

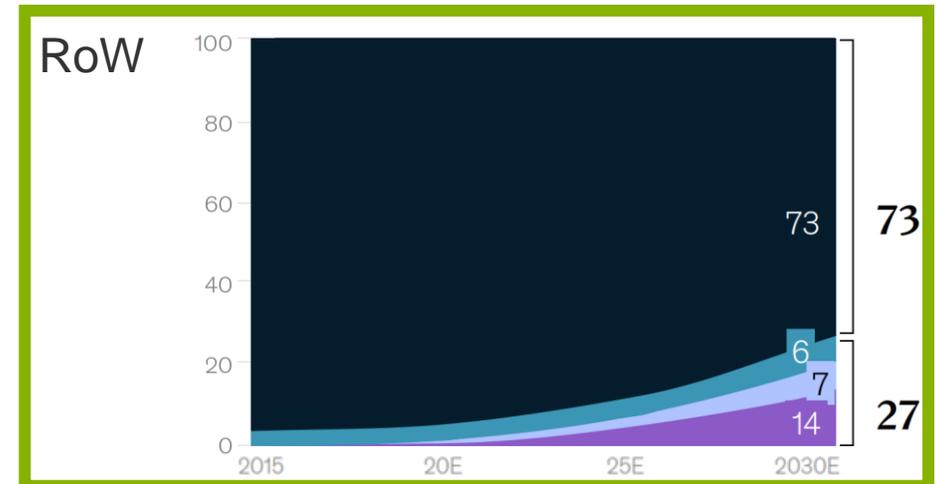
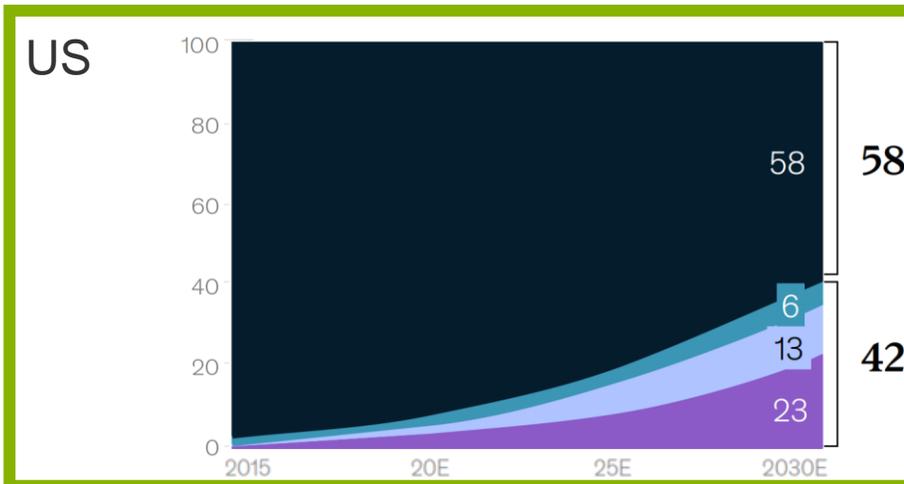
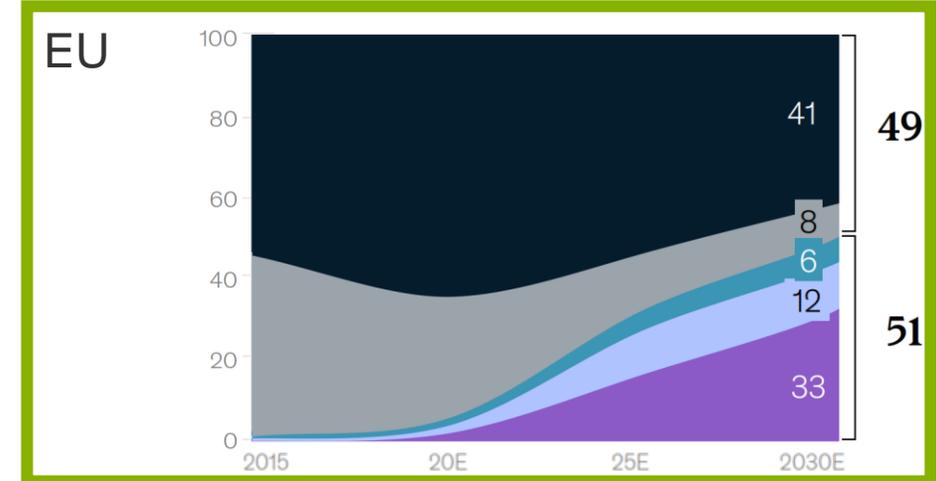
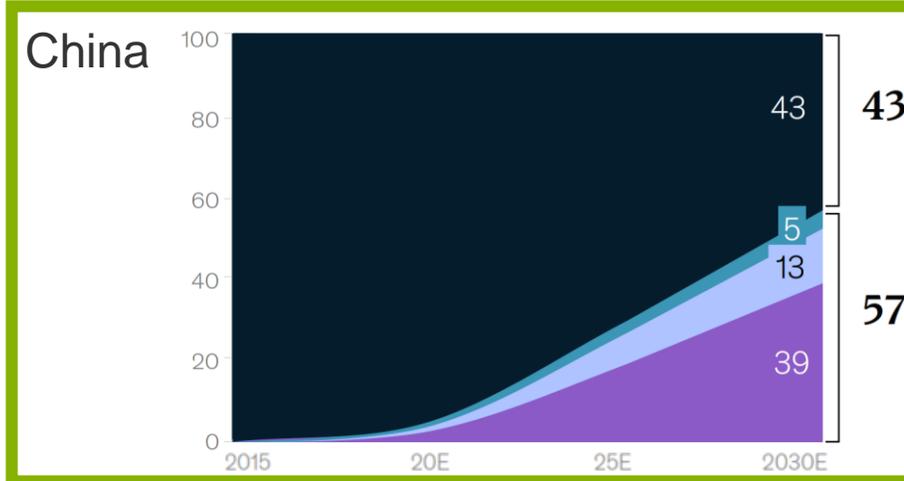
Introduction of company AionaCast

