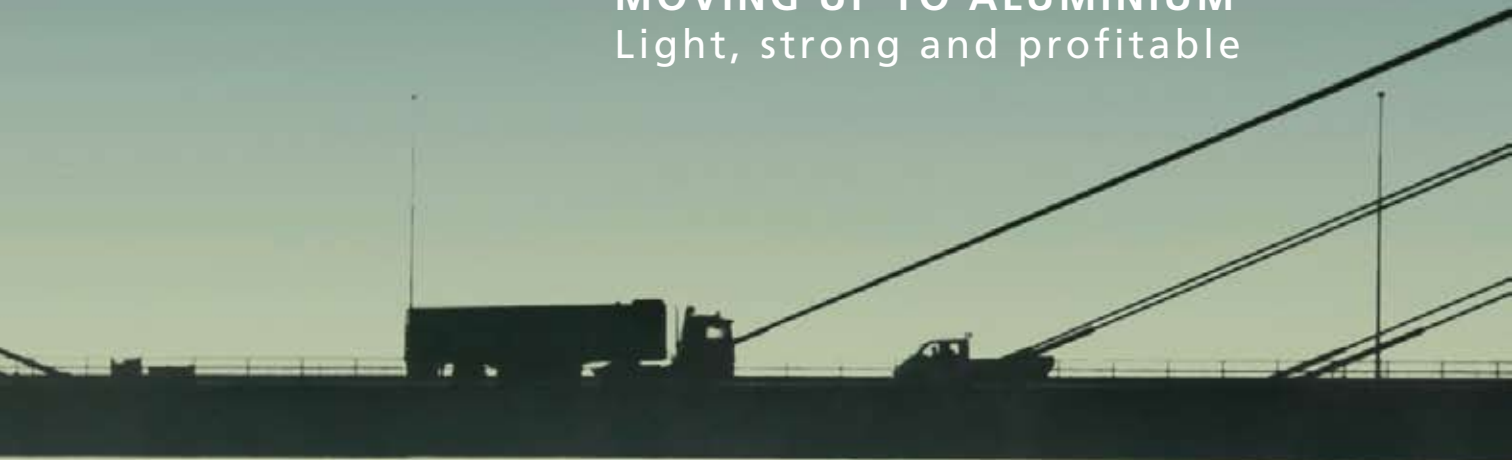




MOVING UP TO ALUMINIUM
Light, strong and profitable





ALUMINIUM AS A COMPLEMENT TO EURO IV & EURO V ENGINES

The EURO IV legislation, compulsory since 1st October 2006, and the future EURO V legislation represent a dramatic reduction of NO_x and particulates emissions.

However, they also impose new combustion processes and exhaust after-treatment techniques representing an additional weight-penalty up to 300kg.

Using more aluminium components allows the manufacturer to compensate for this weight penalty.

The payload can therefore be preserved and even increased.



ALUMINIUM REDUCES FUEL CONSUMPTION

To help coping with high diesel price, aluminium reduces fuel consumption as follows:

- When carrying heavy goods, it allows more goods to be carried per trip. One ton saved on the dead weight saves 1.500 litres of diesel¹ over 100.000 km.
- When carrying voluminous goods, it reduces the overall weight, lowering fuel consumption per kilometer. One ton saved on the dead weight saves 600 litres of diesel² over 100.000 km.

From an environmental point of view, 1 kg of aluminium introduced in a truck saves more than 20 kg of CO₂ over its whole life-cycle³.

ALUMINIUM HAS A HIGH RESIDUAL VALUE AND IS EASILY RECYCLED

Used aluminium vehicles have a lot of success on the second, and even third hand market, where they are usually sold for a very good price. Finally, when they have reached the end of their long service life they still have a high scrap value. This is due to the fact that aluminium is easily recycled, without losing any of its quality and saving 95% of the primary energy input.

MAINTENANCE, DURABILITY & REPAIR

Aluminium's well-known corrosion resistance is an obvious advantage in road transport. It contributes to a long service life, especially in vehicles which work in conditions that can cause serious rust problems. No painting or other surface protection is required and it is easy to clean. Maintenance is therefore kept to a minimum.

Some operators still fear problems with aluminium trailer chassis in heavy duty applications

They should know that, if properly designed, the lifespan of a vehicle is not material related.

Experienced manufacturers produce aluminium chassis offering an equivalent or longer lifespan but at a much lower weight than conventional models. They offer an efficient repair service, based on aluminium techniques that are definitely different from those of steel.



¹ To move the same amount of goods over the same distance, a standard vehicle would need 3.800 more vehicle-km, representing about 1.500 litres of diesel.

² "Energy savings by light-weighting for European articulated trucks" - IFEU - Institut für Energie-und Umweltforschung Heidelberg GmbH, 2005

³ "CO₂ reduction potential of aluminium for articulated trucks" - EAA - European Aluminium Association, 2005.

Hypothesis: 1 kg of alu lightens the vehicle by 0,83 kg, vehicle lifetime = 1.200.000km, 180.000km with heavy goods and 1.020.000km with voluminous goods.

HIGH "STRENGTH-TO-WEIGHT" AND HIGH "STIFFNESS-TO-WEIGHT" RATIOS

Aluminium alloys used in commercial vehicles have strength-to-weight and stiffness-to-weight ratio comparable with the most advanced metals like high strength steel and titanium.

