



New Harmony >> New Solutions™

Aeration Moulding Machine ACE

1. Functional Description

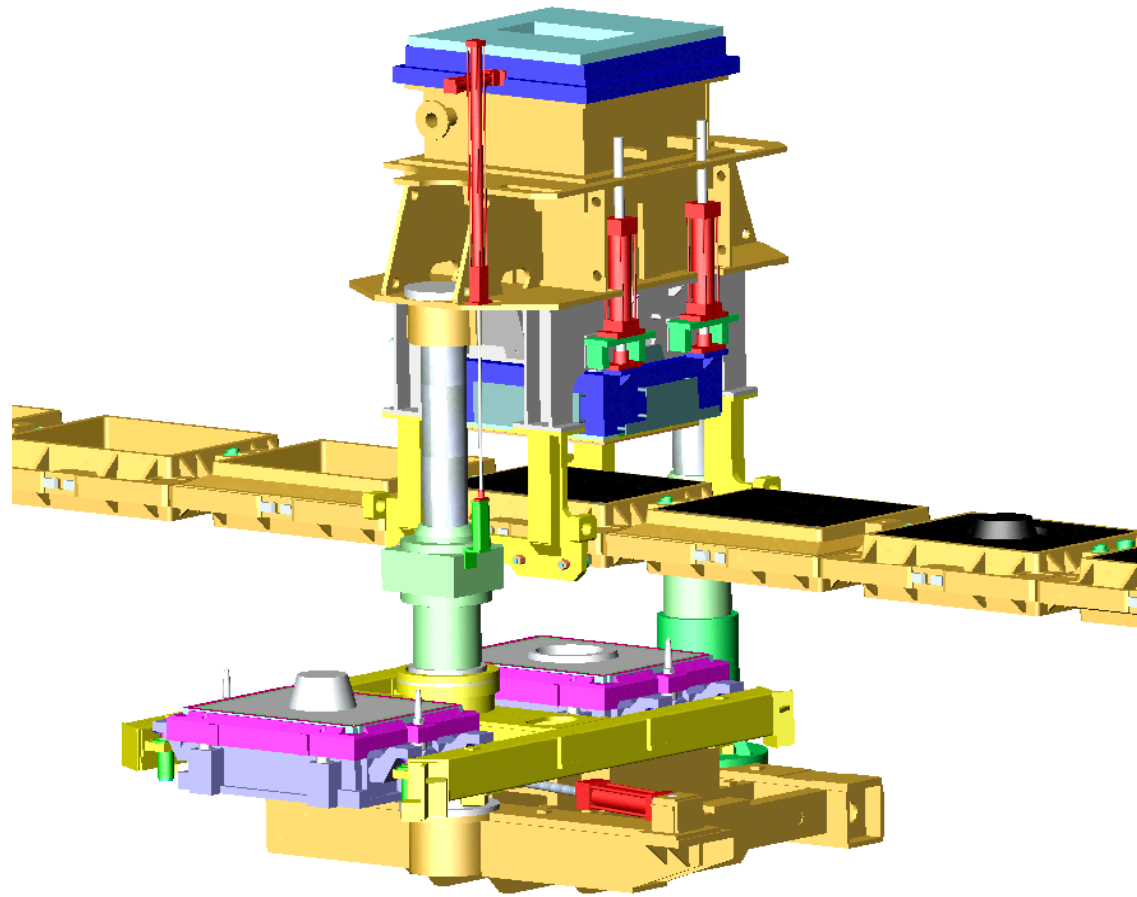
**2. Test Moulding Plant
GF Mettmann**

**3. Possibilities of Saving Energy
and Cost**

4. Application Spectrum

1. Functional Description

Moulding Process



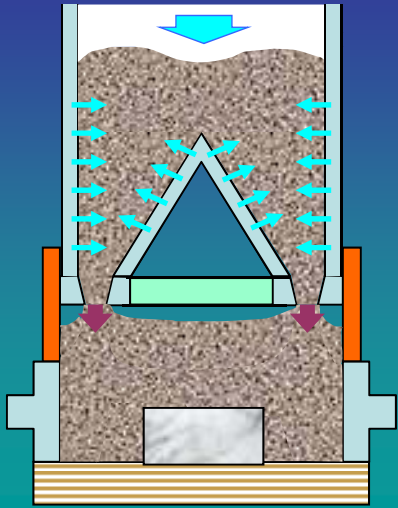
Molding Sequence



Pattern Squeezing

Characteristics ACE

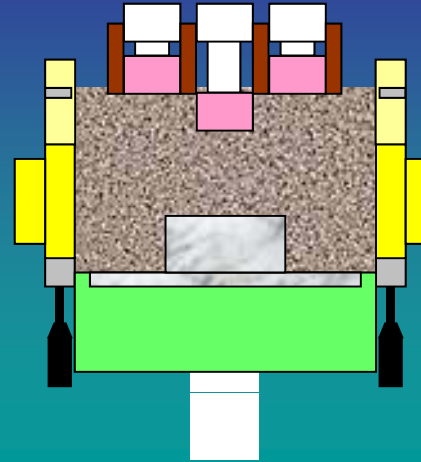
Aeration sand filling



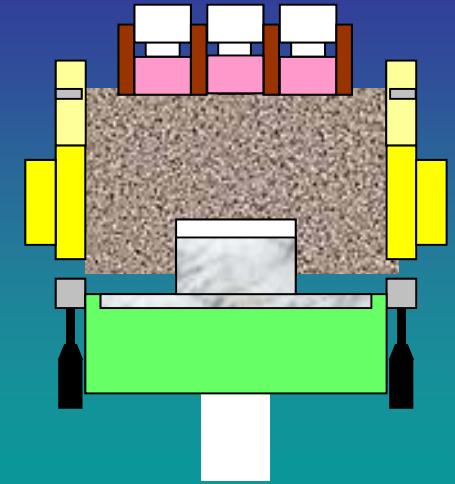
Preadjustment



Combined squeezing



