

## HOT RUNNERS: THE RISE OF UNITIZED SYSTEMS



Husky's fully configurable PRONTO hot halves.

Photo Credit: Husky Injection Molding Systems

These days, if you're not using hot runners to make plastics parts, you're just not cool. And unitizing hot runner systems to reduce machine downtime, increase production, and avoid the pitfalls of multiple sourcing can make your life a whole lot simpler, as well.

By Mark Stephen, managing editor

Probably the key word in "hot runner systems" is "hot" — as in becoming more popular all the time. Nowadays, hot runners are being used more frequently for the production of injection molded parts than ever, as they permit parts to be produced more rapidly with improved quality, making production more cost-efficient overall.

And, as practically any plastics processor will tell you, cost-efficiency is king in today's economic climate.

Hot runners also have a technical advantage: some of the most widely-used forms of injection molding — such as insert, coinjection, and multicomponent molding — would be impossible without hot runner systems.

But there's a slight downside. "Hot runners have to bring together time, temperature, flow, and the pressure of plastics operating on rapid cycles, and this makes them inherently complex," said John Schmidt, hot runner, sales with PCS Company. And it probably doesn't help that hot runners are self-contained, and hidden — incorporated entirely within the injection mold — with tasks and functions

that are completely different from those of the mold itself.

No wonder more than one processor has referred to the process as a "black art".

Many are choosing to overcome any difficulties caused by this complexity by ordering state-of-the-art hot runner systems to be supplied in ready-assembled form as injection halves — or unitized. According to some hot runner system suppliers, this can prevent installation errors, simplify connection of the system, and reduce the amount of time required for installation in the mold.

And it's a service that they're increasingly happy to provide.

### THE IMPORTANCE OF BEING COMMUNICATIVE

For processors that decide to order a unitized system, good communication with the hot runner supplier is — not surprisingly — crucial. "The key thing that needs to happen is a good communication stream with the customer," said Mike Brostedt, director of market development with Gamflux L.P.

Information that the hot runner system

supplier needs to know includes the mold dimensions, information about the interface, the nozzle length, the part weight, and the type of resin to be used. Injection time is also necessary to calculate the melt channel sizing, and information about the injection molding machine itself can also be helpful. "We want to know whether there are any pressure limitations in the molding machine, for example," said Martin Baumann, business manager, hot runners with Husky Injection Molding Systems. "Also, if there's too much pressure being used in the hot runner system, there may not be enough left to fill the part. Most injection molding machines have at least 30,000 psi available, but some don't, and this is important information." Suppliers will also want to know the radius of the injection nozzle, Baumann continued, so that the interface between the hot runner and the machine nozzle fits properly; and the tie-bar spacing, so that the system fits within the given envelope.

Ordering a unitized system, some suppliers say, can prevent some of the pitfalls that can be inherent in a mold obtained from multiple sources, since both the hot half and the mold base are coming from the same source. "Finding a hot runner supplier that integrates both the hot half and the mold base into a single mold package is an alternative approach to multiple sourcing, and can avoid the ongoing design changes, errors, and miscommunication that often result in significant manufacturing rework, and unbudgeted costs," said John Schmidt.

From the point of view of design, a unitized system can make it simpler to configure such things as electrical and hydraulic connections to customer specification. "The hydraulic mechanism driving the valve gate also can be mounted directly on the system, making the injection mold more flexible, and enabling it to be used on machines without additional control valves," said John Blundy, vice president, business development with Incoe Corporation.

Mold-Masters Ltd., for example, offer

ready-to-use hot halves that feature stainless steel plates, and come ready to bolt directly onto a cavity plate with no further machining, wiring, or fitting required.

Positioning can also be optimised. "Unitized systems are centred in the injection mold with minimal contacts made of materials that are poor heat conductors, and do not require any clamping or pre-tensioning of the mold plates," said John Blundy. "The minimal contact in unitized systems provides highly accurate and stable temperature profiles, with energy consumption substantially below that for conventional systems."

### TESTING, TESTING...

Usually with unitized hot runners, the systems undergo electrical continuity, temperature, and pneumatic or hydraulic tests prior to delivery. "If a customer buys an Altanium temperature controller from Husky, for example, we'll test the system before it's shipped to make sure it's electrically-wired properly, so that each nozzle tip reads the temperature accurately," said

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Martin Baumann. "If the customer has not bought the controller from us, we'll still test it, as well as inspect all the key dimensions, and provide the customer with a test report". The end result, Baumann said, is a checked, ready-to-install system that can be easily assembled in the mold and brought directly into operation.