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- STATUS QUO
- INNOVATION
- IMPLEMENTATION
- ADVANTAGES
- OFFER

 <p>Established in 2010</p>	<p>AionaCast is located in the South of Germany.</p>		<p>Vaihingen an der Enz</p>
<p>The company does not have an own production facility, we did set up collaborations with partners who own adequate production capacities in the required fields.</p>	<p>AionaCast is involved in all aspects of the aluminum castings business:</p>		
	<p>Marketing</p>	<p>Sales</p>	<p>Development</p>
	<p>Consulting</p>	<p>Engineering</p>	<p>Trouble-shooting</p>

Share of new vehicle sold, percent

EV breakthrough scenario (evaluated before COVID)



■ BEV
 ■ PHEV
 ■ HEV
 ■ ICE and MHEV (gasoline in Europe, gasoline and diesel in all other regions)
 ■ ICE and MHEV diesel (EU only)

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E - engines

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   example for a 2-shell concept

All new traction electric motor housings for electric driven passenger cars and trucks are liquid cooled, even it is not the only one per motor concept.



inner shell

outer shell

Creating innovation...

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The problem we would like to solve is:
How to offer a production process for the cooling channels, which is at the same time easier, cheaper and of a higher quality?

 **It should present the following features:**


No assembly process, just one casting for the housing, potentially including other features such as a gear box, etc.

Suitable for high volume production -cheap- 



Weight reduction

Flexible layout of the cooling channels

No risk of leakage

 Uniform cooling

Scalable in length and diameter



Low pressure drop

Our idea, which is already patent pending

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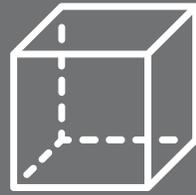
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PCT/EP2017/000304



We insert a light metal sheet package, which already includes all cooling channels and connectors, in a die for gravity or low pressure die casting and we recast it with aluminum.

What makes this innovation really stand out, is the **perfect combination of a standard casting process with the common roll-bonding production method** used for the light metal sheet package!

Hence the innovation is named

RoBoC
(Roll Bond Core)



Design options

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One Side Inflated
with the help of different
aluminum material grades



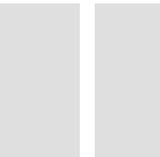
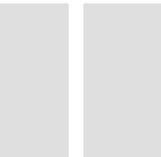
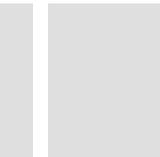
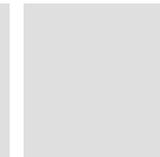
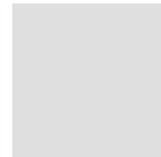
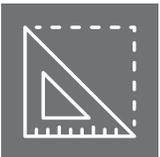
The diagram shows a cross-section of a single aluminum sheet with a central, rounded, inflated section. The sheet is wider than the inflated part, and the inflation is only on one side, creating a curved, dome-like shape.

or

Double Side Inflated



The diagram shows a cross-section of a double-sided inflated aluminum sheet. The central part is inflated on both sides, creating a symmetrical, elongated, oval-like shape. The sheet is wider than the inflated part, and the inflation is on both the top and bottom surfaces.



