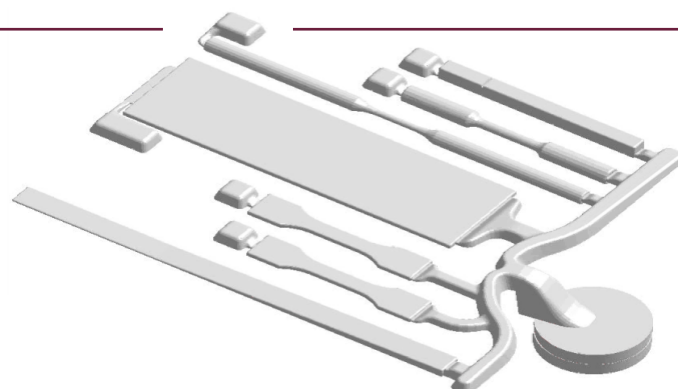


# RAFFMETAL WITH PADOVA UNIVERSITY HAVE DEVELOPED HIGH PERFORMANCE RECYCLED ALUMINIUM ALLOYS

Aluminium is a key element to boost sustainability thanks to its lightweight that reduces CO<sub>2</sub> vehicles emissions. CO<sub>2</sub> reduction is not only important in the vehicle's use but also in the production phase of the raw material used in a vehicle. Recycled aluminium can allow 95% energy savings and 85% less CO<sub>2</sub> emissions compared to primary aluminium production.

RAFFMETAL SPA, in partnership with Padova University (Italy), have developed a new generation of aluminium casting alloys coming from 100% scrap recycling and with very high performances, even if compared

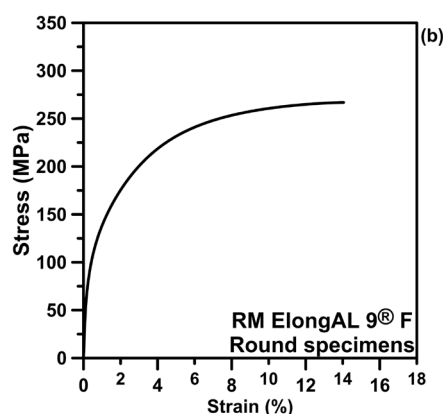
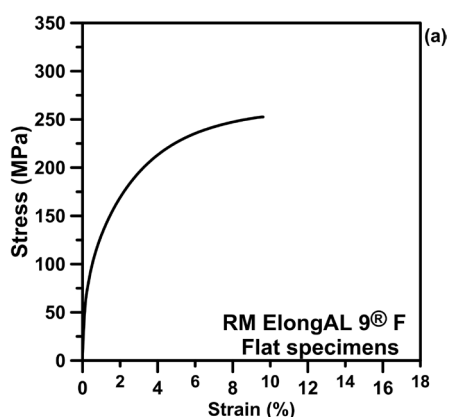
with commercial low iron aluminium alloys. RM-ElongAl (with relevant ductility) represent a stimulating opportunity for new applications of High Pressure Die Casting components with a reduced CO<sub>2</sub> footprint. To evaluate mechanical properties of the new alloys, Raffmetal used a 300 tons cold chamber Die casting machine, without the vacuum system, to produce a standard reference casting according to CEN technical report CEN/TR 16748. Two flat tensile test specimens (3 mm of thickness) and samples for other tests (fatigue, etc.) were employed.



Raffmetal have developed two alloys, RM ElongAL 9<sup>®</sup> where the main target is high elongation in as-cast condition, and RM ElongAL 10<sup>®</sup>, an alloy of high strength and elongation through the optimization of heat treatment.

## RM ElongAL 9<sup>®</sup> HIGH DUCTILITY ALLOY

MECHANICAL RESULTS					
Alloy	Specimens	UTS [MPa]	YS [MPa]	A%	HB
RM ElongAL 9 <sup>®</sup> As Cast	Flat	260	150	6,5 - 9,0	65
	Round	270	115	10,0	



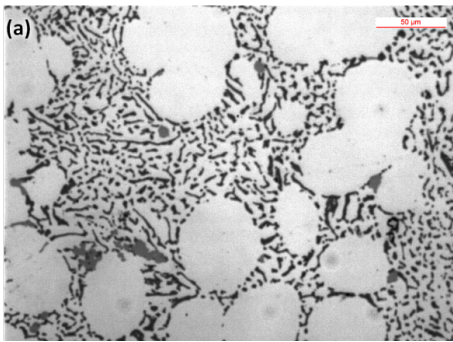
Engineering stress-strain curves of flat (a) and round (b) tensile specimens for RM ElongAL 9<sup>®</sup> alloy

## RM ElongAL 10<sup>®</sup> HIGH DUCTILITY ALLOY

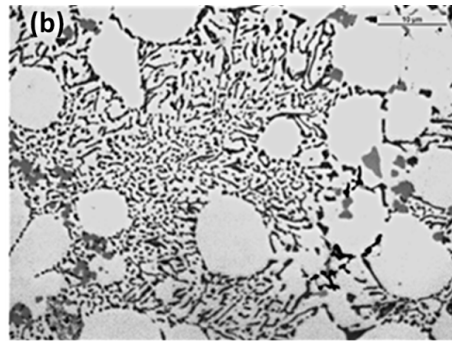
MECHANICAL RESULTS					
Alloy	Specimens	UTS [MPa]	YS [MPa]	A%	HB
RM ElongAL 10 <sup>®</sup> As cast	Flat	290	130	6,5 - 7,0	76 - 81
	Round	270	115	9,0 - 9,5	
RM ElongAL 10 <sup>®</sup> State T7	Flat	200	140	15,0	60

Raffmetal employed a special software to test the level of eutectic silicon roundness, in order to evaluate the modification treatment effectiveness in RM-ElongAL alloys. For ductility purposes, the more round the eutectic silicon grain is, the better it is.

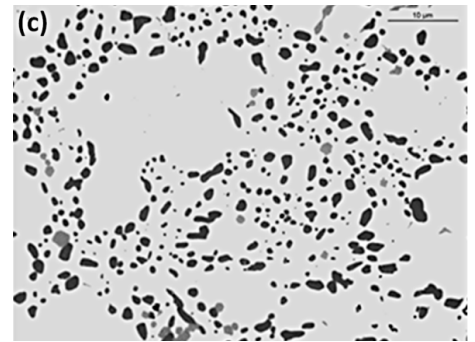
### SILICON MORPHOLOGY EVALUATION IN HIGH DUCTILITY ALLOYS



RM ElongAL 9<sup>®</sup> as cast



RM ElongAL 10<sup>®</sup> as cast



RM ElongAL 10<sup>®</sup> T7

SILICON MORPHOLOGY		
Alloy	Type	Si Roundness
RM ElongAL 9 <sup>®</sup>	As cast	5,7
RM ElongAL 10 <sup>®</sup>	As cast	2,8
RM ElongAL 10 <sup>®</sup>	T7	1,6

Roundness values of eutectic Si calculated for RM ElongAL 9<sup>®</sup> and RM ElongAL 10<sup>®</sup> alloys

In conclusion, Raffmetal new high performance alloys can offer several advantages in High Pressure Die Casting components for both castability and mechanical properties, which are closed to primary alloys, and for cost competitiveness and sustainability, as they are realized by using 100% recycled aluminium!

### MAIN ADVANTAGES OF NEW RAFFMETAL ALLOYS

- MECHANICAL PROPERTIES CLOSE TO PRIMARY ALLOYS
- EXCELLENT CASTABILITY
- LONGER DIE LIFE
- COST COMPETITIVENESS
- SUSTAINABILITY

