

Blown Film Internals™

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

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Working Hard for You!

The light at the end of the tunnel is getting brighter and we are ready to provide our customers with new products, upgrades, improved local service and even an improved web site. While none of us would choose to repeat this past period of slow or no growth, it did provide a unique opportunity to review our business for weaknesses. We redirected our production, engineering, marketing and administration personnel toward strategic tasks to eliminate or significantly strengthen those areas. For example, the IS-IBC1 pneumatics system has been updated to provide three times longer life, faster and finer response (even better layflat control and higher possible production rates), all at a lower cost. Two other examples are that all systems now come with MODBUS protocol to support the new EZViewer interface, and all operator panels have universal color icons instead of words to describe operator control functions. Our web site www.drj1.com has a new search engine that allows you to quickly find product literature or technical support information. We have also added a shipment tracking system so you can track your DRJ systems once they have left our factory.

We are working hard for our customers and we hope you find this issue helpful in making your operations more profitable. Be sure to check out the insert included with this newsletter for an easy way to purchase spare parts, training materials and troubleshooting tools. If you have any questions about how we can help your company with solutions... not just answers, please give us a call or drop us an email. We look forward to hearing from you. ♦



Nova Chemical Chooses IS-IBC1 for Lab Line

Nova Chemical in Calgary, Alberta, Canada recently installed the latest IS-IBC1 Internal Bubble Cooling control system on their lab line. The system is equipped with all the latest features including color touch screen controls, automatic blower balance, layflat controller, automatic cage controller, multiple sensors, and bubble break detector. The system is also equipped with the new PP4 position processor with the latest sensor technology (refer to "Still Using Old Sensors" on page 4). The system has been in operation for more than five months and Nova Chemical has been very satisfied with the performance of the system. John Bayley, the technical service specialist at Nova Chemical states, "D.R. Joseph support has been very good. They have provided timely startup support and thorough training. The modem support through the D.R. Joseph technical department has been especially helpful to us in trouble-shooting issues on the line. The D.R. Joseph IBC system has been very reliable to date and we are very

satisfied with the support we have been receiving from D.R. Joseph."

Nova Chemical will use the lab line for performance testing on new material structures, so it was crucial that the line have an IBC system flexible enough to run different product sizes and material types while maintaining good bubble stability. The IS-IBC1 system and excellent service support provided by DRJ gives Nova Chemical the confidence and assurance that they can trial products without the worry of equipment or performance hindrances from the IBC system. ♦

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What Sets Us Apart?

Potential customers often ask, "What sets the D.R. Joseph system apart from the competition?" The implied question is "If I can get a different IBC system at a cheaper price, why should I buy an IS-IBC1?" Here are the reasons to consider:

Production Rates and Layflat

The IS-IBC1 is a high performance control system designed to combine the highest possible production rate with the tightest layflat control. There are other systems that can provide tight layflat control, but have a production rate comparable to a non-IBC extrusion line. The IS-IBC1 consistently outperforms any contact or non-contact system on the market in terms of production rate AND layflat control; the lower the melt strength, the bigger the improvement. Typical improvement in production rate over competing IBC systems is 7-10 percent.

Automated Startups and Sizing

Everyone wants to reduce startup and change over scrap, particularly hard scrap. The IS-IBC1 reduces scrap by automating bubble stability using blower balancing, bubble sizing, cage sizing, and bubble break functions. At startup or during size changes, the operator enters the desired size and the system manages the change automatically. The system manages all aspects of the size change including detecting and reacting to the onset of bubble instabilities.

Knowledgeable Training/Service

Without proper training, no control system will function properly. Without timely service support, the downtime instantly loses more money than was saved by buying a lower cost system. Operators must learn how any IBC system works and how their interactions with the system affect the blown film process. D.R. Joseph provides a multiple step training program that is designed to make the operator efficient and help the company earn money from their investment for years to come. D.R. Joseph provides competent service support through our main office, network of independent trained technicians, and our web site. This means that regardless of your location or the time of day, there is always IS-IBC1 help available.

Dependability

Service and training are good features to have, but long term dependability is critical to making money...I mean plastic! We recently had a customer compare their service costs between two IS-IBC1 systems and two IBC systems from another manufacturer. Over the period of 2 years, there were two maintenance work orders for the IS-IBC1 systems and twenty-five for the other two systems. The highest cost element was not the spare parts but the lost production time. As a result, the customer was able to justify replacing the two competitive systems with two new IS-IBC1 systems.



Flexibility

Not every blown film line needs all the comprehensive performance provided by our full featured system. That is why we provide ten different configurations to closely match the controller to the application. We even provide built-in protocol support to allow communication between any extrusion control system that supports the industry standard MODBUS protocol. This is now a feature found on even our low-end systems. Companies that want to implement remote control operation can do so with this interface.