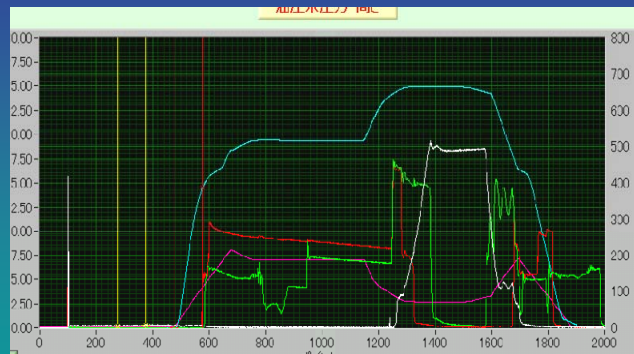
Lifting



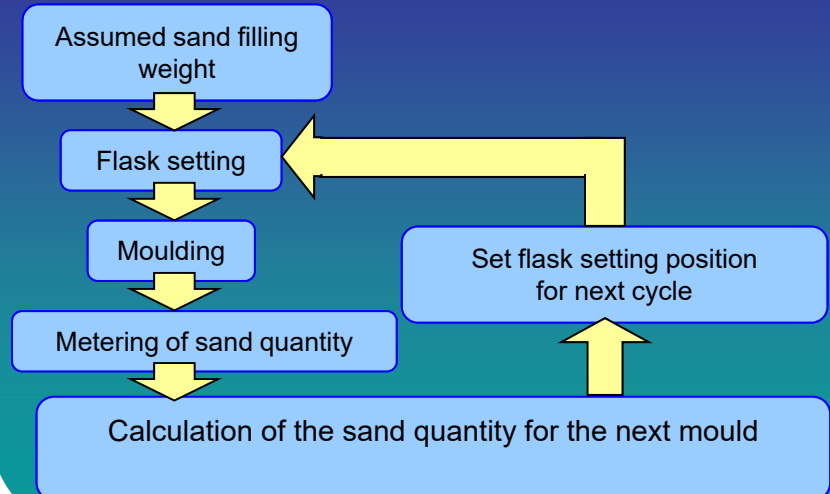
Energy saving hydr.



Molding Data Analysis System



System sand filling optimization



2. Test Moulding Plant GF Mettmann

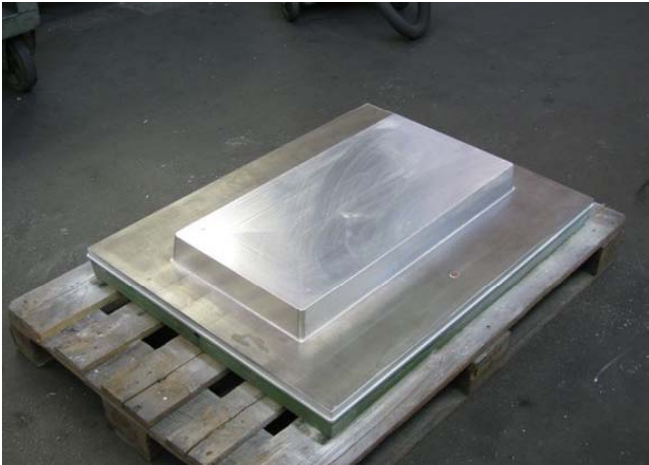
ACE Test Moulding Plant

- HWS moulding machine ACE,
flask size: 930x700x320 mm
- Cycle time 25.0 sec.
- Model year 2010
- Location Mettmann (Germany)

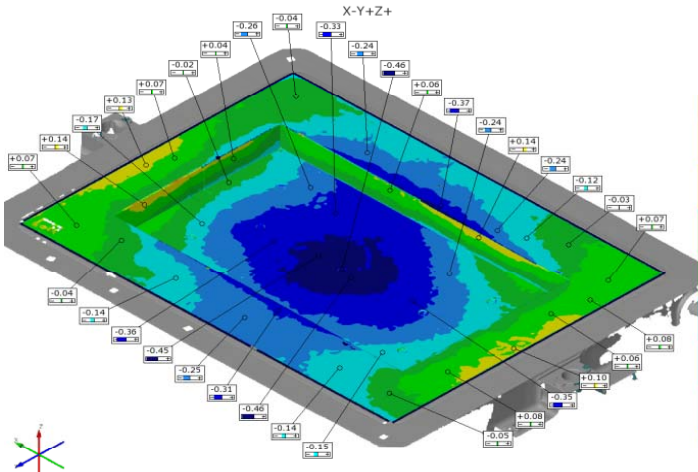
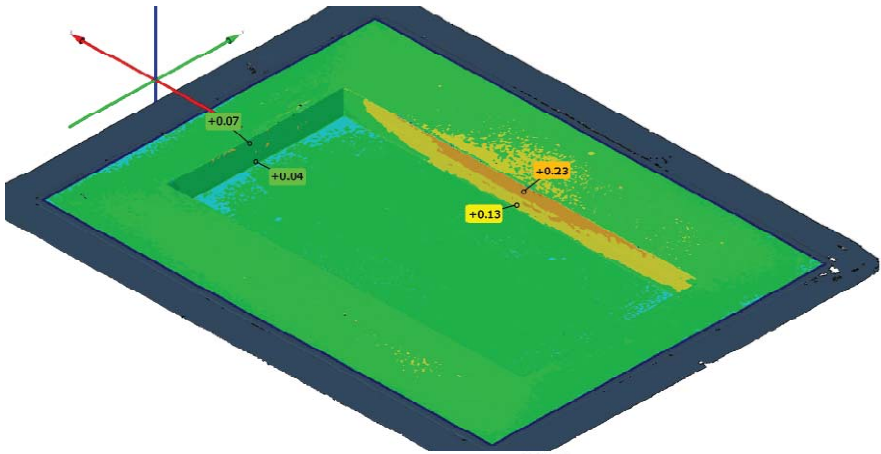


Moulding accuracy block pattern

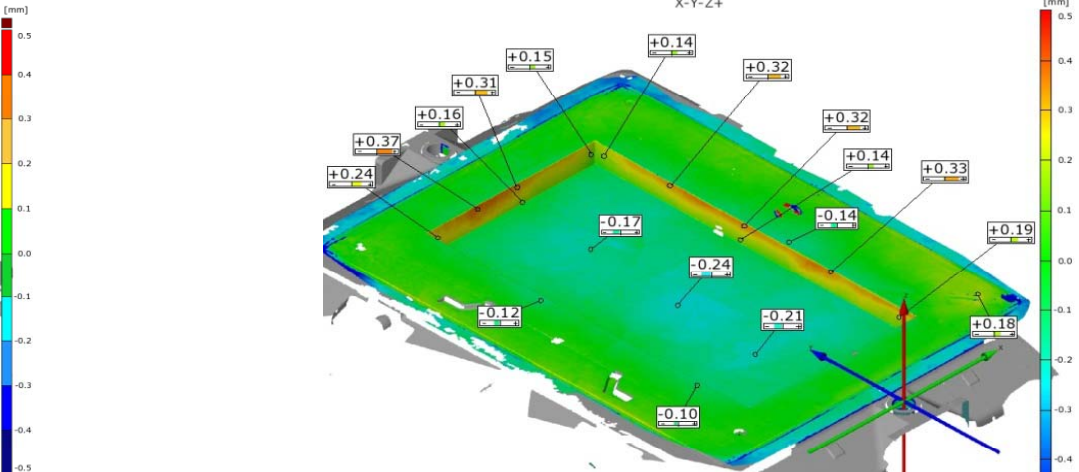
[mm]



