



**MAC GmbH  
Consulting and Engineering**

**Competence of  
Heavy Castings  
from Switzerland**

# THE LARGE CASTINGS CHALLENGE

**Large castings always represent challenges to the foundry.**

**While their production depends to a lesser degree on machinery the handling of mould boxes, cores and the casting itself can present real problems. Each time an item has to be moved it normally blocks a crane which can bring the whole operation of the foundry to a stop.**

**Production logistics gains a much higher importance. Material flow has to be designed that means of transport and goods transported move unidirectional.**

**In addition production processes have to be set-up in firm rhythms.**

**Long cooling times often block areas under high capacity cranes. This results in excessive structural costs to be born by the product. Cooling time becomes the bottleneck of the operation and is limiting further growth.**



# PROJECT EXAMPLES

Grey iron foundry, South Korea, for 2-stroke-marine engine cylinder liners

Step 3



3 von 4 MACConsulting and Engineering GmbH



# PROJECT EXAMPLES

Grey iron foundry, South Korea,  
for 2-stroke-marine engine cylinder liners

*Project Status Phase 3 (December 2008):  
Equipment installed, first castings*

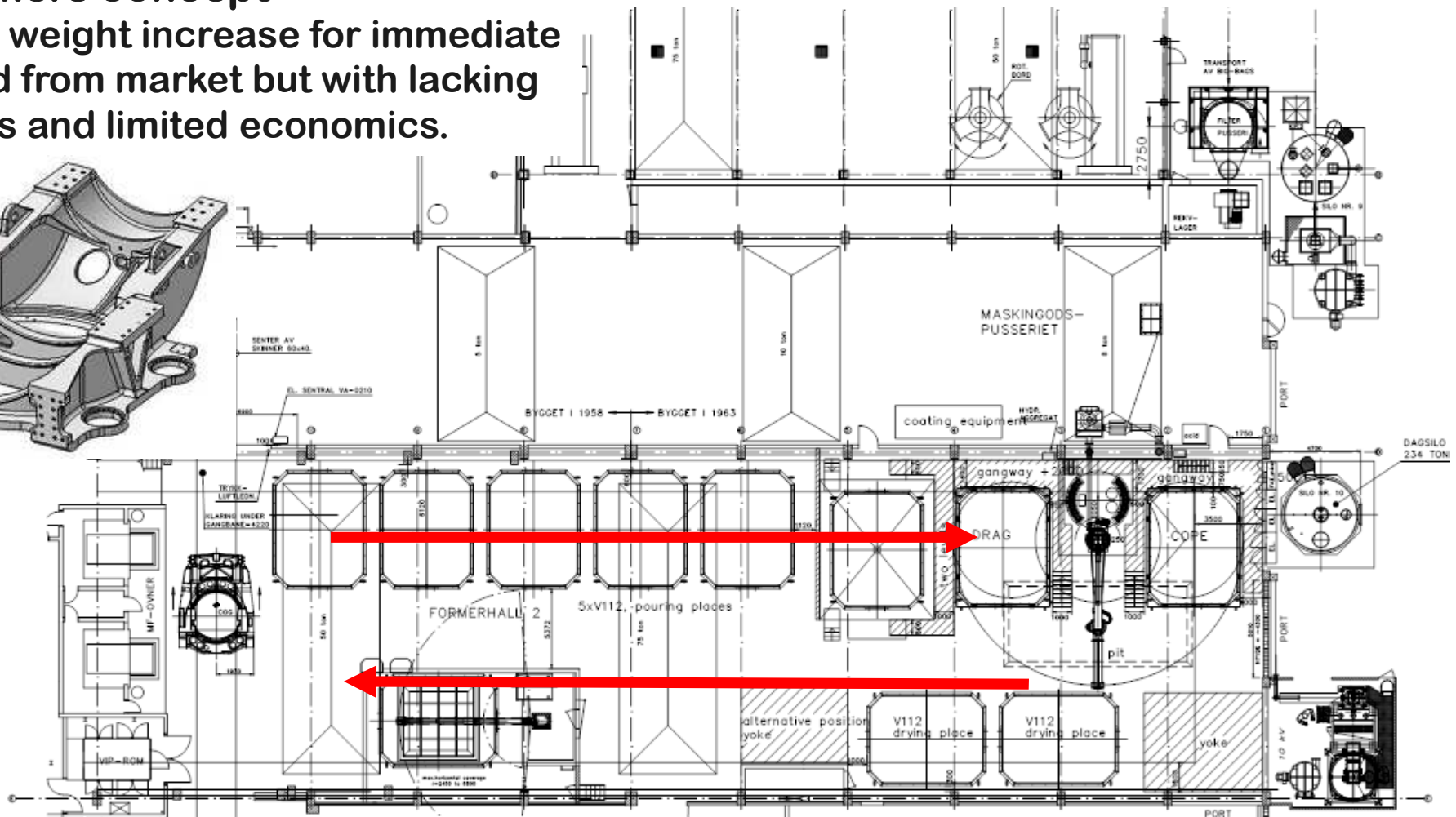
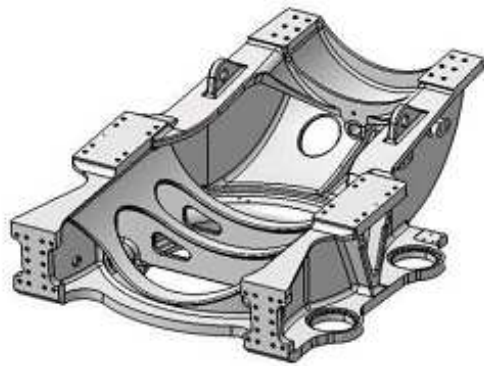