Experience

Over the last fourteen years, the IS-IBC1 system has been proven on a wide range of layflats; from 12 inches to nearly 400 inches. The system is designed to provide fully automatic size and cage control for layflats from 10 to 520 inches. The IS-IBC1 has also run the widest variety of materials, including 100 percent nylon, metallocene and high stalk, high density. The range of material thickness that the system has run to date ranges from 0.0004 to 0.100 inches.

Experience also includes the people behind the product. Our personnel have a high level of experience with the blown film process that enables them to diagnose most any kind of bubble or layflat stability issue.

To summarize, what sets us apart is the performance, ease of use, customer service, experience, and flexibility packed into the solutions we provide to our customers. The price difference you pay up front will be earned back before the end of the first month of production. ♦

New Local Support

D.R. Joseph continues our commitment to providing local sales and service to our customers around the world. Starting this year, we have VCA of Belgium providing sales and technical support as well as a full line of spare parts for the IS-IBC1 system. Christophe Vanpe provides D.R. Joseph Inc. with local support for the Benelux countries, and phone/modem support for all of Europe. Christophe speaks fluent French, Flemish, and English.

We also have UB Tech of Germany providing sales and technical support for the IS-IBC1 systems. Ulrich Buettel, formerly of Kiefel Extrusion GmbH and Windmoeller & Hoelscher, provides consulting and technical services to blown film customers around the world. Uli is also the author of the book, "Blown Film Extrusion – A Science in Itself" which provides an easy to read "how to" book for blown film companies. Uli speaks fluent German and English.

Both VCA and UB Tech have had training from D.R. Joseph on how to work on the IS-IBC1 systems. Both companies work 100% independent of D.R. Joseph so there are no added fees or commissions paid to D.R. Joseph. We are working with other companies in other parts of the world as well. We will focus on two more companies in our next issue of Blown Film Internals. ♦

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Upgrade Corner

The following is a list of all the upgrades that are now available:



Better and Cheaper!

It is always a pleasure to get more for less. This month, we are introducing the next generation proportional valve for the IS-IBC1 control systems. Fully upgradeable, (plug and play) it outperforms, outlives, and costs



significantly less than the previous generation of valves. It also eliminates the small 20-micron filter required by previous valves. Operationally, the new valve will significantly improve system response to very unstable conditions and provide a small improvement in short term layflat control, particularly when running low melt strength materials.

From a purely practical standpoint, the new valve is smaller, much quieter, and runs cooler. All in all, the new proportional valve enhances the overall operation for any customer. Word of mouth demand has been very strong, making it one of our more popular upgrades to date. See the insert that came with your newsletter for pricing and delivery information. ♦

Previous Upgrades:

1. **Handheld** - updated to support the new EZ Viewer features, sensor monitoring and error reset. If you already have a handheld, contact us about the handheld update kit.
2. **Big bubbles** – Cage and Layflat control systems now support maximum layflat of 520 inches (13.2 meters)!
3. **Cage Controller systems** get a backlash control to compensate for cage drive train slack.
4. **Diagnostics 2 Interface Software:** this is a compatibility upgrade that allows D2 to work with Microsoft Windows NT and Windows 2000 operating systems.
5. **Color Touch Screen – 6 inch (160mm):** New TFT technology provides the widest viewing angle possible with a brighter screen, double the memory and faster screen refresh time.
6. **New Digital Ultrasonic Sensors** - More power, easy to install and compatible with all systems. Ask for the PP4 upgrade package.
7. **Cage Control** – Adds the ability for the system to automatically position the cage diameter to the correct size to produce the desired layflat.
8. **Layflat Control** – Adds a second control loop to the IBC system that reduces the time to achieve a desired layflat, with or without gusseting.
9. **Automatic Blower Balance** - Eliminates the need for operators to balance or null blowers prior to every startup of the line. The system also automatically rebalances the blowers if needed.

New Interface Speeds Setup & Troubleshooting

As many of our customers know, accessing the setup information on the non-color touch screen IS-IBC1 systems required either a serial link to a laptop computer or connection via dial-up modem... until now.

Starting August 15th, 2002 all new non-color touch screen systems will be shipped with a new user interface at no extra

cost. Cost effective upgrade kits are also available for existing systems. In addition to the interface, we have added fault logging, and remote control of the IBC system through the industry standard MODBUS[®] protocol. The remote control feature allows easy integration with supervisory controllers and PLCs.

