

## Building a better injection mold

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By Terry L. Schwenk (As published in Tooling Product News, August 1, 2007)

Today it seems more confusing than ever when it comes to building injection molds. As always economics seems to drive the final decision. But you have to ask yourself, are you getting what you pay for? Are you willing to fight for what you pay for? The rules of mold construction have not change. What has changed, are the tooling requirements, or perceived requirements. Do you just build the cheapest tool possible and let the maintenance issue be someone else's problem? Or do you invest the time to build the best possible tool for the application.

It's critical for not only injection molds but all items requiring some type of construction, to build to requirements. That way all quoting and pricing will be based on the same requirements. It can be a difficult task to establish the tooling requirements, when customers and management don't really know the product demands or requirements. However if you can present the alternatives or at least get an agreement on the type of tool required, you're half way home.

With that information in hand you can give the mold-maker some idea about what the expectation of the project is. Then they can make a decision on what features will be standard and what features are options, whether they charge for the options or have them included in the pricing gives you better choices.

### SPI MOLD CLASSIFICATIONS

Molds are classified into different categories based on expected mold lifetime cycles. The different classifications dictate significant differences in mold design and material which will impact tooling price. It is important to have strict adherence to these classifications in mold quoting and build cost.

<b>Lifetime Cycles</b>	<b>Definition</b>	<b>SPI Classification</b>	<b>Est. Build Time</b>
Greater than 1MM	Super high production	101	12-20 weeks
Less than 1MM	Medium production	102	8-12 weeks
Less than 500M	Low production	103	6-8 weeks
Less than 100M	Low production	104	6-8 weeks
Less than 500	Low production	105	5-6 weeks
Low Cavity High Cycles	Pilot Mold (class 101)	PM	8-12 weeks
Less than 500	Prototype	PT	Less than 6 weeks

## SPI MOLD CLASSIFICATIONS

Tool Category	101	102	103	104	105	PM	PT
Full Interchangeability	X					X	
SS Frame	X					X	
SS Water Plates	X					X	
DME #2 or Equivalent		X	X	X	X		
Nickel Plated		X					
Tool Steel Inserts	X	X	X			X	
P/L Interlocks	X	X	X			X	
Pre-hard Core Inserted				X	X		X
Pre-hard Cavity				X	X		X
Guided Ejection	X					X	
Spring KO Return	X	X	X	X		X	
Wear Plates	X	X				X	
Pre-hard Prototype							X
Aluminum Prototype							X
Auto Side Actions	X	X	X	X	X	X	
Manual Side Actions							X
Steel Certification	X	X	X			X	
Dimension Certification	X	X	X	X	X	X	
Heat Treat Charts	X	X				X	
Full Design	X	X	X	X		X	
Layout Only					X		X
Auto Running	X	X	X	X		X	
25% Spares Quoted, (Separate line item)	X					X	

**So, now you have all the information for making a good decision, right? Wrong!**

To remain competitive, companies need to have all the departments associated with the manufacturing of plastics products working together. Let's say you have a new widget and the volume requirements are 1,000,000 pcs. per year. Here are some questions to consider.

1. **How many cavities do you need?**
2. **What class of tool is needed?**
3. **How much money has been budgeted for the project?**



Here is where it gets complicated. A single cavity tool @ 18 second cycle can produce a million parts per year. But it ties up one molding machine all year and if your machine rate is \$50.00 per hour, manufacturing cost per part is \$0.2778. The tool class required is 101 and the most expensive.

A two cavity tool will produce the required parts in approximately 6 months @ a cost of \$0.1389 per part. In this case, you may be able to get by with 102 class tool.

A single cavity tool running a 9 second cycle can also meet the requirements. It will cost more than the original single cavity but less than the two cavity tool, and still produce the parts @ \$0.1389 per part.

So not only do you need to look at the tooling requirements, but also the manufacturing requirements of not only this application, but how it affects all the other tooling applications and capacity planning of the manufacturing floor. It boils down nowadays for engineers to not only have an engineering background, but to also have a high degree of awareness of the total manufacturing requirements and planning.

Asking the right questions early on in the process can save a lot of money down the road. Inexpensive tooling does not mean in-expensive manufacturing. And just because the volumes are low doesn't mean you don't invest into a high performance tool. If your company lacks these disciplines' internally, there is help outside. Seek out these professionals in the industry that can assist you with these issues before you buy your next tool. You'll find that being competitive and profitable is still attainable in today's market.

## **Process and Design Technologies contact:**

### **Terry Schwenk**

9030 32<sup>nd</sup> Avenue  
Kenosha, WI 53142 United States  
Tel: (262) 237-2525  
Fax: (262) 694-3961  
Email: [tschwenk@processdesigntech.com](mailto:tschwenk@processdesigntech.com)  
[www.processdesigntech.com](http://www.processdesigntech.com)

### **About Process and Design Technologies**

Process and Design Technologies, a technology partner and associate of SWM & Associates, was created to provide plastics companies with complete optimized processing solutions through efficiencies gained in engineering, manufacturing and processing. Company founder, Terry Schwenk has over 33 years of experience in the plastics industry, including more than 22 years of specialized experience in hot runner technology and tooling. An active member of SPE and holding the position of Past Chair for Mold Making & Mold Design SPE divisions, Terry has an associate degree in Business Administration and is accredited with several patents.