*Technological values of first customer  
specification reached with 5th casting*

# PROJECT EXAMPLES

## Ductile iron foundry for wind castings

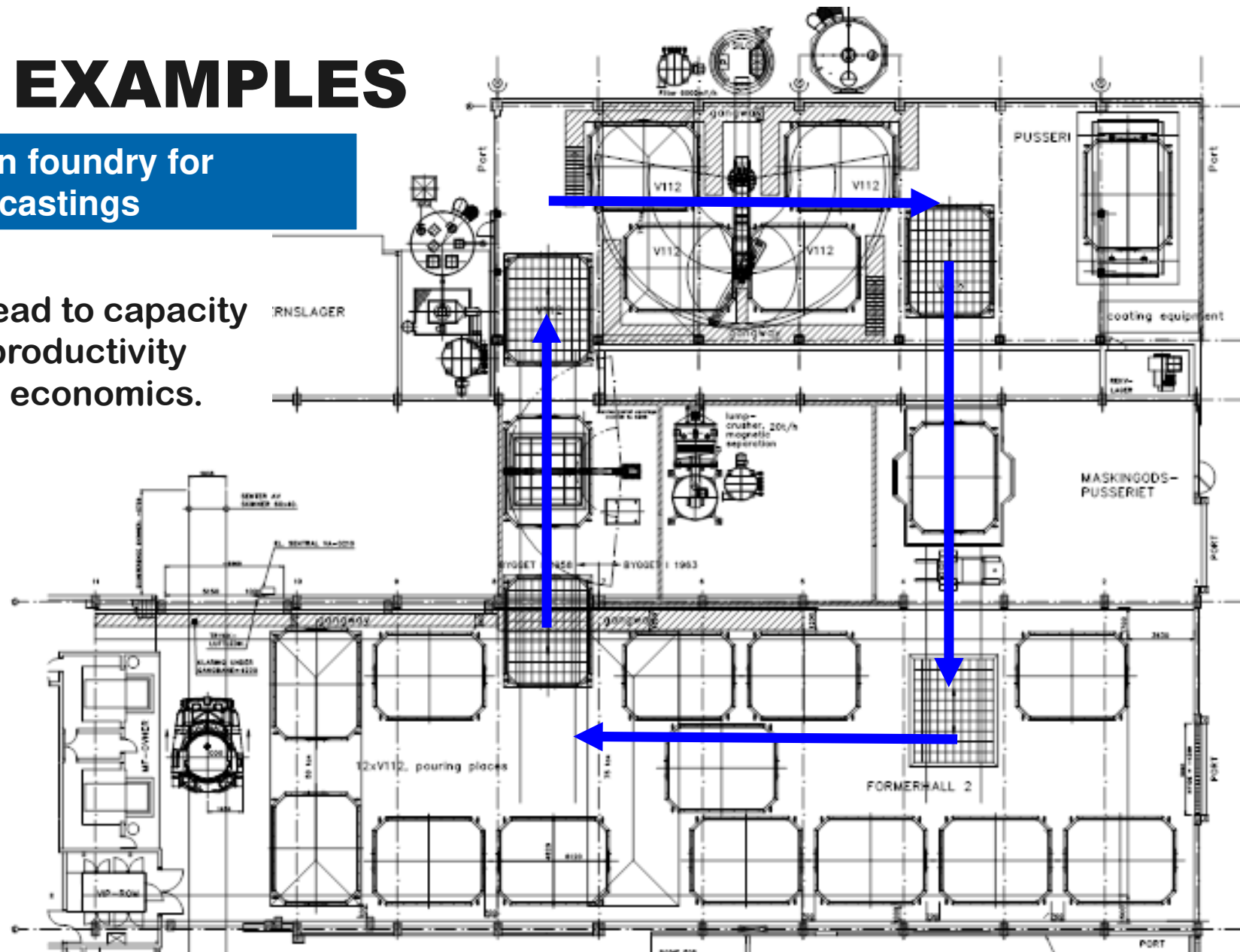
**Customers concept**  
 casting weight increase for immediate demand from market but with lacking logistics and limited economics.



