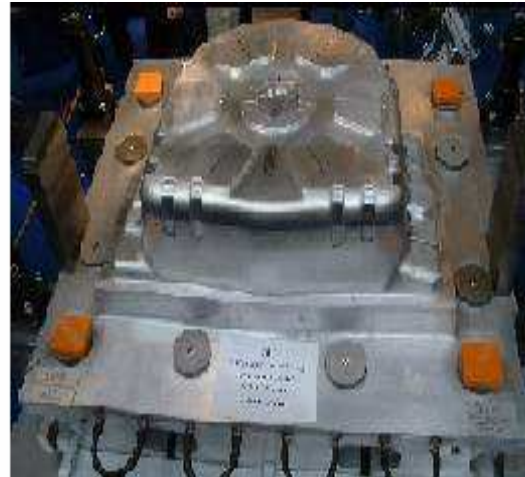




**ALUMOLD<sup>®</sup>**

*The Alternative*

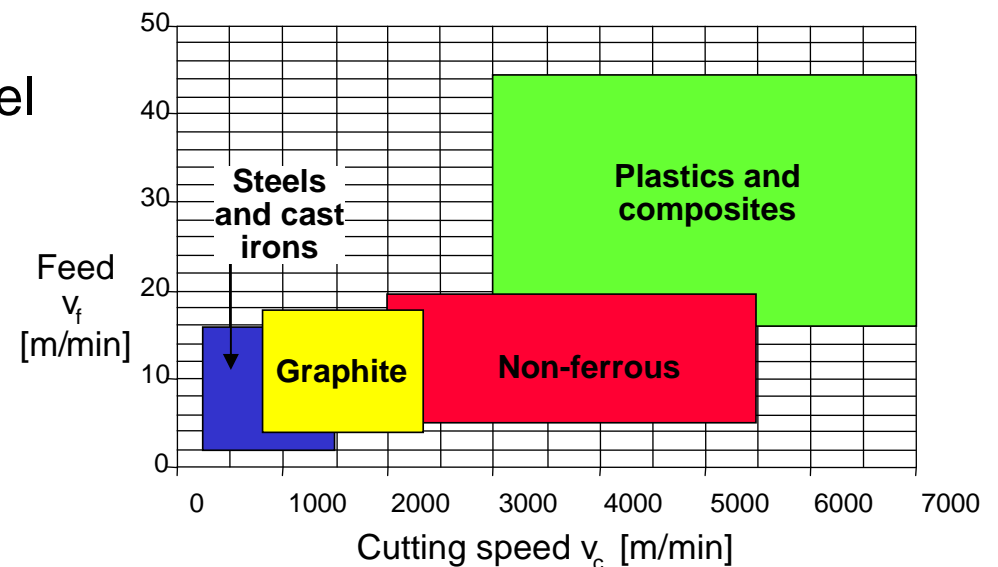


# 1. Advantages...

## ① For mold makers

- Optimal machining
  - Milling : up to 10x / steel
  - EDM : up to 5x / steel
  - Polishing : up to 4x / steel

***At least : 30% savings***
- Low tool wear
- Dimensional stability
- Short time delivery
- Easy handling : 3x lighter / steel