Other suppliers offer similar services. For example, Hasco's new Hot Base comes tested, assembled, and ready for installation of cavity and core plates or inserts, according to Louis Hebert, president of Hasco Canada. "The unitized Hot Base can be configured for speciality designs like side-entry, multi-material, high-cavitation, and stack molding," he said.

Despite this complexity, the construction of a unitized system can be relatively

quick, too. For example, D-M-E Company's unitized hot runners can be ready to ship in as little as three weeks, the company said.

If the unitized system has been properly built to specifications, its value can become apparent as early as during installation, some suppliers maintain. "The design of unitized systems makes it possible to install pre-wired hydraulic connections directly on the system, independent of the mold to be used," said John Blundy. "The hydraulic mechanism driving the valve gate also can be mounted directly on the system, making the injection mold more flexible, and enabling it to be used on machines without additional control valves."

On unitized systems, the nozzles and manifold blocks constitute a single drop-in unit. The melt channel runs from the manifold block directly to the nozzle without any potential misalignment or dead spots. "Any potential for plastic leakage between the nozzles and the manifold block is eliminated since the nozzles are inserted within the manifold by a thread connection," Blundy continued. "This eliminates the tendency for plastic leaks between the nozzles and manifold, which can occur during heat expansion of conventional bushing-type system designs, causing production inter-

ruptions."

"With a bolt-on hot side system, the customer doesn't need to make any adjustments, just put it next to the cold half and turn on the temperature switch," said Tony Brusca, president of Alba Enterprises. "Within 20 to 25 minutes, depending on the size of the system, they can make their first shot."

Benefits of a unitized hot runner system continue once it's running, suppliers say, beginning with routine maintenance. "While conventional injection halves also allow some maintenance to be performed when in the molding machine, it's limited to the very front of the nozzle area due to the retainer plate. Servicing beyond this point requires the hot runner manifold system to be removed from the machine

in order to expose the manifold system, and this involves a considerable amount of work, with a renewed risk of assembly and installation errors," said John Blundy. "Maintenance can be performed on an integrated system without removing the system from the molding machine."

Then there's the question of inserts. Inserts can easily be interchanged. Since the hot runner system remains firmly attached to the stationary plate during this work, the mold can be repositioned again immediately after the service work is complete, and can be ready for production again in just a few minutes. Integrated systems can thus save several hours — or in large systems perhaps days — during routine hot runner system maintenance.

Also, unitized systems can provide a considerable contribution to reducing the number of errors and saving time for mold manufacturers during the manufacturing and sampling of new molds. In addition, integrated systems permit additional savings for injection molders by reduc-

ing downtime during injection molding production.

### WHEN NOT TO

Does it always make sense to order a unitized hot runner system? Not necessarily, some suppliers say. Many molders of large auto parts, for example, prefer the do-it-yourself approach. "For large parts molders, the hot runner system still tends to be pieced together by them, or the moldmaker is tasked with the responsibility of piecing it together," said Mike Brostedt. "It's done for the same reason that a house is typically built on-site: it's simpler that way, and makes a great deal of sense."

There are also many moldshops that will handle the assembly or the wiring of any hot runner system in-house because they're willing, and technically capable, to do the procedure themselves — which is fine with hot runner suppliers, too. "We'll certainly provide them with a drawing and enough information so their designer can handle the job," said Tony Brusca.

"Whether or not a customer wants a unitized system, hot runner technology will continue to play an increasing role in injection molding production, and it's our job to make this transition as inexpensive and convenient as possible." **CPL**

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### RESOURCES LIST

#### **Alba Enterprises Inc.**

(Rancho Cucamongo, Calif.);  
www.albaent.com; 1-800-432-6653

#### **D-M-E of Canada Ltd.** (Mississauga, Ont.);

www.dme.net; 1-800-387-6600

#### **Gammaflux L.P.** (Sterling, Va.);

www.gammaflux.com; 703-471-5050

#### **Control Solutions** (Brampton, Ont.);

905-458-8382

#### **Hasco Canada** (Toronto);

www.hasco.com; 416-293-5044

#### **Husky Injection Molding Systems**

(Bolton, Ont.); www.husky.ca; 905-951-5000

#### **Incoe Corporation** (Troy, Mich.);

www.incoe.com; 248-616-0220

#### **Mold-Masters Ltd.** (Georgetown, Ont.);

www.moldmasters.com; 905-877-0185

#### **PCS Company** (Fraser, Mich.);

www.pcs-company.com; 1-800-505-3299

(Windsor, Ont); 1-800-521-0546