The thickness of each sheet is approximately 0,5 to 2,5 mm

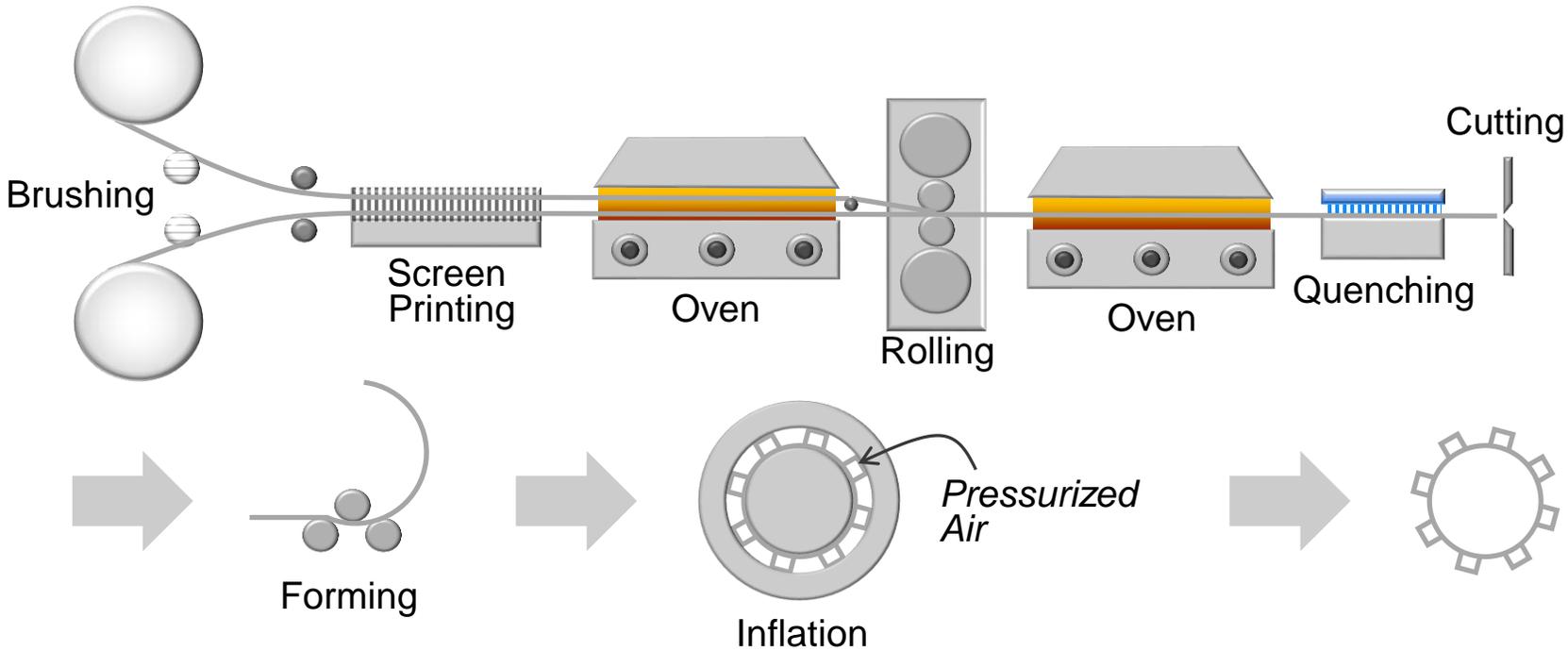
Geometric tolerances are similar to the standard sand core process

Stable up to a burst pressure of 60 bar

Realization

1.