# 1. Advantages ...

## ② For mold users

- Improve productivity

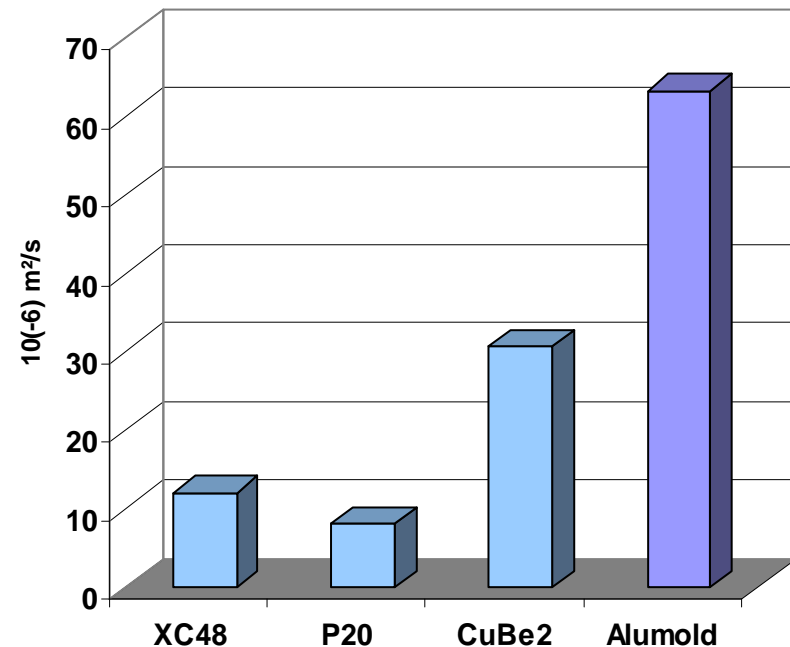
High thermal diffusivity

= “*high evacuation speed*”

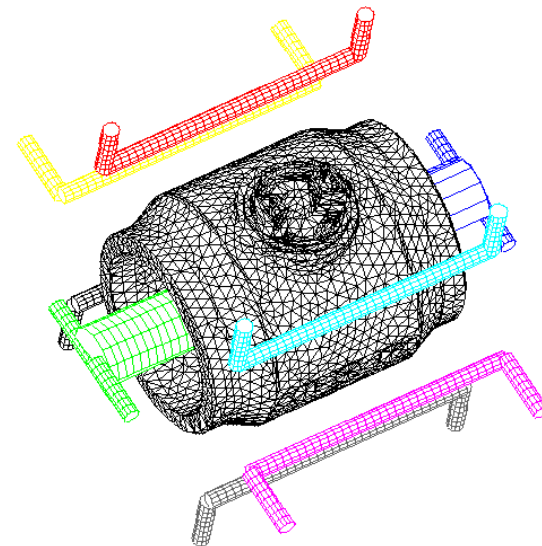
⇒ **Cooling times reduced  
and cycle time savings  
from 10 to 60%**

- Save time on injection press
- Easy handling / less efforts
- Better quality

$$\text{Thermal Diffusivity} = \frac{\text{Thermal Conductivity}}{\text{Specific Heat} \times \text{Density}}$$



- Case study : valve body, PEHD, wall thickness 1.2 in.