ACE – existing jolt-squeeze flask



Jolt-squeeze moulding machine



Shoot-squeeze moulding machine

Moulding accuracy production pattern

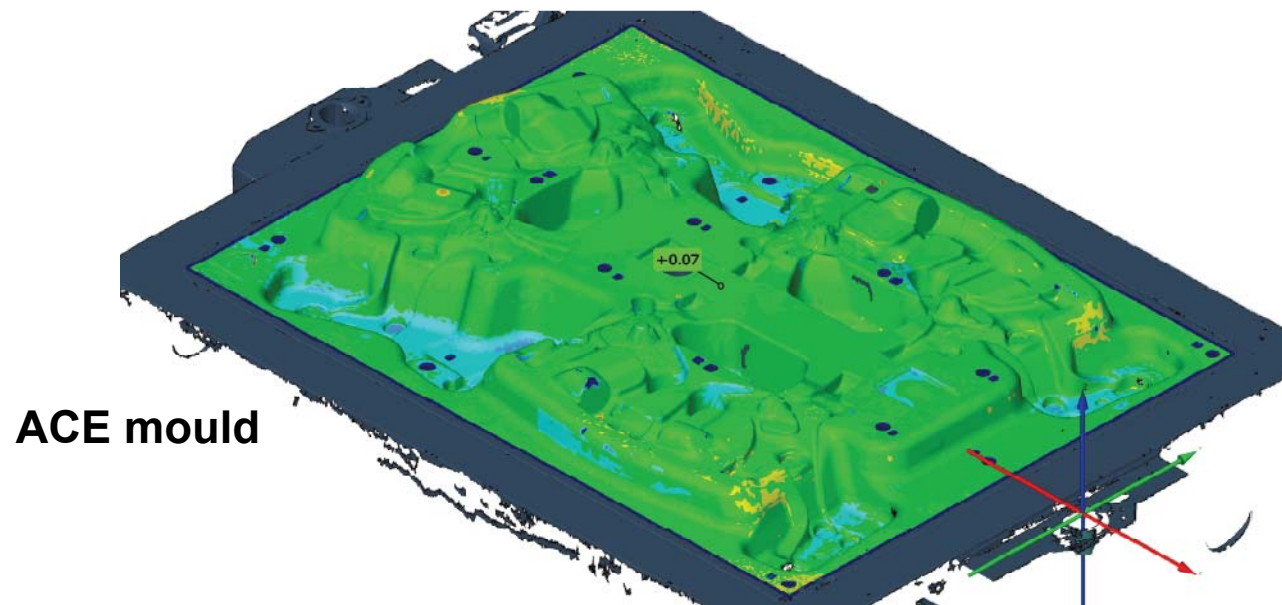
[mm]



