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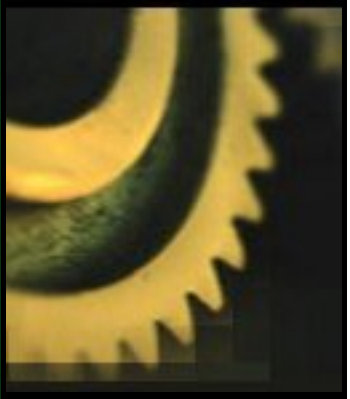

Welcome to Advanced Technology Home Page*

EPS Molding Machines, Engineering, Installation, Training & support is the small list of what we offer. The **Lostfoam Casting Process** will be one of many castings processes we support.

Other casting processes will include, but not limited to (DieCasting - Trim Presses, Permanent Molding, Investment Casting, Plaster Process, Replicast and many others.) Also additional information will be made available on Equipment like Trim Presses, Cell Automation, Pick & Place for Parts, Plastic Injection Machines, and many other Special Application Machines. (customized or customer design)

We have strategically aligned ourselves with FALLS PRESS as the Manufacturer of Our Presses for Lostfoam Systems and Installations, cooperating with Superior Automation & Engineering, who we have worked with for over 12 years. Rich Gall, who is the owner of FALLS PRESS, has had extensive experience working with EPS Machines. He developed one of the

Largest EPS Molding Machines (85" Platen) for molding 5 full length bumpers in Polypropylene for automotive application, that was built for Speed and Duribility for Longevity. You can **go to his sight** to see equipment and background experience.

Thank you for your continued patronage and we here at Advanced Technology are looking forward to a rewarding relationship.

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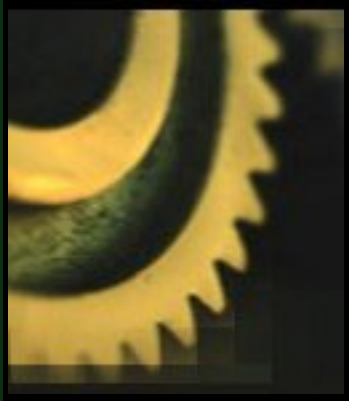

Lostfoam Casting Process

The following link will open up a PDF file, Created in Adobe.

If you need the reader, you may get it by going to News Letters above for the Link.

This is about a 20 page document going through the overall basic questions people have about the Lostfoam Process - Process - Tooling - Quantities - other information.

Click on the next line to open file.

For Free Reader - Get Adobe Acrobat Reader

Lostfoam Casting Process Explained - PDF File

Or Click Here to see Text Version

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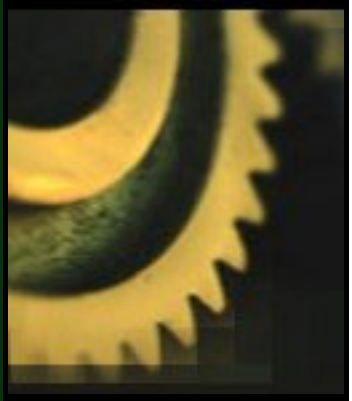

Lostfoam - Technology NOW - & other Casting Processes

These Web Pages were developed to be a source of information for our customers. The following is product availability and engineering capabilities of Casting Processes, including Rapid Prototyping, Rapid Tooling, Epoxy Tooling, New Technology Developments, for most casting processes in the Industry Today. These processes include Lost Foam, Investment, Plaster Process, Plastic Injection, Thixomold, Die Casting, Low Pressure Permanent Mold, Green Sand and many other processes. We are a Single Source for supplying our customers with the Best Service to Technology, Machinery, System Integration, and much more. Our customers depend on our Expertise & Engineering Capabilities to help them through their projects. References are available. Our Combined Network Teams have over 100 years experience to offer assistance.

Click here to go through written text only on the lostfoam casting process.

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Lostfoam Casting Process - Questions and Design Criteria

First, a foam pattern and gating system are made using a molding press and aged in drying oven.

Secondly, the foam pattern and gating system are assembled into a cluster.

The cluster is then coated with a permeable refractory coating and dried under controlled conditions.

The next step is to invest the dry coated cluster in loose unbonded sand that is vibrated in and around the foam cluster.

