano layer films are nosing into the mix as well. These actions are especially important for producers who have historically sold products based on price.

With higher overhead and raw material costs, no amount of volume can compensate for negative margin. Like sailors of old who would lighten their ships when forced to sail turbulent and stormy waters, blown film producers have sold off lab lines, equipment and skilled personnel. Notably, ship captains did not include throwing the crew overboard to lighten the load (unless it was time to abandon ship). I am also certain that Captain Kirk, of Star Trek fame, would never have gone on any voyage without his chief engineer, Mr. Scott. Hence I am concerned about a true lack of experience and knowledge in our industry because of how many ***did*** throw the crew overboard to lighten the load.

It is a common theme among many I speak to that competent folks are not to be found. Like anything valuable, we can't expect the people we need to be sitting at home waiting for us to place an ad. We have to go out and find them. If the population of experienced personnel is near zero, then we have to grow up the next generation from scratch.

Yet, it won't be as easy as investing in training. There also has to be a focus on making the work environment a place that people are willing to spend 8-10 hours a day in. The next generation work force expects different things from their workplace than our parents did. This means we have to rethink what the next generation of thin film manufacturing facilities looks like. To attract competent personnel, it can't be a dark, dirty, and hot production facility. But, it could be smaller, cleaner, and environmentally controlled with a focus on high value products and technical excellence.

There are a lot of new material science breakthroughs which often include unique properties tied to thin plastic based films. It is my opinion that our industry has to concentrate efforts to develop methods for producing these high value products with an eye on long term sustainability. Even this is not a guaranteed success formula. We have to also take into account the effects of instant information access, political and financial turmoil (it seems the world excels in this area), and changing locations of low cost energy availability.

North America has made an aggressive move toward energy independence and unlike the politicians who do much talking without results, the oil and gas industry has significantly changed the center of gravity when it comes to energy availability at a competitive price. This change will have a tidal impact on the how and where of global manufacturing.◆

End of Life for 8-bit IBC's

As many of you know, May 31, 2013 was the end of support for first generation 8-bit IBC systems sold between 1989 and 2003. This means that DRJ will no longer provide email, phone or onsite support for 8-bit systems. Spare Parts (rebuilt with no warranty) are on a first come first serve basis, with a limited stock.

Part of the reason for the end of life term is the unavailability of 8-bit hardware, while the other end of the equation has to do with management of old technology; the new 32-bit processor is 100 times faster and is packed with many new improvements and user friendly features.

Self-Service with Online Knowledge Base

To allow customers the option of self-service, we have implemented a complete library of the 8-bit service documentation. You must be a registered customer to access the knowledge base. To register, visit our home page and navigate to the lower right hand corner. Click on the appropriate Knowledge Base link. There is also a help page to guide you through the registration and 8-bit document access.◆

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