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Automotive materials
ACHA6012

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a) The main elements in 7xxx is aluminium is Zinc and Magnesium, the benefits to us as lightweight good corrosion resistance and wearability, limitations of this alloy is its strength as its not as strong as its steel equivalent

aii) The 1st number indicates that the steel is a carbon steel the last 2 numbers show that it has a Carbon Percentage of 0.45%.

b) 3 types of composite classifications are Particle Reinforced, Fibre Reinforced and Structural Reinforced. Particle reinforced are harder and stiffer than the matrix material as the particles are part of a macro/micro or nanoscopic scale along with improved mechanical behavior depending on the interface bonding. Fibre composites will have high strength to weight ratios whilst utilizing a low density fibre and matrix material, but will fail with minimal deformations so need to be perfect. ~~but~~ Structural composites make up of both a composite and an inhomogeneous material formed in a homogeneous structure in order to maximize strengths of both properties.

c) Volume = 0.65

$E_F = 65 \text{ GPa}$

$E_m = 3.2 \text{ GPa}$

$\frac{F_F}{F_m} = \frac{(65 \times 0.65)}{(3.2 \times 0.35)}$

$= 16.62$

$F_F =$

$F_C = 30 \text{ MPa} \times 0.03 = 9 \text{ N}$

$F_m =$

$F_C = F_F + F_m = 9 \text{ N}$

$F_m = 16.62 \times 9 \text{ N}$

$F_F = 9 - 1.452 = 7.548 \text{ N}$

$17.62 \times F_m = 9 \text{ N}$

$\frac{17.62}{1} = 1.452 \text{ N}$ $F_m = 1.452 \text{ N}$