Wheel carrier VW PQ 35 – weight of raw part 5.66 kg



Base support with cope plate



ACE mould

Trial mould pressure measurement at pattern plate

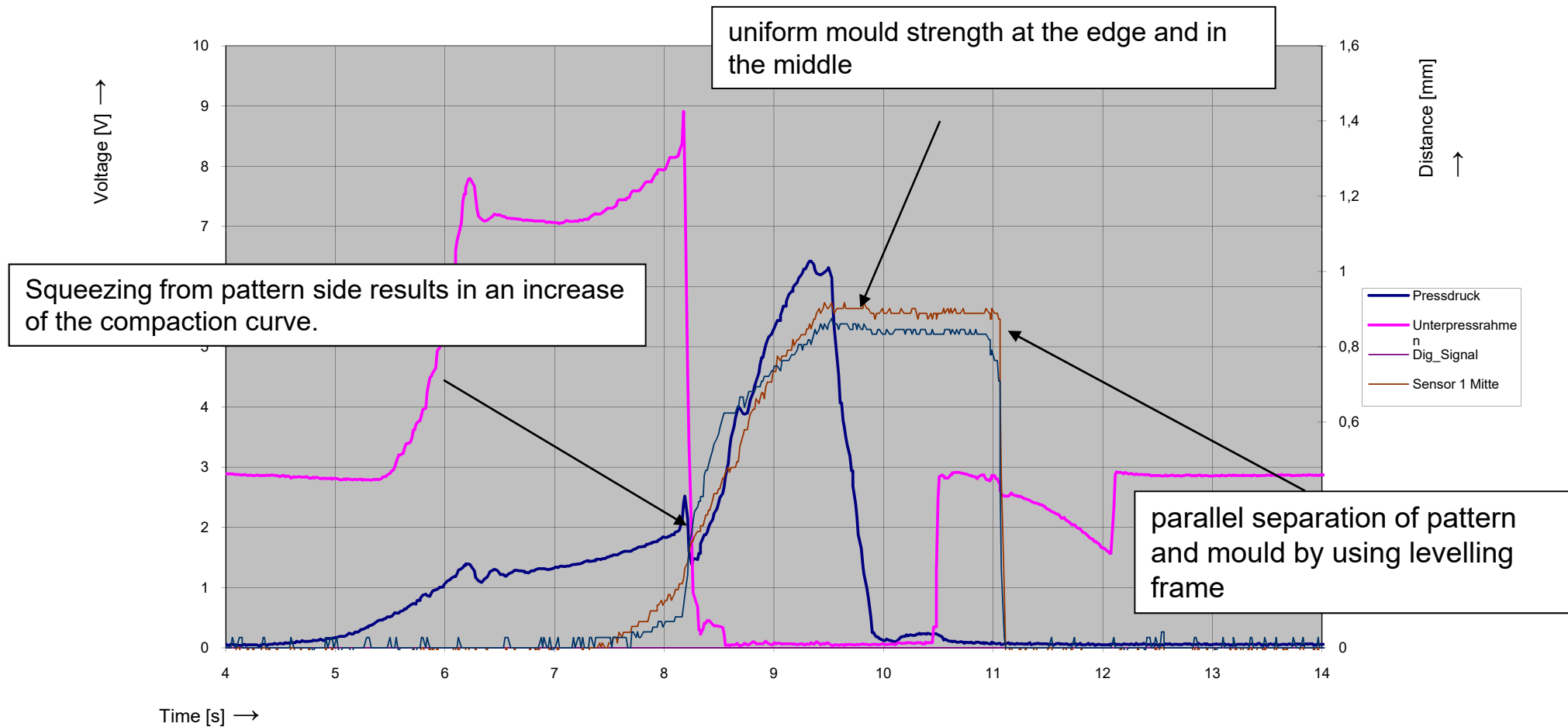
Test point 1 = centre



Test point 2 = edge



Trial mould pressure measurement at pattern plate



Wear characteristics

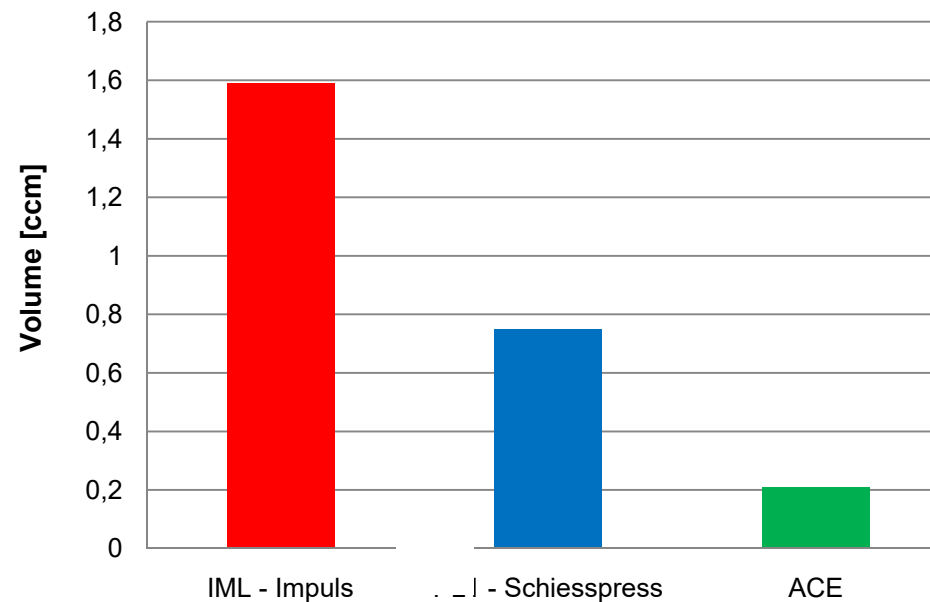
Specimen: wear cone
Material: corpus material Sika M940

$$\text{Wear: } V = \frac{(\text{weight}_{\text{start}} - \text{weight}_{\text{end}})}{\text{density}} \times \frac{10,000}{\text{moulds}} \text{ [cm}^3\text{]}$$



Wear cone

Wear per 10,000 moulds



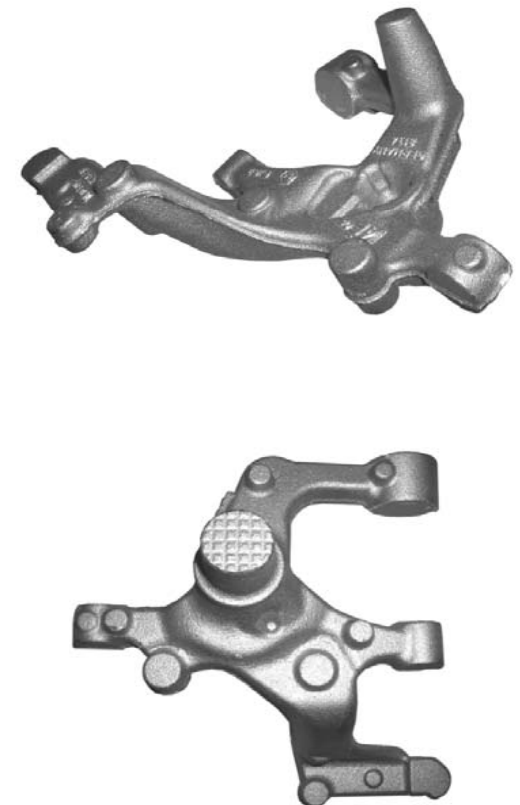
Dimensional accuracy of the castings

- Test results

Type of accuracy	IMC	AM409	ACE
S thickness dimensions [mm]	0.16	0.15	0.09
DCTG grade	9	9	7
S x.Y position dimensions [mm]	0.17	0.20	0.14
DCTG grade	9	9	8
S z position dimensions [mm]	0.15	0.15	0.13
DCTG grade	8	8	8

* S = standard deviation of a test statistic of 20 pieces

DCTG grade as per DIN EN ISO 8062 relating to the averaged values and a process capability of 1.67



Conclusion of the moulding tests

- With the ACE moulding machine, tolerances of DCTG 9 were reduced to DCTG 8 (some dimensions even down to DCTG 7).
- The dimensional accuracy of the moulded copes and drags is higher than in any other tested moulding process.
- The mould hardness can be adjusted uniformly up to the flask edges.
- Moulding by using the levelling frame is very precise and exact (lifting curves with pressure sensors).
- Wear of the pattern plate is very low in the ACE process.