The final step in the casting process is to pour the molten metal directly into the foam cluster, decomposing the foam in the system and replacing it with metal.

The Flask is left to cool for a period of time, depending on the type of metal that is being poured. Once enough cooling has taken place, the flask is either dumped out onto a conveyor or casting cluster is extracted before dumping sand.

Casting cleaning operations would include minimum (cutoff, grinding), heat-treat if necessary, and typical tumbling. This is similar to other casting processes, but this is one area of cost reductions. The other would be on the reduction of machining features in the casting. Dependant on the tolerances of holes, passageways, or machine stock, major savings in

the process are in the reduction of machining.

While maintaining good process control over key parameters in the process, inspection could be kept down to a minimum. Process Control is a must, with proper documentation in the lostfoam process. This starts with the raw material through the inspection process.

Click here to go to next Question. - What is the Lost Foam Process

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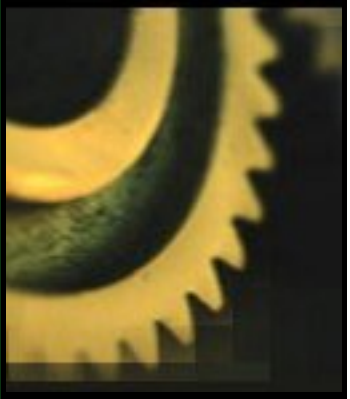

Molding Presses

Lostfoam Casting Process - Questions and Design Criteria

What is the Lost Foam Process

The **Lost Foam** Casting process originated in 1958 when H.F. Shroyer was granted a patent for this cavity-less casting method, using a polystyrene foam pattern embedded in traditional green sand. The polystyrene foam pattern left in the sand is decomposed by the molten metal. The molten metal replaces the foam pattern, precisely duplicating all of the features of the pattern. Like investment casting (Lost Wax), a pattern must be produced for every casting made.

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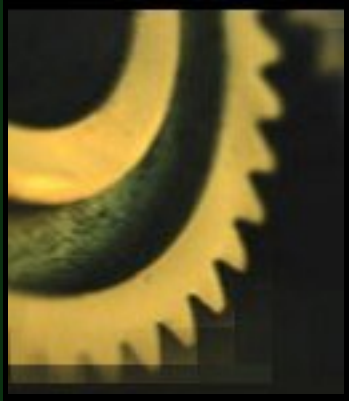

Molding Presses

Lostfoam Casting Process - Questions and Design Criteria

What size parts can be poured?

Lost Foam Castings can be produced in most all metals from a fraction of a pound to thousands of pounds. Slightly different techniques are used for extremely large castings. i.e. Full Mold for Large Base Castings. We have found that if you have a casting that is 10 lb plus in Aluminum or 30 lb plus in iron, these castings become very competive, even on simple parts.

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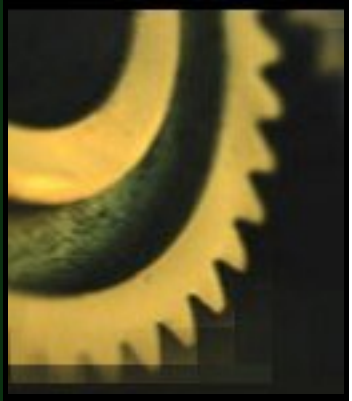

Molding Presses

Lostfoam Casting Process - Questions and Design Criteria

What kind of surface finishes can I expect?

Because a thin permeable refractory shell is applied around the smooth foam pattern, the resultant finish is excellent. (See comparison on chart). Each casting facility may differ slightly from standards shown. This must be discussed and agreed upon based on the function and cosmetic requirements of the part prior to release of the tooling order.

CASTING PROCESS_____RMS RANGE

Die Casting ----------20-120
Investment Casting ----------60 - 200
Lost Foam ----------60 - 250
Shell Mold ----------120 - 300
Centrifugal - Perm. Mold -----120 - 300
Static - Perm ----------200 - 420
Normal Non-Ferrous Sand ---300 - 560
Normal Ferrous Green Sand -560 - 900

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Lostfoam Casting Process - Questions and Design Criteria

What type of tooling is needed? How much will the tooling cost?