To provide even more value, we have added a configurable bubble break detector that comes standard with each new system. The break detector reads the IBC sensor and triggers a break signal when the bubble exceeds an adjustable distance. There is also an adjustable time delay provided. For very small dies, the IBC sensor may not be the best choice for a break detector. In that case, an optional break detector sensor is available. The extra break sensor has the same configuration as the IBC1 sensor, making it an instant spare if needed. Finally, we have added a configurable process alarm output. This output activates when the valve position moves outside a predetermined window.

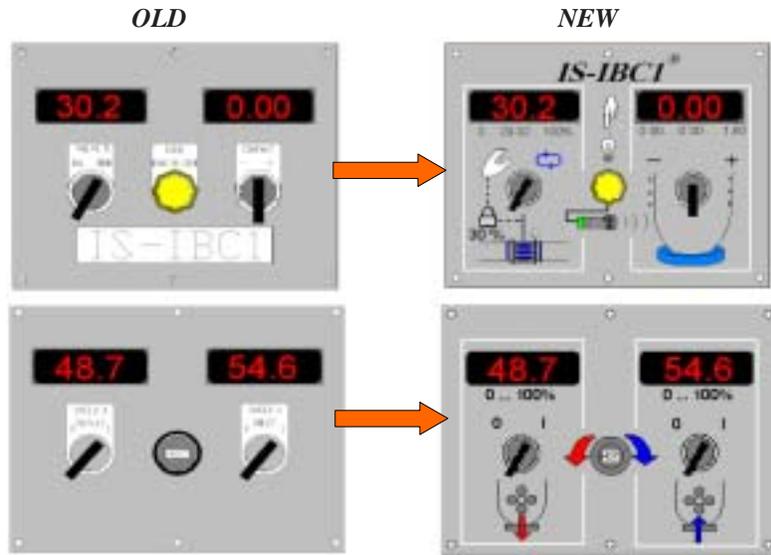
The standard IBC systems with EZ-Viewer (including the units with automatic blower balance) now have the capability to commission, save and restore custom settings, restore factory settings, monitor sensors, tune the system, and detect faults. All internal settings are password protected and the password can be changed. We have put together a cost effective upgrade kit that can be installed in minutes. If you need more information before ordering (see our quick response order form), call us or visit our web site. ♦



No More Language Barriers

Effective written communication is essential for operators to learn how to work each piece of machinery on a blown film extrusion line. D.R. Joseph has just redesigned all of the operator control panels (excluding touch screens) to support customers who have operators that speak different languages. Previously, the DRJ solution was to provide the IBC system with labels in the language native to the country the equipment was sold into. With a customer having operators that speak 3-4 different languages, this solution was obviously problematic. Starting in August, all DRJ IBC systems will be shipped with the new operator control panels that use picture icons instead of words to describe the physical controls.

The panel plates will also use color to assist in defining the meaning of a control. For instance, cooling control elements are colored blue, while exhaust control elements are colored red. The old panel is shown below along with the new style panel for



comparison.

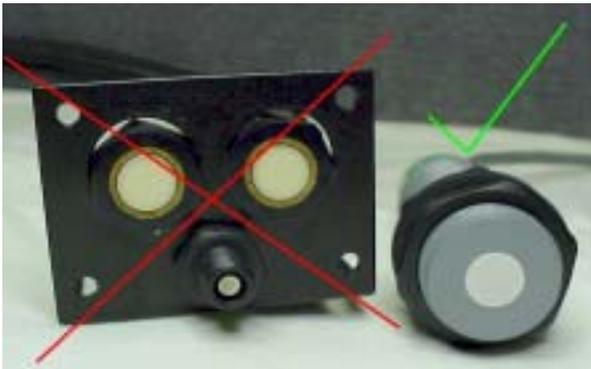
In addition to the operator panels, we also produce easy to read picture-training manuals in several different languages. Visit our web site to download any of these. ♦

Still Using Old Sensors?

If your IBC system from D.R. Joseph was purchased before 1999 and your ultrasonic sensors look like the sensor

significant increase in sensor power. Customers also like the new status LED on the back of the sensor that immediately identifies if the sensor is properly detecting the bubble, and if the sensor health is good or not. The new

people will find diagnosing the new technology a breeze (using our handheld diagnostic tool you can interrogate the internal operations of each sensor and reset the sensor).



New sensor (right) is very easy to install

on the left, you should upgrade to the latest sensor technology (pictured on the right). Customers who have upgraded are raving about how much better the system performs overall and how much more forgiving the sensor is to improper positioning.