**Steel : P20 – 110 Kg**

Thermal conductivity : 30 Btu/h.ft.°K

Specific heat : 0.110 Btu/lbm.°F

Density : 7.8

Heat capacity : 3.58 10<sup>6</sup> j/m<sup>3</sup>

**Thermal diffusivity : 0.387 ft<sup>2</sup>/h**

**Aluminum : alloy 7000 serie**

Thermal conductivity : 88 Btu/h.ft.°K

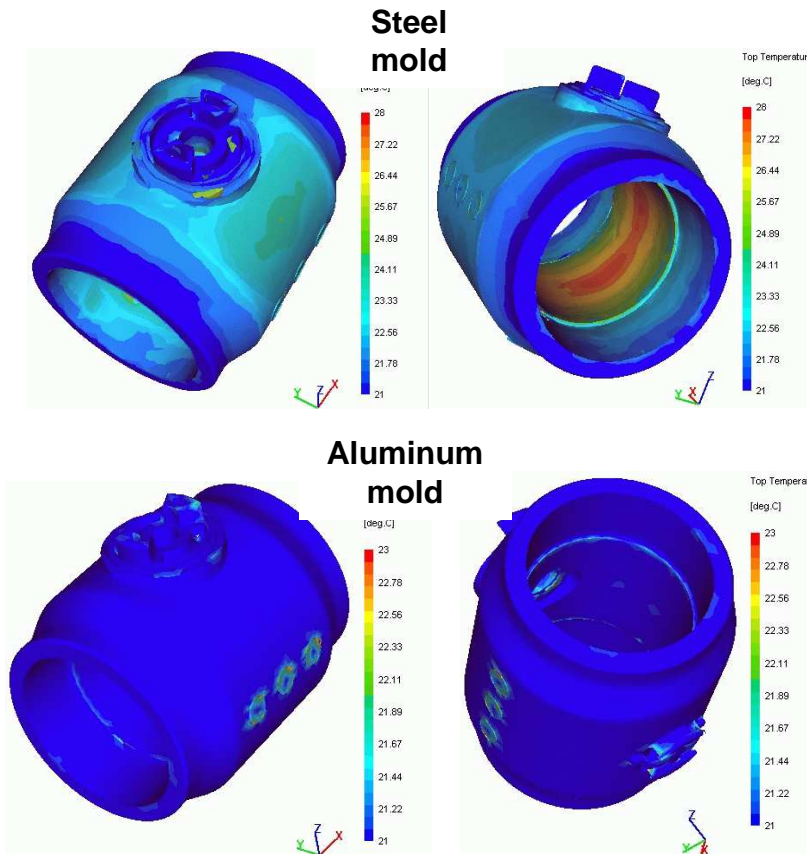
Specific heat : 0.204 Btu/lbm.°F

Density : 2.8

Heat capacity : 2.18 10<sup>6</sup> j/m<sup>3</sup>.°C

**Thermal diffusivity : 2.441 ft<sup>2</sup>/h**

- Temperature distribution at demolding



	<b>ALUMOLD 500 mold</b>	<b>Equivalent steel mold</b>
Cycle time	6 minutes	15 minutes approx.
Out of round	0.015 in.	0.04 to 0.08 in.
Surface quality	Excellent	Good
Pressure inside the mold	18 850 psi (23200 psi max) (400 Mtons injection press, screw 4.5 in.)	
Weight of the part	6.2 lb.	
mold Temp. Plastic Temp.	68 ℉ 448 ℉	
Target production	100 000 parts	

# 1. Advantages

**Example** : car bumper (fig. : average T° within mold during cycle)



<b>COSTS COMPARISON</b>	<b>Raw material</b>		<b>Total cost of the mold (incl. mach.)</b>	<b>Cycle time</b>	<b>Production time for 200,000 parts</b>	<b>Injection cost (1800MT @ \$200/h)</b>
	<b>kg</b>	<b>\$</b>				
<b>P20 steel</b>	30 000	70 200	700 000	47	110	528 000
<b>Alumold</b>	12 000	90 000	600 000	35	81	390 000
<b>Savings with Alumold</b>	<b>18 000</b>	<b>-19 800</b>	<b>100 000</b>	<b>12</b>	<b>29</b>	<b>138 000</b>