# PROJECT EXAMPLES

Ductile iron foundry for wind castings

**MAC-Concept**  
 optimised logistics lead to capacity increase, improved productivity and excellent overall economics.



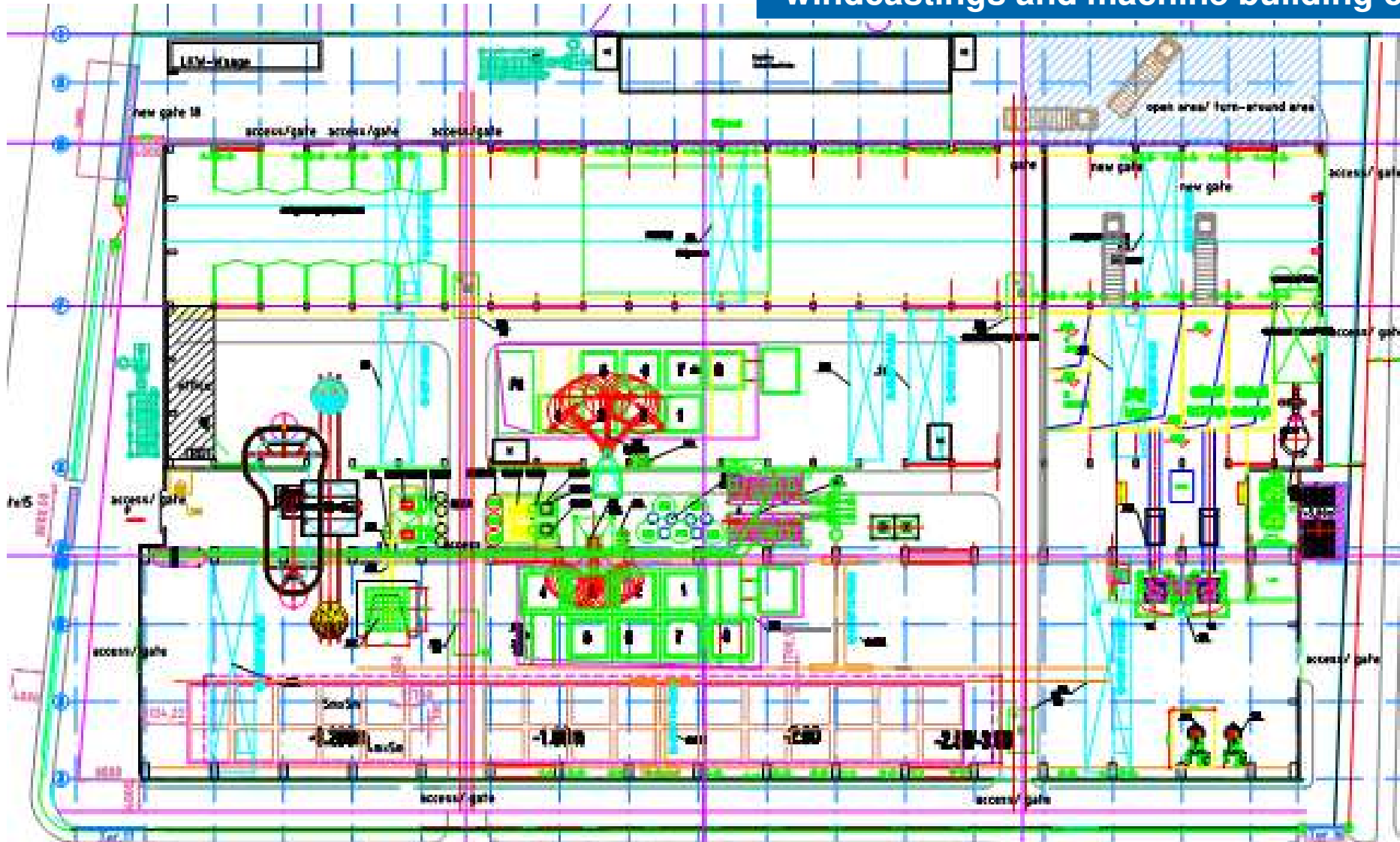
# PROJECT EXAMPLES

## Projects

<b>JIANGYIN DIHAG CASTING, Jiangsu, China</b>	<b>Vestas, Kristiansand, Norway</b>	<b>SULZER, Oberwinterthur, Switzerland</b>
<b>Iron foundry for wind turbine components and injection moulding machine parts, &lt; 25 mt</b>	<b>Ductile iron foundry for wind turbine parts (mainframes), casting weight 16 mt</b>	<b>Large marine engine blocks with max. 56 mt casting weight</b>
<b>ductile iron (grey iron) Capacity 30.000 mt/a</b>	<b>ductile iron cope &amp; drag moulding</b>	<b>grey iron, ductile iron Core block moulding</b>
<b>Remodelling of an existing light industry plant building into a competitive large castings foundry</b>	<b>Capacity increase in total output and part weight including enforcement of building structure, change to water based coating</b>	<b>Shortening of cooling time up to 80%, reduction of residual stress improvement of micro structure</b>
<b>Concept engineering, equipment specification, sourcing, tendering, quote evaluation, contract negotiations, supply supervision</b>	<b>Redesign of concept, equipment specification, tendering, quote evaluation, supply and installation supervision, SOP, claim management</b>	<b>Production support for reduction of throughput time, scrap reduction by elimination of increased residual stress and therefore productivity increase</b>