3. Possibilities of Energy and Cost Savings

Minimised hydraulic station

Conventional



75 kW



ACE

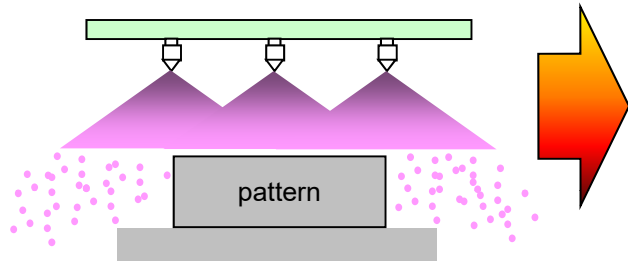


22 kW

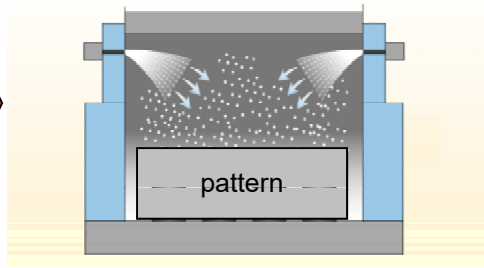
Flask size 900x700x250/250mm, 120 moulds/hr

Check of spraying agent

Conventional method
= open spraying

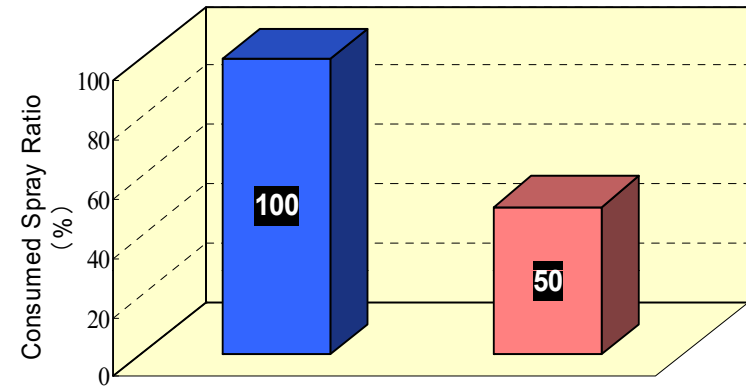


ACE
= closed spraying



[Video](#)