Manufacturing of a Roll Bond, ready to be inserted



Realization

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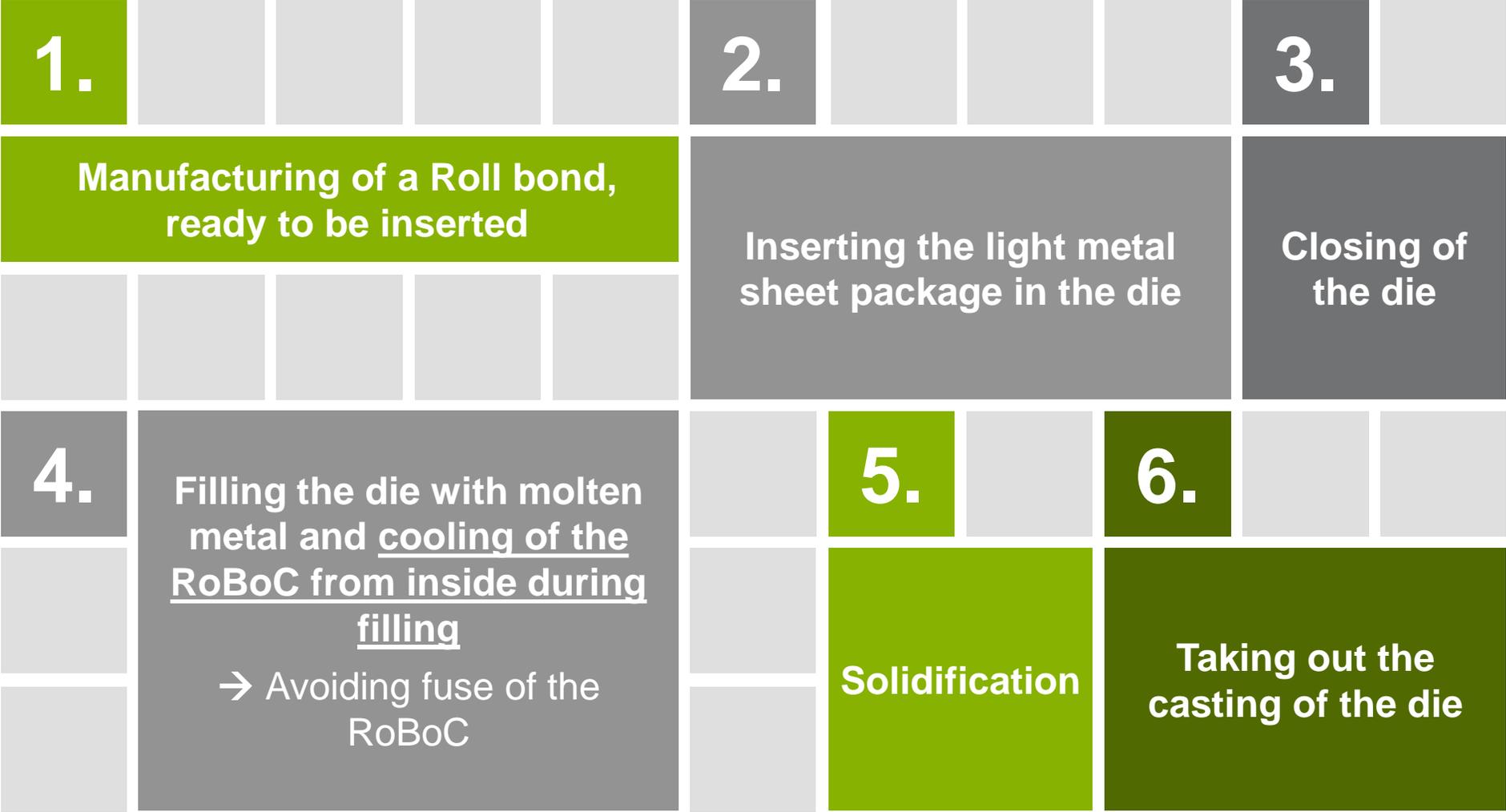
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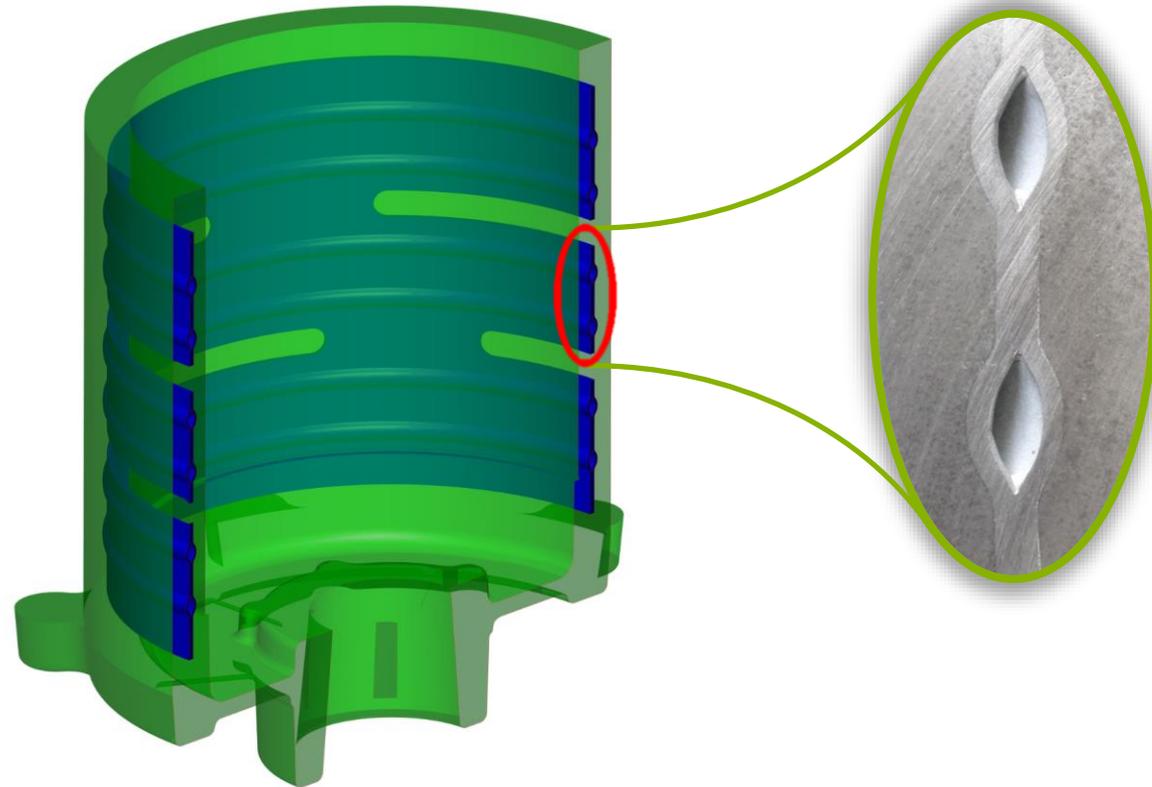
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Result

