



HOW TO SUCCESSFULLY LAUNCH IN-MOLD DECORATING (IMD) IN YOUR MOLDING FACILITY

A guide for injection molders



What is in-mold decorating (IMD)?

In-mold decorating (IMD) can be a valuable way to create aesthetically pleasing plastic parts. In the IMD process, graphics are printed on a film (or label) which is then inserted into a mold cavity. A compatible resin is then injection molded behind or over the decorated appliqué film, permanently embedding it into a molded part. The result is a single highly durable, eye-catching part. IMD products are used across industries for a wide variety of end-use applications.

Why should I start doing IMD?

IMD is a lot more complicated than traditional “shoot and ship” molding, typically requiring longer lead times and higher developmental costs. So, why make the effort? To put it simply, IMD solutions are increasingly in demand and there are few molders with the capabilities to execute IMD projects successfully. By expanding services to include IMD, molders can reap significant financial rewards.

Some of the many benefits to launching IMD in your molding facility include:

- Higher dollar value projects
- Access to higher value markets
- Larger customer base
- Leads to development of in-mold structural electronics (IMSE) solutions
- Secondary manufacturing processes can be eliminated with IMD



How do I get started?

There are a number of things to be aware of before you start soliciting proposals for IMD projects. It's important to understand the success of an IMD program is largely based on cooperation and collaboration between the OEM, molder and printer. This is why DuraTech created this eBook, to help molders understand what it truly takes to launch IMD and optimize production processes. Keep reading to find:

- Important considerations to be aware of before launching IMD
- Tips on how to optimize IMD manufacturing processes
- Guidance on common IMD materials
- Insights on how to enhance your IMD offerings

Product development and processing time

The biggest thing for molders and OEMs to know is that IMD development takes longer than traditional injection molding. There are many reasons for this, but in general, molders may have to adapt processes to:

- Add a cleaning step prior to inserting the mold
- Increase pack time
- Slow injection speeds
- Add robotic material handling steps
- Make other changes that will increase cycle time

All of the adjustments listed above can add processing time and projects often require multiple trials before all issues with a part are resolved. So, it's important for molders and OEMs to manage expectations before launching an IMD project.

Fallout in production

IMD projects typically experience a higher percentage of fallout, or higher scrap rates, than other molding projects. That's because the inclusion of graphics and the need to achieve the desired aesthetics add complexity and a subjective element to the process. It's not unheard of for molders to experience 10% fallout rates with IMD projects. This is why it's so valuable to work with an experienced printer early in the IMD process to help identify and solve potential problems.



Tooling costs

Like any other effort to expand service offerings, adding IMD to your list of capabilities is going to require some investment. While existing molding equipment may be acceptable, gate locations and venting may have to be changed. When working on 3D IMD projects, forming and cutting tools are often required. IMD is not common to a lot of mold tool makers, and tooling costs can be upwards of \$10,000 for each forming and cutting tool. However, these costs can be offset by the fact that IMD products demand a higher price point, and offering IMD services can open molders up to higher value projects.

Insert options

The requirements for the film for an IMD application are much different than a standard adhesive-backed label. IMD films need to be dimensionally stable due to the heat and pressures of the IMD process. Film thickness is also an issue. Thinner materials will help avoid gate wash, while thicker films are better suited for use with deeper draws. IMD lends itself well to second surface printing instead of first surface because it enhances durability. So, UV-, chemical- and abrasion-resistant films are often used for IMD applications.



Commonly used IMD film types:

- Polycarbonate (PC)
- Acrylic
- Polyester
- Blends & Laminates
- PC-PET
- Acrylic Capped PC
- Polypropylene
- Copolyester
- PVC

Specialty ink considerations

For first surface printing projects, any ink that is compatible with the selected IMD film is acceptable. The ink system does not need to be gate wash resistant. The only unique consideration is making sure the ink

is heat-resistant enough to ensure it won't stick to a heated mold face when applicable.