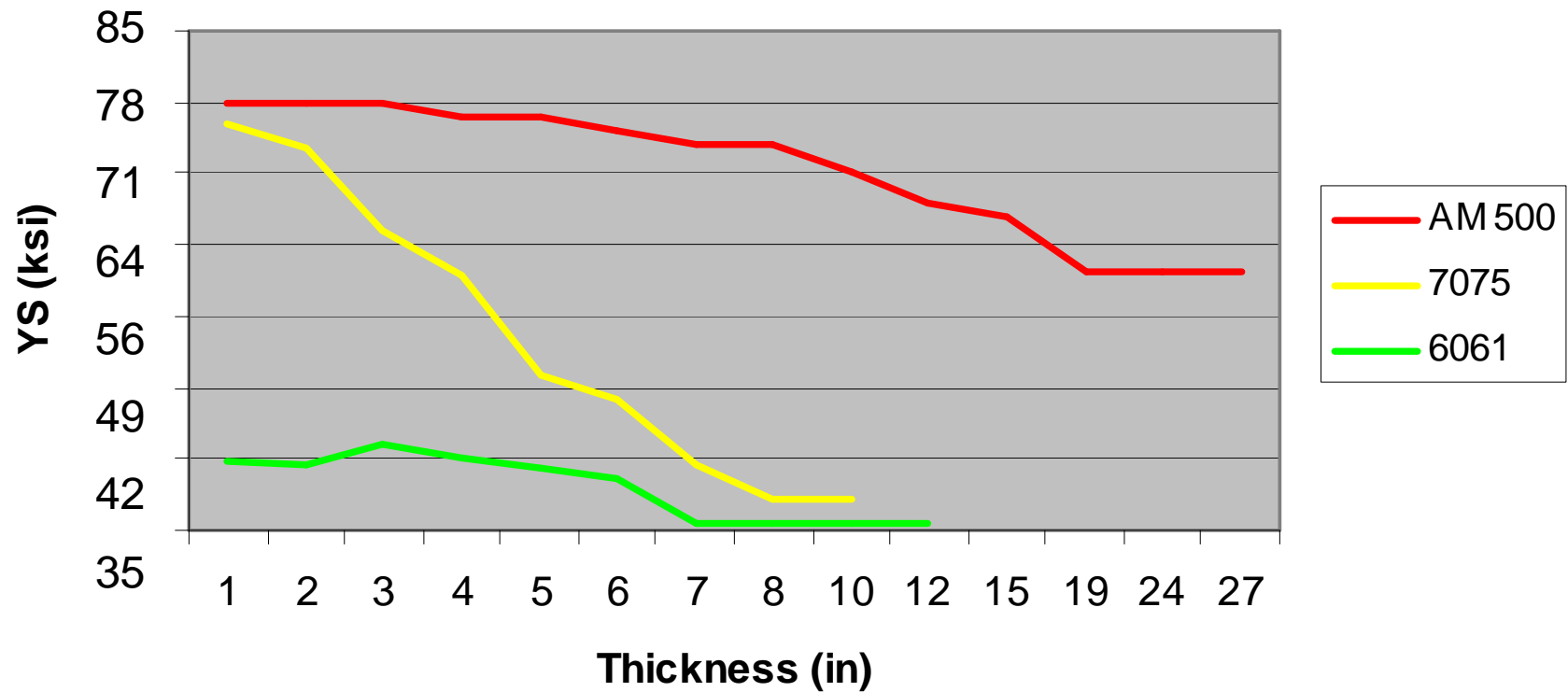
## 2. Competition

### *Alumold 500 vs. steel (4" thick)*

	<b>Alumold 500</b>	<b>Carbon steel</b>	<b>P20</b>	<b>Tool steel</b>
Density	2.82	7.8	7.8	7.8
UTS (ksi)	84	90	146	190-290
YS (ksi)	76	47	129	145
Young Modulus (ksi)	10,400	30,450	30,450	30,450
Hardness (HB)	185	174	304	400 - 600
Thermal conductivity (Btu/h.ft. °K)	88.5	30	22.5	19.6
Thermal diffusivity (ft <sup>2</sup> /h)	2.441	0.542	0.387	0.348
Specific heat (Btu/lbm. °F)	0.204	0.11	0.11	0.11