The result is a smooth embedded metal sheet with the shapes for the cooling channels integrated in the casting.



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Implementation (proof of concept)

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Cut electric motor housing

At that time, little attention was paid to the size of the cross sections for the cooling medium and weight reduction



Implementation (proof of concept)

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Casted electric engine housing with connectors



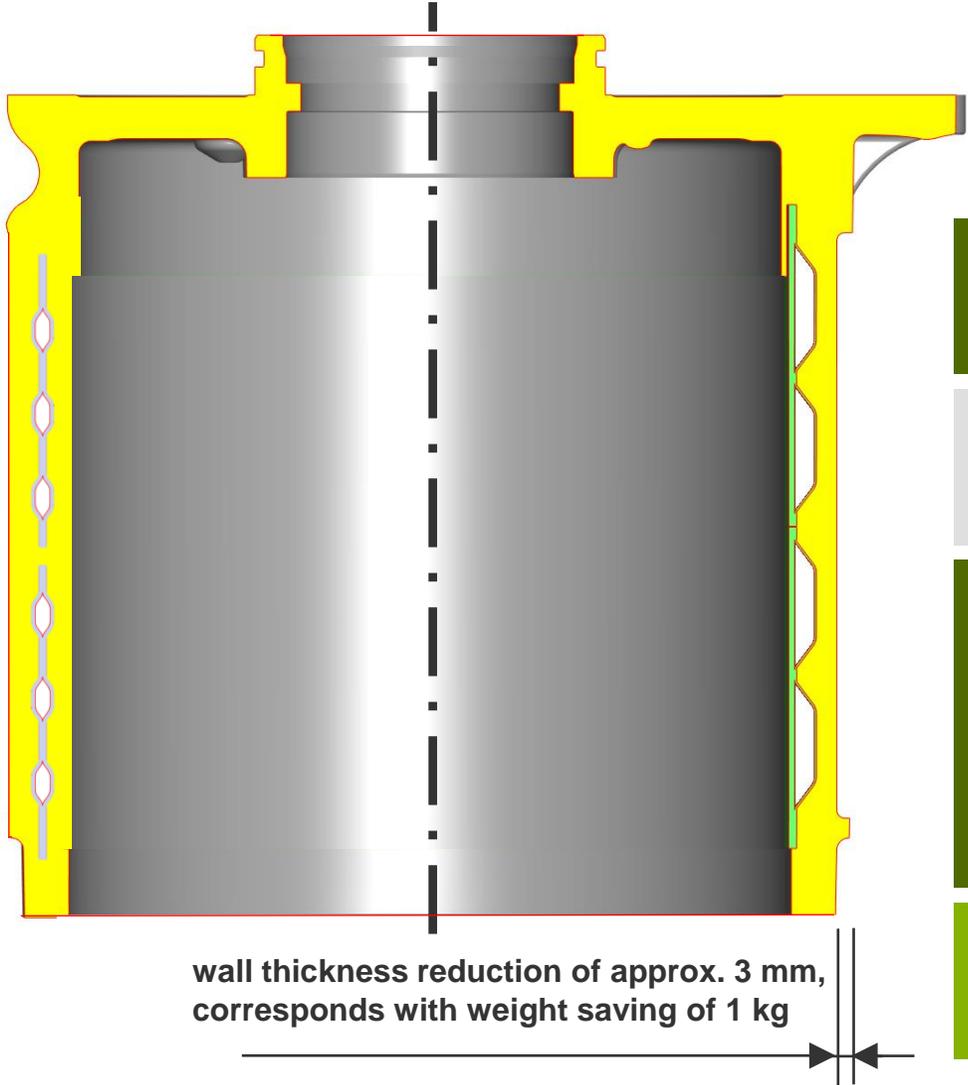
Implementation, Generation 2

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 Generation 1

Clear responsibility allocation for mechanical stability and tightness

cost advantage



 Generation 2