Requirement of spraying agent

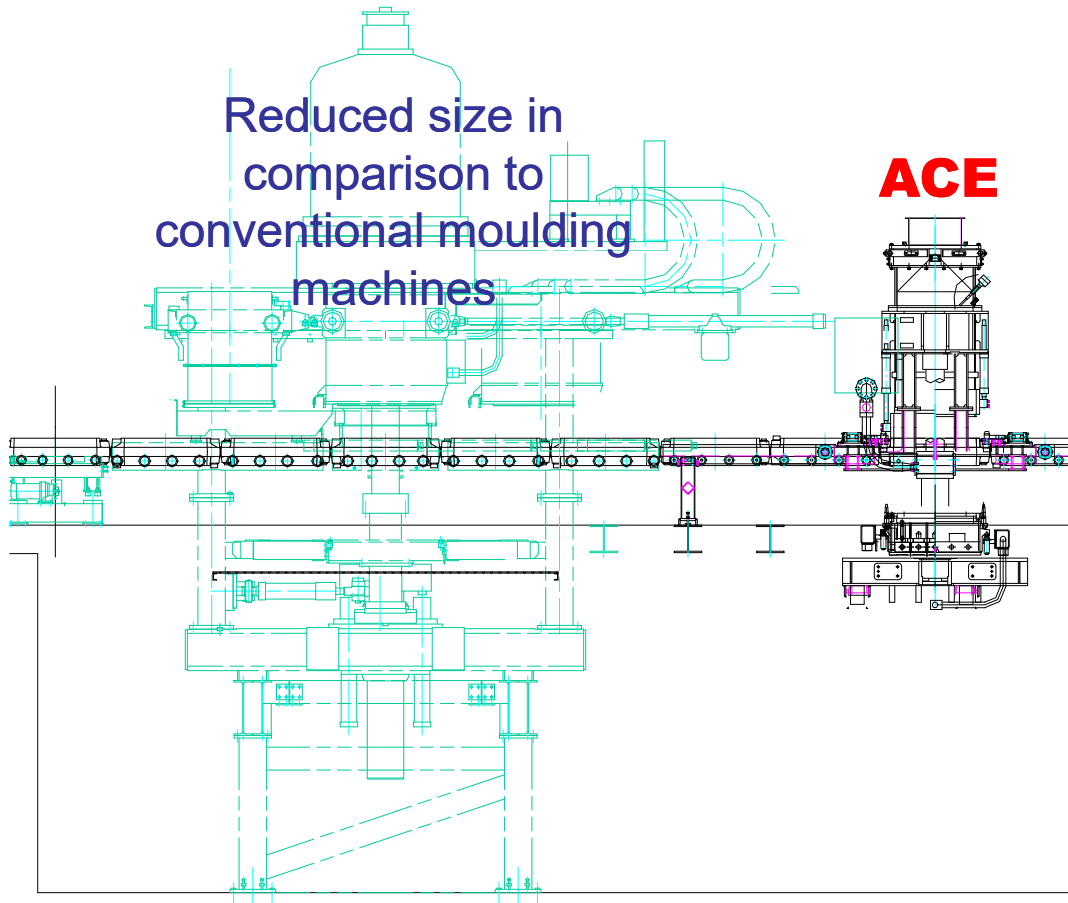


conventional

ACE

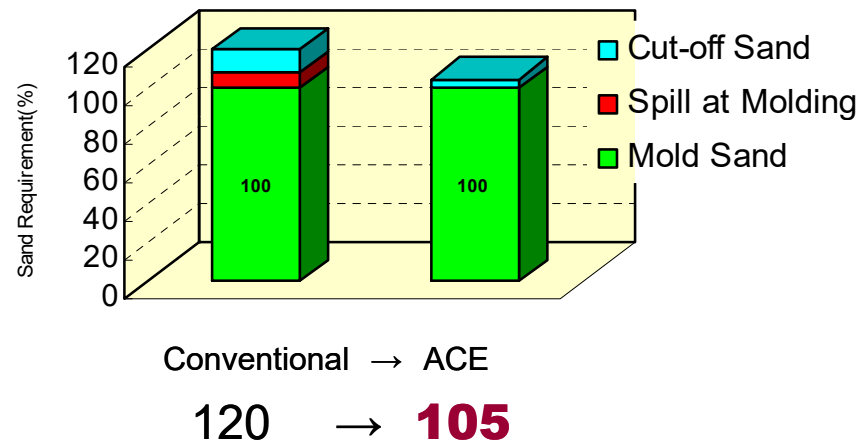
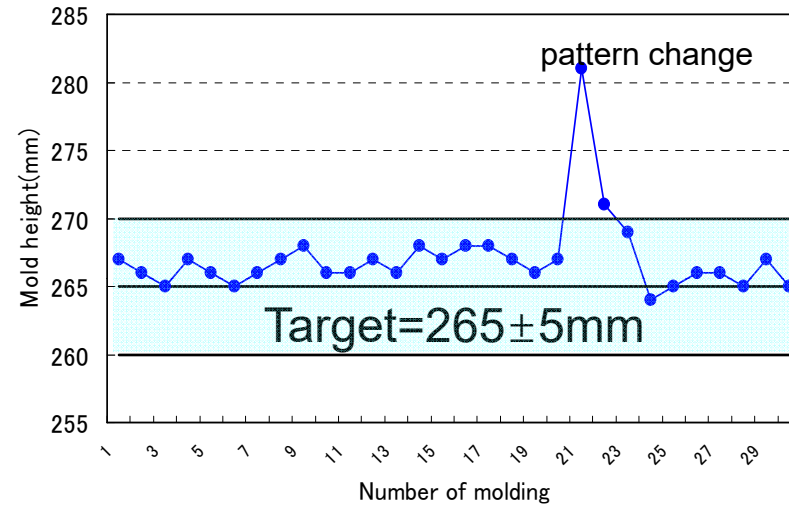
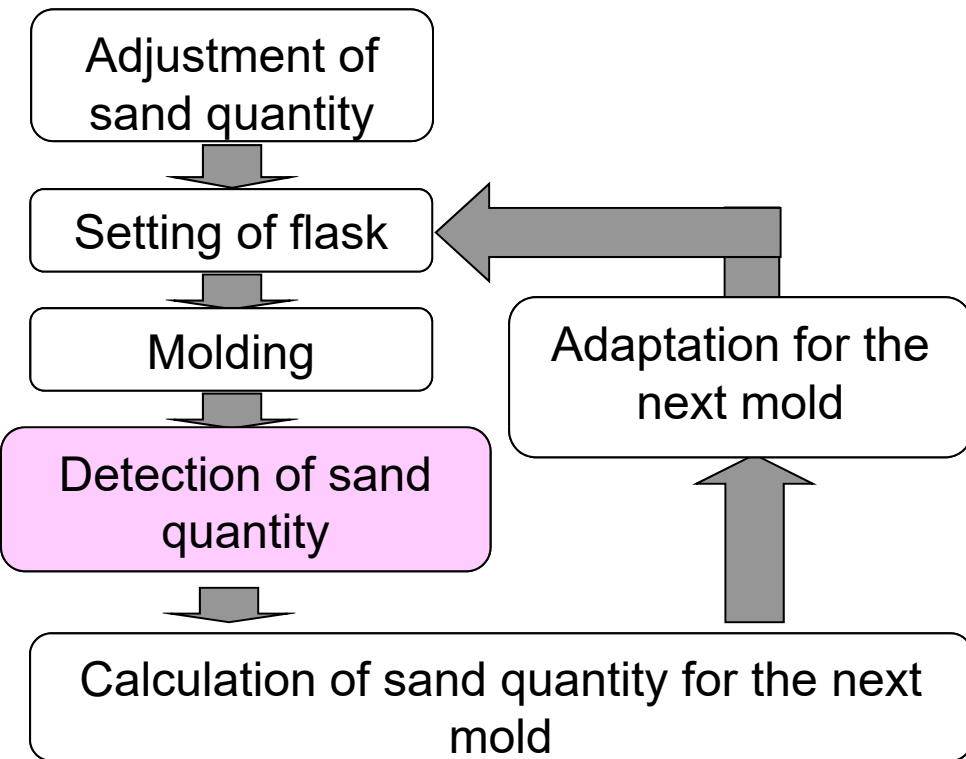
No excessive
material in use

Less space required for the ACE



Optimization of sand filling “sand filling check”

Sequence of sand filling check



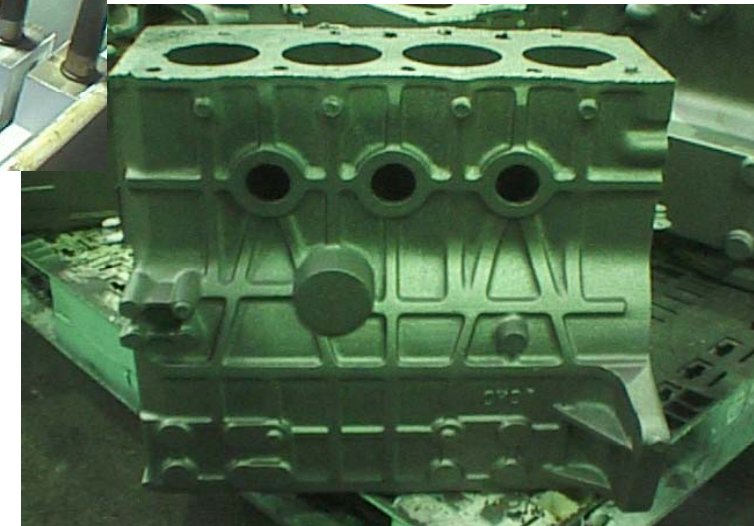
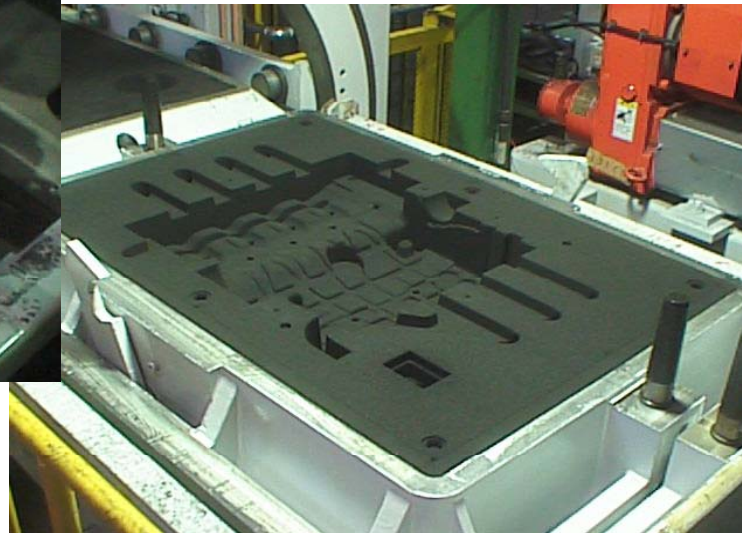
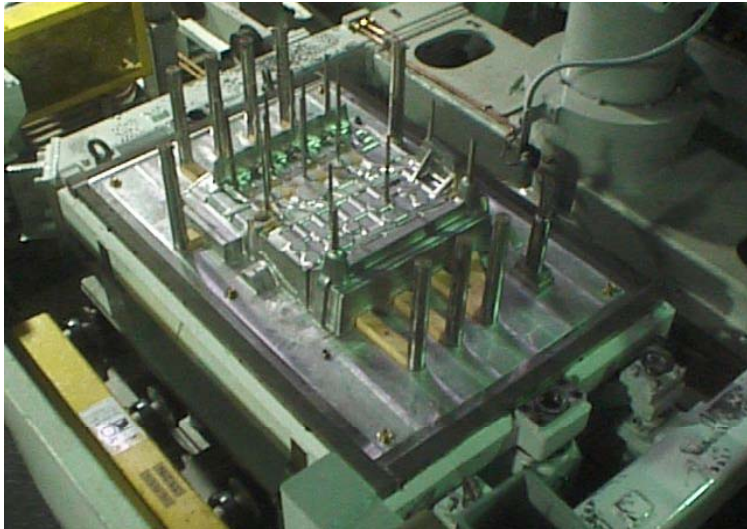
ECO Metals Award GIFA 2011