Designs optimised for aluminium, are based on specific sections, smooth transitions and clever joins, which normally give 40-60% weight saving over competing materials.

Comparison of weight-optimised beams made with 3 different materials and 2 design criteria⁴

	EQUAL STRENGTH			EQUAL STIFFNESS		
	Traditional material		High strength material		Aluminium alloy	
Strength	1	=	1	=	1	
Stiffness	1	>	0,3	<	0,6	
Weight	1	>	0,7	>	0,4	
Section height	1	>	0,6	<	1,2	

	EQUAL STIFFNESS				
	Traditional material		High strength material		Aluminium alloy
Strength	1	<	2,2	>	1,5
Stiffness	1	=	1	=	1
Weight	1	=	1	>	0,6
Section height	1	=	1	<	1,4

The comparisons made are based on standard beam design, the so called "double T".

However, further weight optimisation is possible with aluminium because finite element modelling allows precise definition of most favourable section's geometry and these sections, even if very complex, can easily be obtained through the aluminium extrusion process.

HIGH STABILITY

Achieving IRTE⁵ Class A⁶ tipping stability standard for an aluminium tipper chassis is no problem. Aluminium, according to tests carried out in the summer of 2002 has no issues with flexing and easily provides the equivalent rigidity of steel.

Indeed, a full-aluminium vehicle, significantly lighter than others, passed the IRTE Class A test at 44 tonnes with its standard chassis, reminding everyone that an appropriate design leads to both lightness and torsional stiffness.

LESS PAIN FOR DRIVERS

Mobile parts that are manipulated at each delivery, like drop-side walls or rear doors, are lighter to move when made out of aluminium. This saves a lot of effort for the drivers and reduces the risk of injuries.



⁴ Mechanical characteristics [Yield strength (MPa), E-Modulus (MPa), Density (kg/m³): Traditional material [350, 210000, 7800], High strength material [760, 210000, 7800], Aluminium alloy [250, 70000, 2700]. Calculation based on finite element modelling. Results are typical values and not contractual.

⁵ Institute of Road Transport Engineers, UK

⁶ "Class A" standard states that a trailer should be able to tilt sideways 7° without falling with a fully loaded and raised body.



ALUMINIUM IMPROVES ROAD SAFETY

Aluminium systems make it possible to absorb significantly more crash energy per unit of weight than traditional systems. As a rule of thumb, the light-weighting potential exceeds 40%.

For this reason, aluminium is very well suited for front, rear and side bumpers.

Aluminium elements can also be used to improve the energy absorbing potential of front and rear end under-run protection devices, and may also be used to build soft deformable truck noses.

Last but not least, extra safety features always mean additional weight, which can be balanced by replacing heavy materials by aluminium.

SOME ALUMINIUM APPLICATIONS & WEIGHT SAVINGS...

Components for tractors & rigid trucks

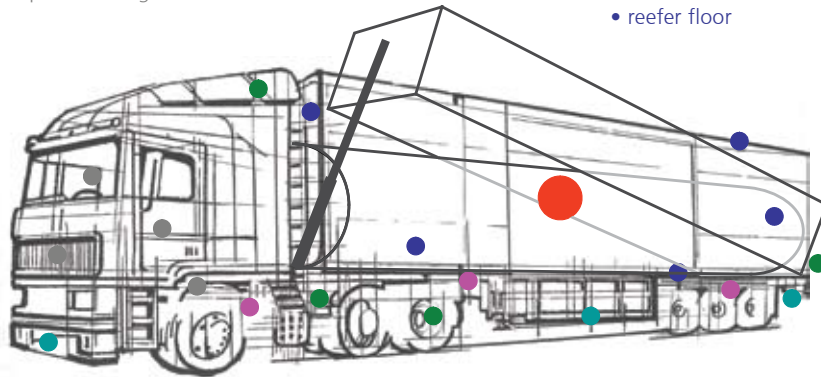
- cabin & doors: -200kg
- chassis: -350kg
- powertrain parts: -125kg
- suspension parts: -110kg

Complete superstructures

- rigid body: 90m² = -800kg
- tipping body: -800 to -2000kg
- ADR fuel tank: 43000l = -1100kg
- self-discharging body
- silo

Components for superstructures

- curtain rails: 2x13.5m = -100kg
- front wall: -85kg
- rear door: -85kg
- side boards: 600mm = -240kg
- stanchions: 10x600mm = -50kg
- reefer floor



Safety parts

- front bumpers: -15kg
- rear bumpers: -15kg
- side bumpers: -20kg
- front and rear under-run protections

Trailers sub-structures

- chassis: 13.5m = -700kg
- chassis: 6m = -300kg
- chassis+floor: 13.5m = -1100kg
- legs: -35kg

Accessories

- air pressure vessels: 6x60l = -54kg
- diesel tank: 600l = -35kg
- toolbox: -15kg
- tail lift: -150kg
- wheels: 14 rims = -300kg

CALCULATE YOUR PROFITS

Increased payload + Higher residual value = Additional incomes

Fuel saving + long life + reduced maintenance = Cost savings

Calculate your payback and discover other advantages on www.alutransport.org