## 2. Competition

*Alumold 500 vs. other aluminum*



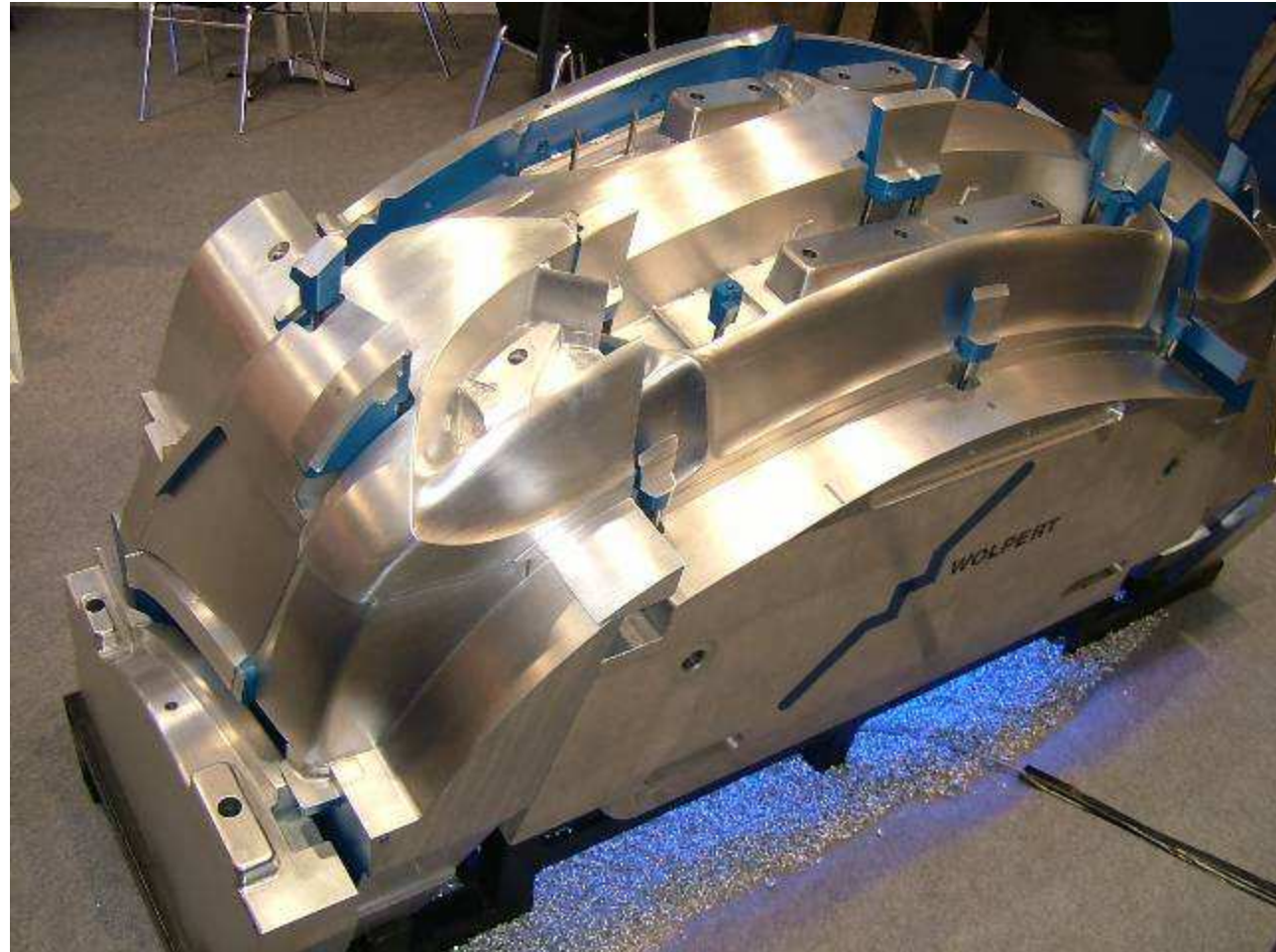
**Door pocket - Renault Trafic (Alumopla European Project)**



Air conditioning cover



Car bumper – BMW 3 Series



Spare wheel case – Mercedes Benz Maybach



## 5. Conclusion

- Aluminum molds - a solution for fast and efficient response.
- Aluminum is recyclable and is a solution to reduce energy consumption during machining and operating the molds, and finally to reduce the GHG emissions.
- For successful implementation: **optimized design, manufacturing and operation parameters of the mold** for specific end-use applications.
- Aluminum metallurgy and fabrication support available from world class Alcan technologists.