Typically a split cavity aluminum die is made that is the negative mold from which the positive foam pattern is produced. This tooling is highly specialized and must be done by expert tooling manufacturers familiar with the requirements of the casting producers. ***"The casting can be no better than the pattern used to produce it."*** Most tooling for Lost Foam patterns will compare very favorably with permanent mold and die casting. About $1000 on the low end to several hundred thousand dollars on the high end for automotive components like engine blocks, cylinder heads, and manifold. Lost foam tooling life is at least 5 to 6 times that of permanent mold or die cast tooling.

One of many Major advancements of Prototyping parts, before hard tooling is cut, casting

shrinkeage can be established. This can get a project on track, many months ahead of schedule of permanent hard tooling. Process Parameters can also be worked on, during permanent tool construction, saving time for casting development. Rapid ProtoTyping in Lost Foam can be done by MACHINE CUT FOAM, CNC CUT FOAM, SPRAY METAL TOOLING, OR EVEN SPECIAL EPOXY TOOLING. Another advantage of prototyping is having the capability of testing out a specific design, before spending on tooling. Customers have cut years off development on this type of prototyping development.

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Lostfoam Casting Process - Questions and Design Criteria

What is the the Quantity of Parts I need

Not as many as you may think! Tooling amortization is a key factor in this determination. Potential overall savings for your application will aid in your decision. Generally a minimum of 500 to 1000 pieces per year is a good place to start. On the high end, several hundred thousand automotive parts per year are currently cast in the Lost Foam Process economically.

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Lostfoam Casting Process - Questions and Design Criteria

What kind of tolerances can I expect?

Typically, a linear tolerance of +/- 0.005 in./in. is standard for the Lost Foam Casting Process. This varies, depending on size, complexity, and geometry of the part. Subsequent straightening or coining procedures often enable even tighter tolerances to be held on one or two specific dimensions. A concerted three-way effort between the foam pattern producer, the casting producer, and the casting user will often result in a Lost Foam Casting that substantially reduces or completely eliminates previous machining requirement.

DIMENSIONS	NORMAL	PREMIUM
up to ½"	+/- 0.007"	+/- 0.003"
up to 1"	+/- 0.010"	+/- 0.005"
up to 2"	+/- 0.013"	+/- 0.008"
up to 3"	+/- 0.016"	+/- 0.010"
up to 4"	+/- 0.019"	+/- 0.012"
5" to 10"	Add 0.003"	Add 0.001"
max. variation	each add.Inch.	each add.
	+/- 0.040"	Inch

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What about casting integrity.

Lost Foam Castings are used for many critical applications - in the automotive, marine, aero space, and construction industries, requiring x-ray and other soundness testing.

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Are Lostfoam castings expensive?

While Lost Foam Castings are generally more expensive than forged parts, or parts made by other casting processes, they make up for the higher cost through the reduction in machining due to the tight, near-net shape and net shape tolerances achieved as cast. Many parts that require milling, turning, drilling, and grinding can be Lost foam cast with only 0.020" - 0.030" finish stock. Again, it is imperative that all involved discuss what features can be cast to determine final finished product cost.

Next Question

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Lostfoam Casting Process - Questions and Design Criteria

What kind of lead times can I expect?

Lead times vary greatly depending on part complexity. Generally 3 to 12 weeks is typical for tooling and first casting. Then 1 - 3 weeks for production after sample casting approval. By utilizing casting drawings designed with surface models, we can cut 2 to 5 weeks off from production tooling. There are rapid prototyping methods available; however, tolerances, surface finish, and cost will be considerations. Establishing geometric shrinkeages is a major cost savings overall. On the other hand, faster to market does have it's overall cost advantages, offsetting prototyping costs. As was stated before, if prototype tools are made, much of the casting development can be done during permanent tool construction.

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Lostfoam Casting Process - Questions and Design Criteria

What kinds of metals can be poured?

- **Aluminum**
  - **356 - 319 - 355 - 333**
- **Gray Iron**
  - **Class 25 - Class 30 - Class 35 - Class 50**
- **Ductile Iron - A D I - Steel - Low Carbon Steels**

At this time, because of the carbon pickup, we would recommend using Ceramic Shell and High Density Foam as an alternative process. This works well for larger castings. Similar to Investment. There will be a future link to this process, with more detail.

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