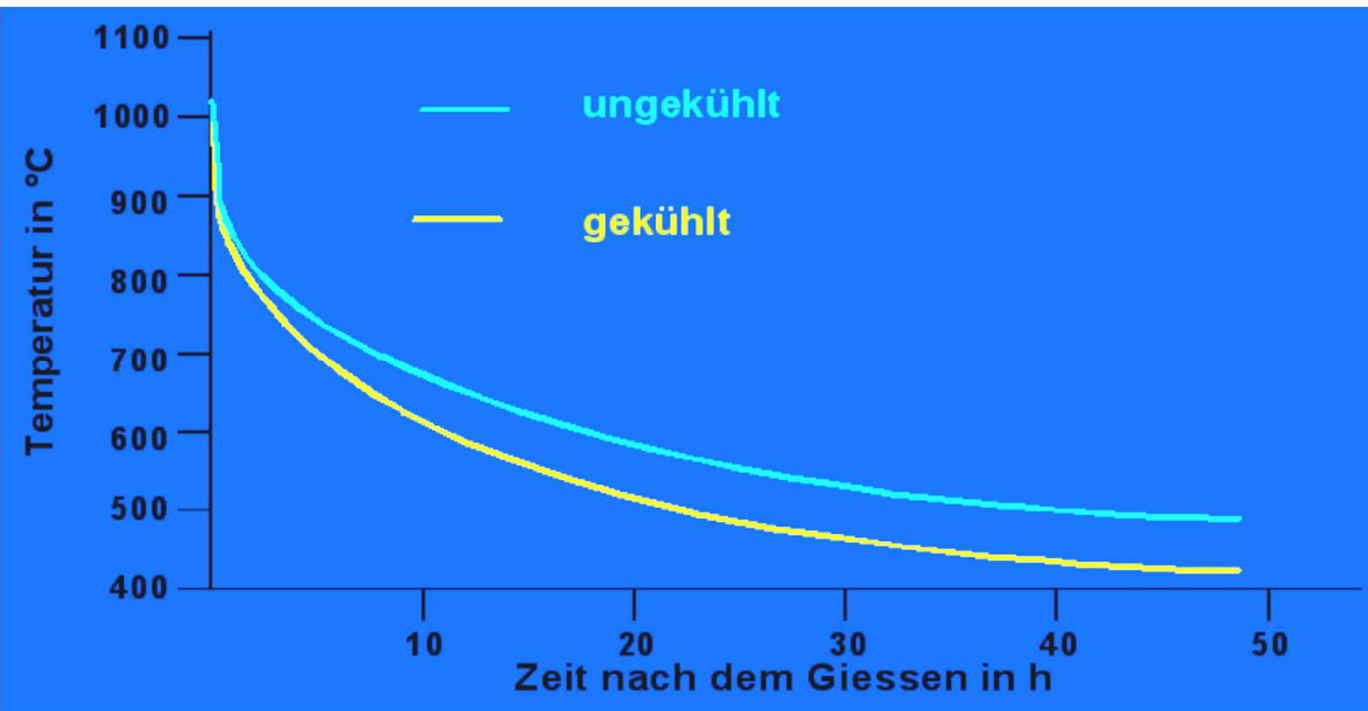
# PROJECT EXAMPLES

Jiangyin DIHAG Casting  
windcastings and machine building castings





# DYNAMIC COOLING OF LARGE CASTINGS

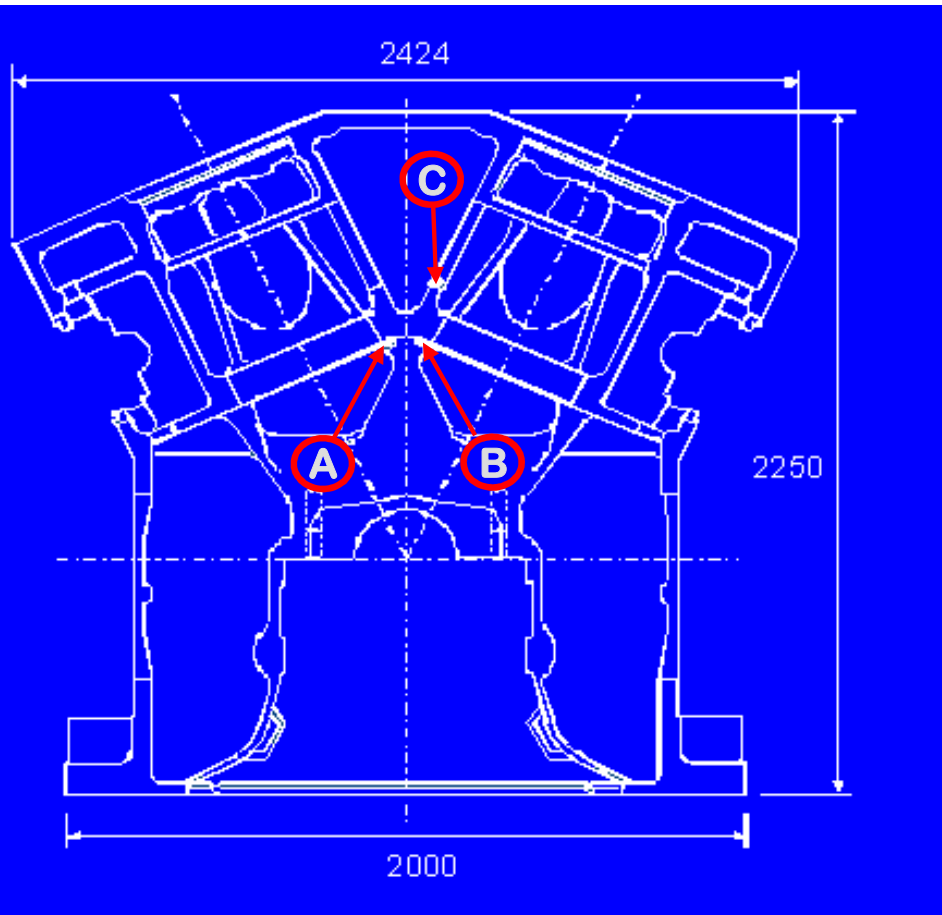


Increased production capacity of existing foundry installations via higher throughput in bottleneck areas leads to decreased fixed cost per kg.

Higher throughput in foundry areas with high structural investment (high capacity cranes, high building structure costs).

Increased turnover rate of the inventory in the foundry.

# DYNAMIC COOLING OF LARGE CASTINGS



Lower residual stress in the casting results in quality improvement and scrap reduction.

Improvement of technological properties in areas with increased wall thickness.

Increased design flexibility due to controlled residual stress and metallurgical variability.

Cost savings through heat treatment elimination for ADI products.

$\sigma_{ES}$	normal cooling	dynamic cooling
A	86 N/mm <sup>2</sup>	- 86 N/mm <sup>2</sup>
B	106 N/mm <sup>2</sup>	- 36 N/mm <sup>2</sup>
C	119 N/mm <sup>2</sup>	- 5 N/mm <sup>2</sup>

# WHAT CAN WE DO FOR YOU?

MAC is always available for questions regarding our area of expertise or for a discussion of a certain task.



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