1 kg less weight

distance from water to stator reduced by approx 75 %

much faster cooling

Implementation, Generation 2

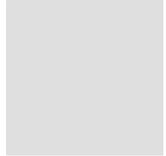
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Example of a design (Helix) for the inserted metal sheet



The Roll Bond Core touches the stator, no casted material in between



Implementation, Generation 2

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Roll Bond Core with
in- and outlet

The Roll Bond Core
touches the stator

Distanz between stator and coolant
= 1 to 2 mm

Implementation, Generation 2, result

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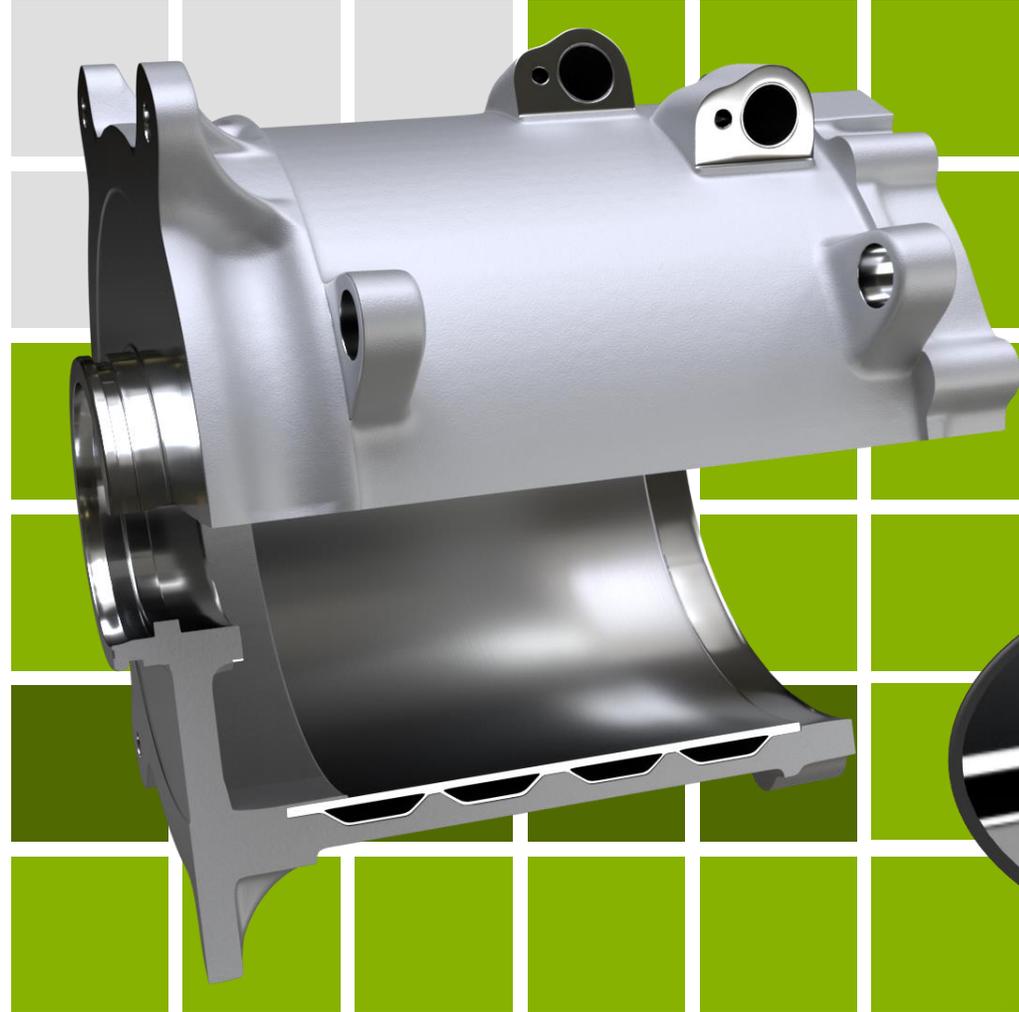
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Electric Motor with
Roll Bond Core Gen2