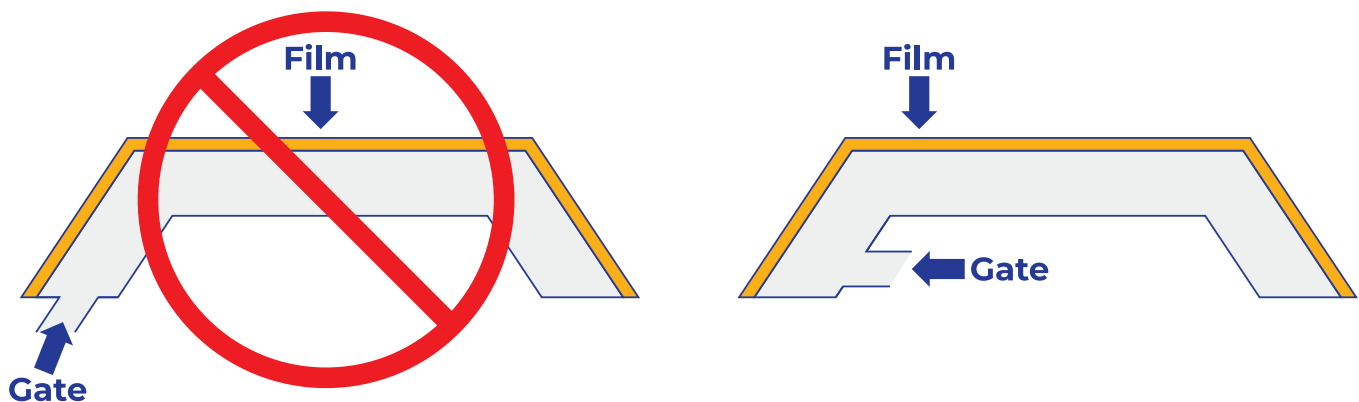
However, inks used for second surface printing (which is much more common with IMD) will need to have special properties. Resin to ink adhesion can be very challenging and the use of tie coats or binder passes may be necessary. Inks used will need to:

- Adhere to the film and resin
- Be printable
- Offer gate wash resistance
- Be formable (for 3D IMD projects)

Molders should work with their printing partner to identify and test appropriate inks based on application requirements.

Gate placement

Experienced injection molders are well-versed with gating and how they must work with tool designers to ensure gates are located in appropriate areas. But with IMD, gating is even more important and more challenging because if located in the wrong place, the injected resin can cause serious issues. The force of the resin flow can damage the applique or blow it away completely, while the heat can potentially melt inks and applique substrates. So, it's vital gate placement is executed with the unique challenges of IMD in mind.



8 tips for better IMD gating

1. Use one gate whenever possible to reduce knit line effects.
2. Use short land lengths to ensure good flow.
3. Use impinging gates whenever possible to lock the film into place during fill.
4. Direct flow toward vents to prevent gas entrapment.
5. Gate from thick to thin areas to avoid venting issues.
6. Gate away from impact areas to minimize stress in those areas.
7. Use indirect runner systems to prevent jetting and potential gate wash.
8. Minimize flow restrictions near gate.



Testing requirements

There are certain testing requirements that are applicable to in-mold decoration that molders may not be familiar with because they are unnecessary with traditional molding. For example, actuation testing is required if an IMD product — such as an elevator button — needs to be able to surpass a million actuations. The printer, molder and OEM need to work together to design a label that can withstand that many actuations without high failure rates. These kinds of considerations need to be specified early in the product development process to avoid major issues.

Types of IMD testing



Stain resistance testing



Color stability testing



Exposure testing



Chemical testing



UV testing



Abrasion resistance testing



Actuation testing



Reliability testing

Find quality printing and testing partners

A quality, experienced printer like DuraTech can recommend vetted IMD label materials, inks and process improvements to help molders meet testing requirements. This can help speed up production and shorten lead times for IMD projects. It may also be a good idea to establish partnerships with third-party labs for testing to ensure all products meet application requirements and quality standards.

Benefits of working with an experienced printer early in the IMD process

Much of the success of any IMD project depends on early collaboration between molders, printers and OEMs. By partnering with an experienced printer early in the product development process, molders can be better positioned to:

- Optimize molding processes
- Ensure film, ink and resin compatibility
- Shorten lead times
- Avoid materials sourcing issues
- Ensure client satisfaction

Why you should choose DuraTech

DuraTech offers customized in-mold decorating solutions using cutting-edge technology and backed by extensive IMD experience. We've created IMD applications for customers in the automotive, home appliances, medical devices and consumer electronics industries. Our team works closely with engineers, tool makers, designers and product development specialists for both molders and OEMs. That collaboration helps shorten lead times, reduce fallout and enhance overall IMD quality. Put our experience and industry knowledge to work for you to reduce your decorating costs and improve your graphics durability.

Work with DuraTech for your next IMD project!

Experience the value our IMD services and technical expertise can bring to your business.



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