As we have mentioned in past newsletters, the advantages from the new sensor technology come from the



Monitor up to 32 sensors with new interface

system continues to allow the sensors to be changed on the fly (a technology D.R. Joseph commercially introduced in the spring of 1993). This helps to eliminate the normal down time needed to change a sensor. The upgrade procedure is very easy.

What are you waiting for? Your extrusion lines will start easier, scrap will be reduced and your maintenance

Finally, with the new technology, you will be able to take advantage of a significant list of upgrades to come. See the insert included with this newsletter for pricing and contact us directly or visit our web site for more information. Delivery is quick and as always, our technical support and documentation will quickly lead you through the upgrade process. ♦

TECH TIP

Quality Tubing and the Oscillating IBC Die

Anyone who has tried to run quality tubing on an oscillating die with internal bubble cooling (IBC) knows that there are special problems that occur when oscillating the die. The problems can stem from misaligned equipment, irregular bubble shape or from inconsistent airflow from the two oscillating plenums required to deliver the IBC cooling and exhaust. Let's take a look at each of these problem areas with special focus on the oscillating plenum.

Layflat Variation From . . . Misaligned Equipment

This issue is the easiest to check and therefore should be done before trying the other solutions presented here. The basic issues are the levelness of the die and air ring assembly, the alignment of the primary nips over the die and the alignment of the cage over the die.

Any one of these problems can cause layflat variation when the die or nips are oscillating. The die and primary nips should be level to within 0.004 inches. The cage should be level and centered over the die to within 0.060 inches. It is important to note that the die should be checked for level without the air ring installed. The air ring mounting should also be checked to make sure it is level on the die.

Irregular Bubble Shape

As an oscillating die rotates, the sensing devices (contact or non-contact) sense the bubble shape. If the bubble has a bulge or flat spot, that irregularity is sensed as a change in size when it passes in front of the sensor. The IBC system responds by making the bubble bigger or smaller. By adding more sensors, this effect can be reduced but never eliminated. To eliminate the problem the bubble shape must be corrected. The easiest solution is to check for gauge variation in the transverse direction and make sure that the gauge variation is

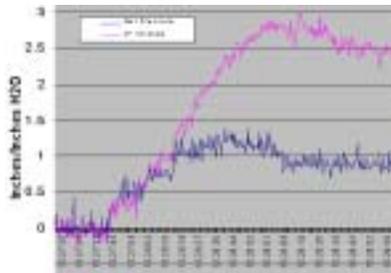
uniform all around the bubble. Adjustments to the die that improve the gauge will improve the bubble shape.

Excessive cage contact or pressure between the bubble and the cage can also give the appearance of irregular bubble shape. The easiest way to determine if this is the case is to set the IBC system so the bubble is not touching the cage at all. If the bubble shape is still irregular, contact pressure is not the problem and other adjustments should be considered.

Oscillating Plenums

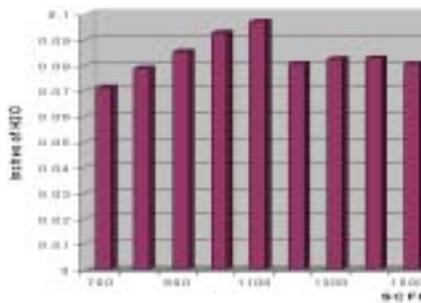
Inconsistent Air Flow

This is the most overlooked issue, mainly because it is difficult to decipher the subtle clues from a failed plenum. The first principle we have to establish is how sensitive layflat is to pressure changes inside the plenum. The graph below (from an eight inch die) shows that for an increase of one inch (H₂O) of static pressure inside the plenum, there is an increase in layflat of 2.5 inches. Therefore, we can interpolate that a change of only 0.1 inch (H₂O) in pressure causes a change in layflat of



0.25 inches.

That may be a surprise to many of you. But the reason will be apparent when you take a look at the actual static pressure inside a blown film bubble. This information was provided courtesy



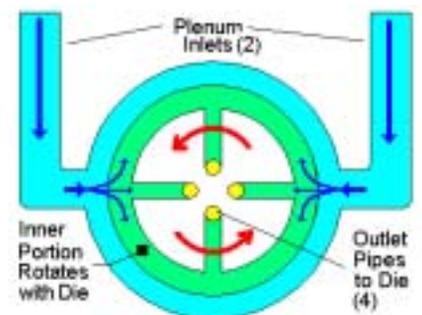
The static pressure inside the bubble is

very low, so you can see that the internal plenum pressure must remain stable to prevent induced layflat variation. The reason it is called induced layflat variation is because the change in pressure causes the bubble size to change suddenly, which the control system works to correct afterward. Unfortunately, the constantly changing pressure makes it impractical for the control system to cancel out the induced change. These pressure changes are caused by a variety of things. In some cases there may be internal seals that have failed or seal channels are worn. Either problem can cause leaks to atmosphere or internal leaks between the supply and exhaust (referred to as "cross-leaking"). In other cases there may not be enough backpressure in the chamber to ensure a consistent airflow for all positions (see below).