magnified



Technical advantages

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High stability of the housing, compared to a 2 shell design and therefore less weight and less required installation space



Cooling of the channels during pouring and solidification of the molten metal, means better mechanical properties of the casting

distance from the stator to the cooling channel approx. 1,5 mm ⇒ weight reduction of up to 1 kg

Helix-Cooling design could reduce the size of the total engine in reason of higher cooling efficiency

no risk for leakage and residual dirt

parallel channels are possible



Clear responsibility allocation for mechanical stability and tightness

The process is also suitable for battery housings, power unit housings, junction boxes and other similar applications

Technical advantages

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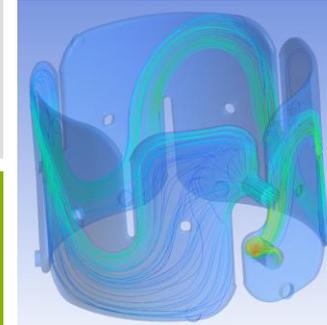
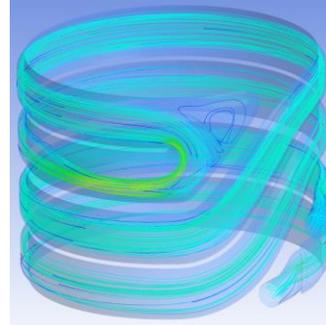
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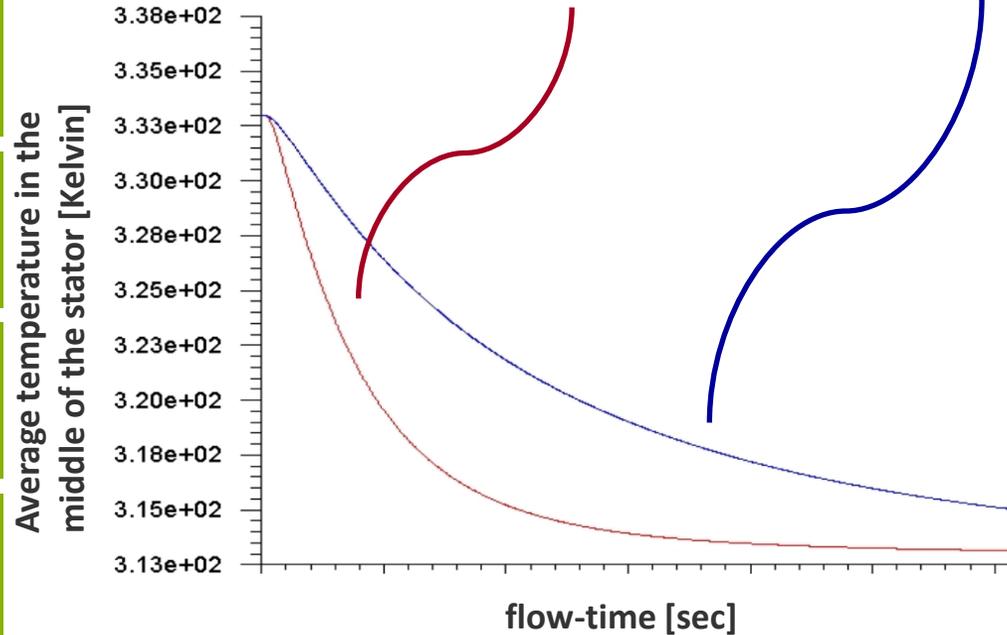
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RoBoC Gen2 Design



