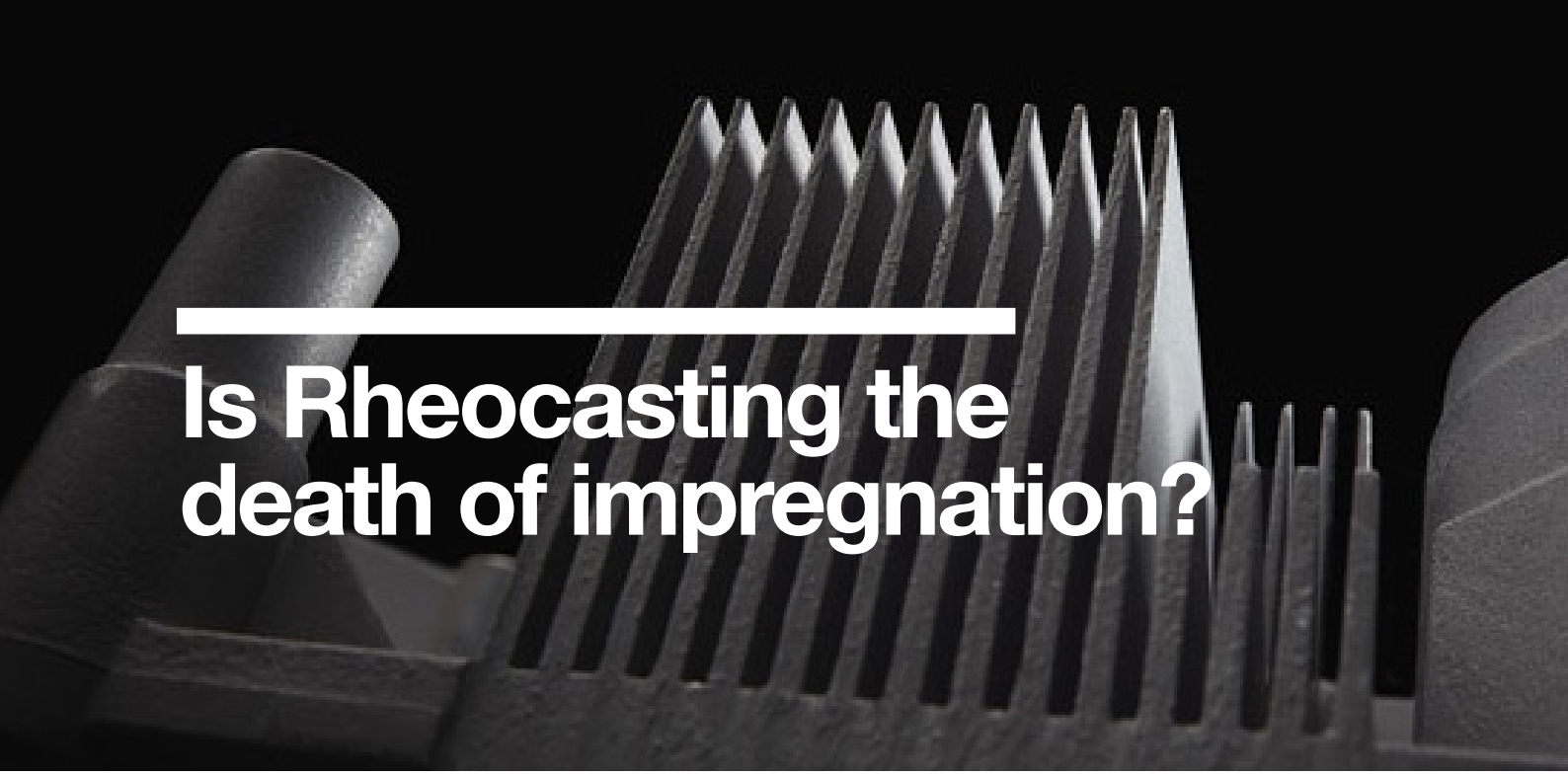

Is Rheocasting the death of impregnation?

Background

The use of impregnation has for many years proved it capability of making high pressure die casted components leak free. But more and more applications for E-mobility and others are now requiring non impregnated components as temperatures, pressure peaks and pressure dynamics is simply ruling out impregnation as an solution. And as impregnation is a cost there is a clear driver to reduce this cost and also simplify the supply flow of components.

The choice has been to use machining, Hot isostatic pressing or other processes in order to achieve the same result, but what if Rheocasting is the solution?

Achieved results with Rheocasting

The results are based on development and production of several parts. Medial is ranging from gas to oil and the results are proven with more extreme measures as 120 Bars of pressure and Helium as test gas. The use of Helium is based on that the He atom is so small that is will likely creep through any leakage channel however small it is. Another proof of concept is that several parts and projects are now in high volume production after extensive tests at customers laboratories.

Rheocasting

There are many semi solid processes out on the market. Most of them are functional and doing god parts better, but for very high demands there are still some doubts. Basically the great difference from a process that allows a completely laminar flow, effective after feeding must have a high level of solid fraction to start with. Further, it must be cheap to install and run in production as many customers now are in the automotive industry, e mobility or not, the parts must be cost effective.

Current status of Rheocasting in non leaking applications

Semi solid casting has been around since Professor Flemings invention in the early 70:ties. As methods for casting it has been a slow development until 2016 when the interest become large. The reason for the interest is mainly due to the fact that HPDC is not giving the design features enabling higher functionality and lower weight for the automotive sector.

As for now there is volume orders taken for the automotive industry and the number of projects is growing constantly. Besides this there are double digit number of discussions about implementation of Rheocasting around the world.

The applications of interest

Basically, everything that is impregnated today and is made from casted aluminum are of interest. This means that everything containing gas (compressors, gas distribution) or oil (hydraulics, transmission valve bodies) or water (cooling systems e-mobility, high efficiency battery packs)

What are the callanges then?

To design and industrialize a component for Rheocasting is the same as for a HPDC part, with some changes in thinking regarding the casting process. It is very slow in the beginning, but then fast in the end why tool design is crucial.

The biggest challenge is engineering capabilities. As for now the number of people that have experience and skills for the industrialization of Rheocasting components are few, to few why our concern is that these people will be absorbed rapidly in the current wave of component development.

How is the cost/price affected?

IN order to make an overview we have listed the main cost drivers identified in the table below:

Cost driver	Difference from HPDC	Remark
Cost of castingc (HPDC as comparison)	+/-0	There is the same investment cost, and same cycle time
Tool cost (initial investment)	+/-0	Same size and steel used
Tool wear (number of shots)	Life length 60-90% longer	Reduction of amortization with 30-50%
Impregnation cost	-0,3-2 EUR, depending on part size and complexity and volume.	Only the impregnation cost, no transport or friction costs
Friction cost impregnation	Test, transport, tied capital, discussions, quality process, rejects from end customer etc.	2-5 times the process cost of impregnation as process

In summary the first saving is the impregnation cost, but the larger saving is from the friction costs for transportation of parts back and forth and al the OH and resources required to keep the quality of parts due to leakage in order.

Summary

The reasons for standard impregnation is to be reevaluated and carefully examined as Rheocasting can reduce the cost in the short and long run. More ever the environmental effects are also present: less transportation with less harm to our ecosystem

About Comptech AB

Comptech AB is a research and development driven foundry with production in Sweden and in China. We have a large R&D portfolio that has resulted in processes and alloys for: thin walls (0,4 mm thick), high heat dissipation, long elongation (+9%), high strength and pressure tight parts (up to 150 bar). We work with universities and customers to reach those results and we welcome new potential customers to take advantage of our findings and results.

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