Atmospheric pressure leaks are generally easy to find, but atmospheric vacuum leaks are much more difficult. The best method to find all leak issues is to check one chamber at a time. For instance, if the supply plenum is pressurized and airflow is detected in the exhaust plenum, there is a cross-leak that must be fixed. Using your hand or a smoke generator, atmospheric pressure and vacuum leaks should be easy to spot. The important thing to remember is to focus on the cross-leak issues before working on the atmospheric leaks.

Not Enough Back Pressure

Rotating plenums require air to travel a variable path length to reach the die. Like any other fluid, the air takes the path of least resistance. The drawing below shows a case where the pressure increases when the internal pipes (yellow circles) line up with the two main plenum inlets. For plenums that do not produce enough backpressure, this



(Continued on page 6)

Tech Tip (continued from pg 5)

orientation is the least resistive path and causes an increase in airflow to or from the die. In one 360° rotation there are four positions in which the alignment occurs. This means there are four pressure swings, which cause four swings in layflat variation.

D.R. Joseph has a pressure test system that allows measurement and recording of the air pressure during an entire rotation of the die. The system can also monitor the individual sensor signals and coordinate all signals on a single display. This allows the technician to determine the exact source of the layflat variation. Once the problem source is identified, the proper steps can be formulated to correct the problem. Most often, the corrective action requires increasing the backpressure in the plenum to ensure uniform pressure in the plenum for all positions.



Summary

It is possible to produce high quality tubing with the proper implementation of the oscillating plenum. Multiple sensors do provide a benefit to the process, but will not solve problems associated with plenum airflow issues. If you have questions about your particular application or would like your plenum tested, give us a call or send an email to danielj@drjosephinc.com. ♦

The Last Word

When things are slow, low or no cost improvements can be hard to find. In the blown film extrusion business, new extrusion lines, die packages or winders are all significant investments. There is no doubt the investment will provide a good payback, but if the cash is not available, even a short payback is a moot point. However, in this competitive world market, none of us can afford to wait around for the cash to show up. We all have to look at what can be done with the resources that are available to us.

Where do we look? Most of us will immediately think of our machinery. However, many improvements can be found in the systems of running the machinery and the people running the systems. In fact, these two areas are where the majority of low or no cost improvements will be found.

What are we looking for? We are looking for ways to reduce steps in the systems. This does not mean reducing quality objectives; but instead it means achieving the same objectives with fewer or lower cost steps. An example of a consumer product reduction is the combination of the cell phone and personal data assistant into one device. It is an obvious combination, particularly for those who have used both items.

Who knows the most about reducing steps in the processes? It's the people on the floor doing the work. To prove

it, videotape your best operator starting a blown film line, printing press or off-line bag machine. Then videotape your newest employee and compare the differences. You will find it is not a simple matter of forcing everyone to start the machine the way the best employee does it. Instead it is a task of analyzing each step in starting the line, and assessing the most efficient way to complete each task. Don't throw out the video of the new operator just because he took twenty minutes to get the bubble stable. You may be surprised to find out that a new employee has found a faster way to thread the winders that has escaped the experienced operators.

Another area to look at is the machine setup process that occurs before the machine is actually started. The proper setup steps can mean a huge savings in scrap and time. Once you have the most efficient startup procedure, start looking for ways to reduce steps. Pay particular attention to areas where the operator has to linger at a particular control or where the operator has to continually return to the same step in the process. What is causing the operator to maintain his attention in these areas? Interview the operator and get his or her input on the issue. Perhaps a small amount of training will significantly reduce the time required to start or setup the machine. Perhaps machine features are not being used properly. Whatever the cause of this behavior, these are the areas that will bring the most benefit. You know a process is working well when the operator steadily progresses from step to step without backtracking.

This is the same process we use to focus the development efforts at D.R. Joseph. When we see problem areas for operators, we develop solutions like automatic blower balance, automatic layflat and automatic cage control. The process of gleaning the best from your operators will pay dividends in areas of consistent quality, less materials wasted, and believe it or not, machinery that lasts longer. ♦

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Email: admin@drjosephinc.com, Telephone (972) 641-7711 or (800) 767-4470, Fax (972) 641-8747 Website: www.drj1.com. D.R. Joseph, Inc. manufactures the internal bubble cooling and layflat control systems for blown film extruders. President: Daniel Joseph; Managing Editor: Tamara Handley