serial production design

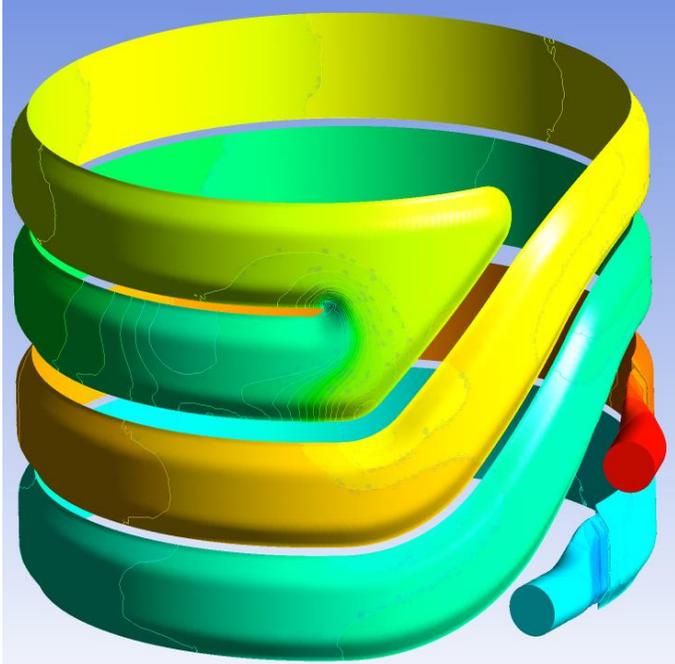
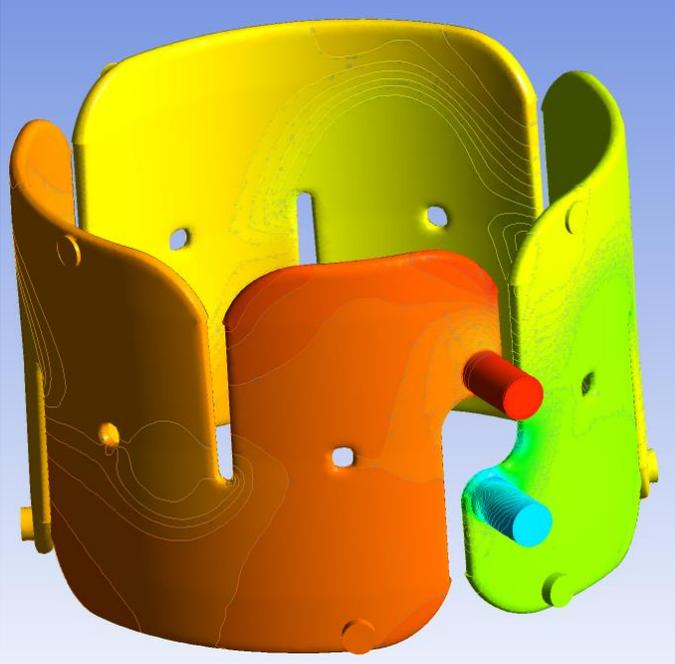


3 times faster from 60 to 40°C



Technical advantages

70 % increase of the heat transfer coefficient at the interface between housing and stator with the RoBoC Gen2 design

	RoBoC Gen2 design	very similar pressure drop	serial production design	
		   		   
				
				
				

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Cost advantages

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 <p>One piece of casting, no additional machinery or assembly process necessary - means simplification of the process</p>		Elimination of non value-added operations		
		highly complex sand core production	necessity to remove the sand core	machining and associated closing of the core prints
	Much less CNC machining 	Elimination of the flow rate and leak pressure test after casting / assembly		
 <p>Shorter cycle times for the casting process in reason of cooling from inside during casting</p>			 <p>Less casting scrap</p>	

Offer

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We can offer business cases ...

- a.** delivery of ready for assembly electric motor housings (with partner)
- b.** licenses
- c.** rights of the patent pending
- d.** shares in a company AionaCast Engineering



... get in touch with us!