4. Application Spectrum

Cylinder block

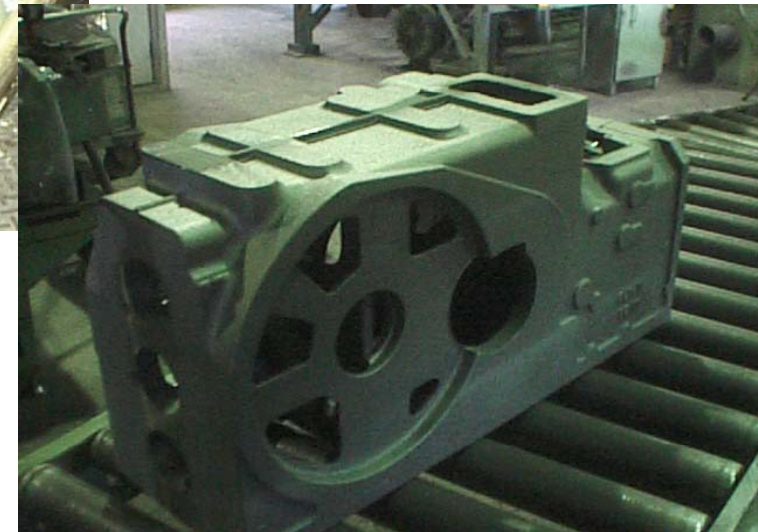
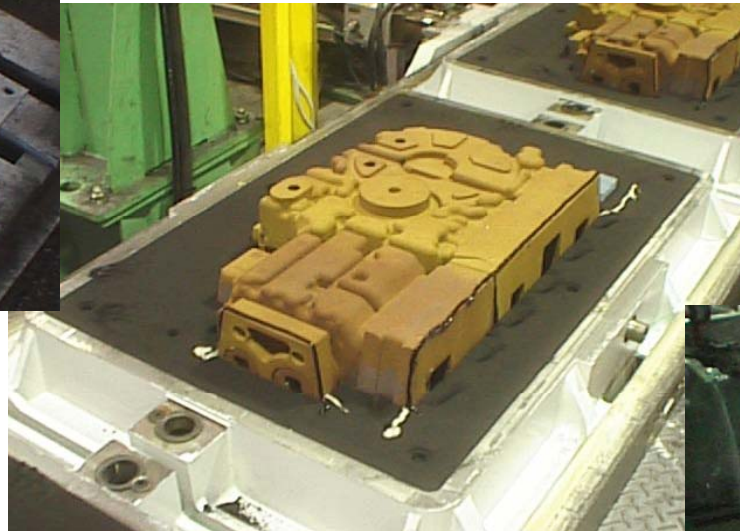
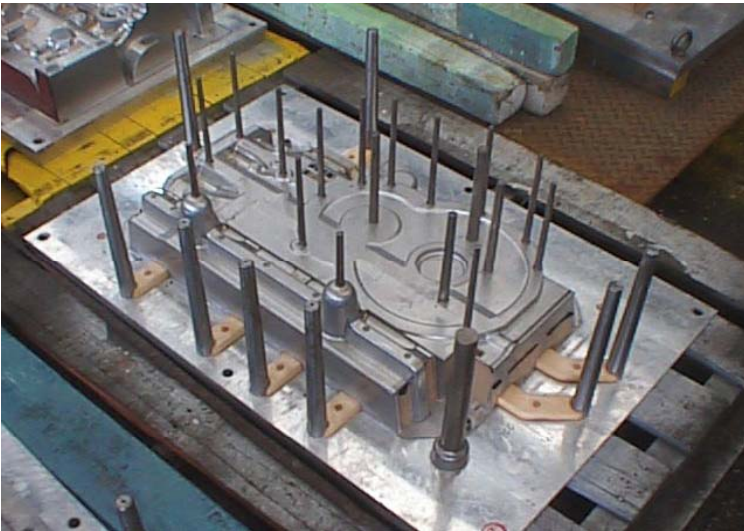
ACE 5 (flask size: 1050 × 700 × 300/300)



	Jolt Squeeze (AVS) Squeeze Pressure 60 N/cm² per area	ACE Squeeze Pressure 60 N/cm² per area
Casting Weight (kg)	Ø = 73.8	Ø = 71.7 ▲ 2.8%

Gearbox housing

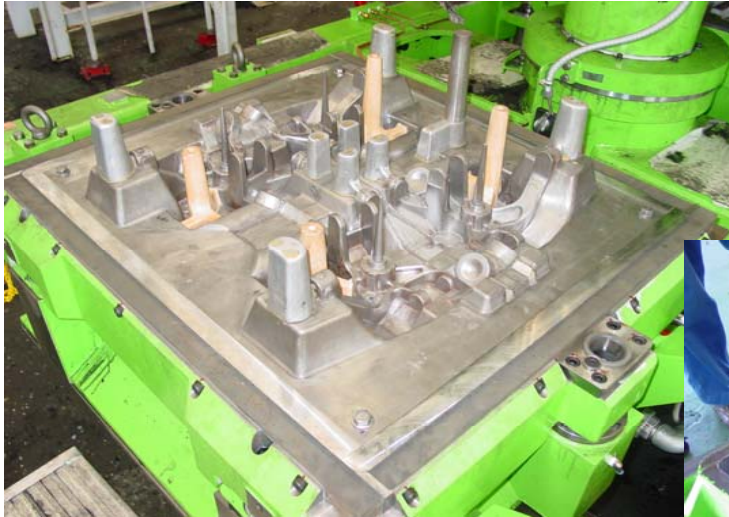
ACE 5 (flask size: 1050 × 700 × 300/300)



	Jolt Squeeze (AVS) Squeeze Pressure 60 N/cm² per area	ACE Squeeze Pressure 60 N/cm² per area
Casting Weight (kg)	Ø = 74.5	Ø = 71.6 ▲ 3.9%

Wheel carrier

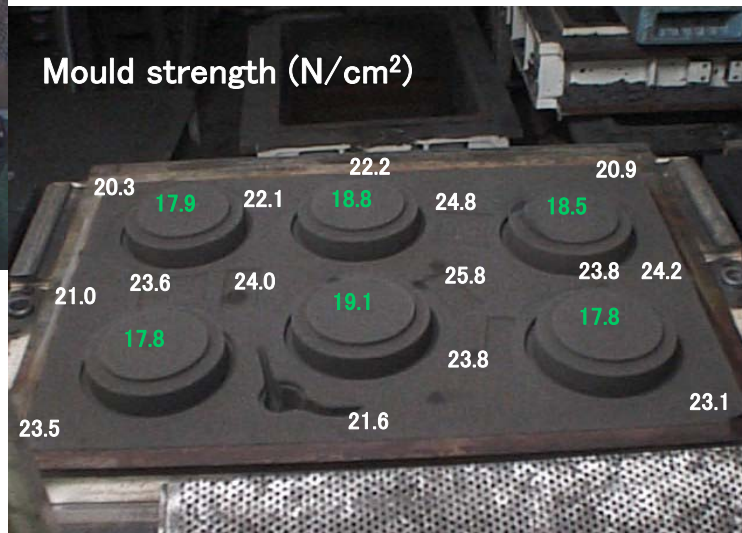
ACE 5 (flask size: 850 × 750 × 250/230)



▪ Free from burrs!

Brake drum

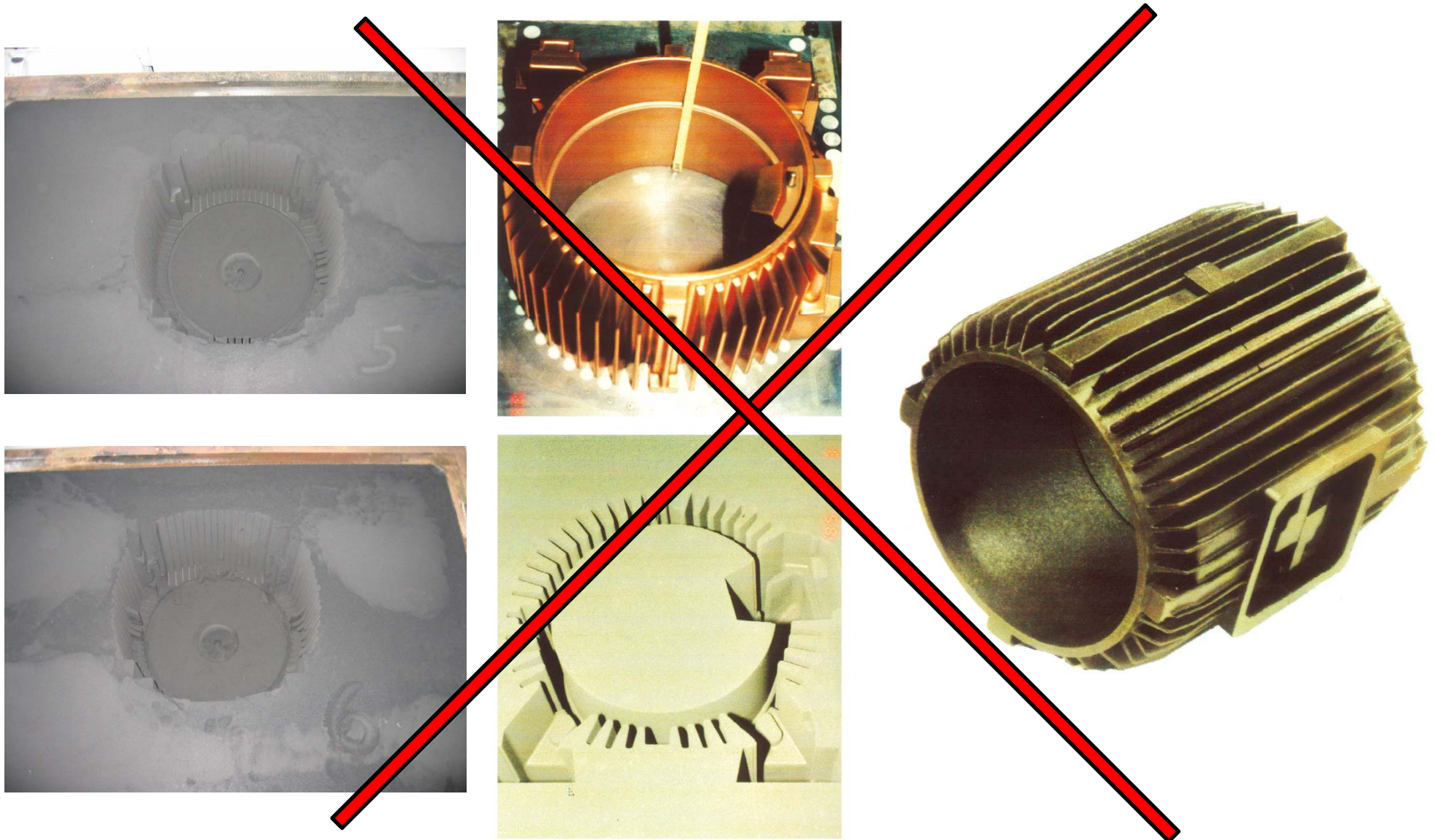
ACE 4 (flask size: 850 × 600 × 280/280)



Mould strength (N/cm²)

▪ partition	ave. 24.0	deviation 1.1
▪ cod	ave. 18.3	deviation 0.5

Housings for electric motors not possible with ACE moulding machine



Summary

- Significantly better mould result in comparison to moulding processes of competitors, documented by tests at GF Mettmann.
- Potential for energy saving thanks to various features (e.g. small hydraulic station, reduction of sand requirement, less parting agent). Thereby possibility for subsidies in case of an application for investment.
- Excellent application possibilities in automotive industry, large-scale production. No housings for electric motors and high cods possible.
- The compact design is well suited for machine replacements.

Thank you!