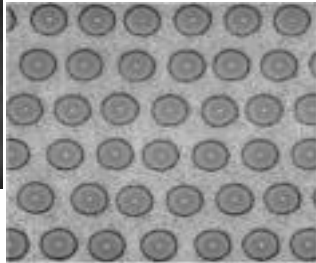
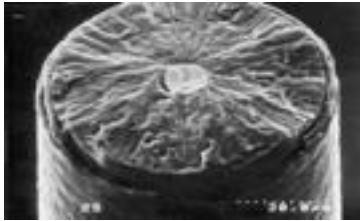


## LCV 2015

### Metal Composites for light weighting



by Stephen Kyle-Henney

Date 9<sup>th</sup> September 2015

# Metal Matrix Composites

Silicon carbide fibre reinforced titanium and aluminium alloys offer 40% or weight reduction.

Can this be exploited in future low carbon vehicles?

## Potential Applications

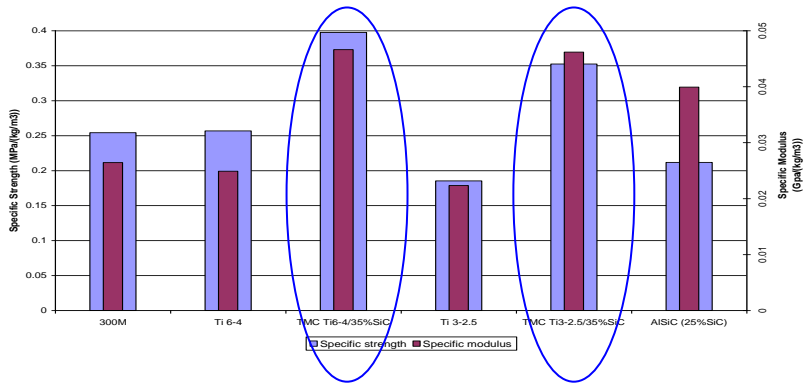
- Engines- high temperature high strength
- Drive shafts- High stiffness –good whirls performance
- Brakes- High temperature low mass
- Suspension- High stiffness
- Hybrid/electric- Flywheels- heat transfer
- New system designs- are materials limiting your designs?

# TISICS

- TISICS is a UK based SME
- We are the only producers of this technology outside America.
- Extensive Innovate support to industrialise this technology in the UK.
- R&D Partnerships with customers and suppliers
- Wide market opportunities and range of component geometries
- Private management owned company seeking investors.

# Specific Properties

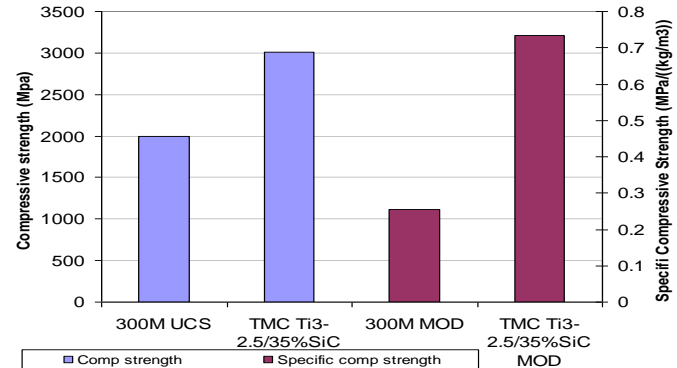
Typical specific properties



Titanium composites  
 Strength 1450MPa to 1800MPa  
 Stiffness 190GPa to 210GPa  
 Similar to steel but lighter!  
 Compression strength 2.5GPa to 3.5GPa Better than landing gear steel.  
 Corrosion resistant, low thermal expansion.

Aluminium composites  
 Strength 1200MPa  
 Stiffness 140GPa  
 Better than titanium but lighter!  
 Compression strength >1.6GPa Lower thermal expansion.  
 Heat transfer structures

Compressive Properties



# Manufacturing

- Near net shape manufacture
- Selective reinforcement
- Use of sheet lay-up systems similar to pre-preg CFRP
- New €2.5M ESA funded filament winding process in progress.
- UK production supply chain
- Capacity will scale with demand.

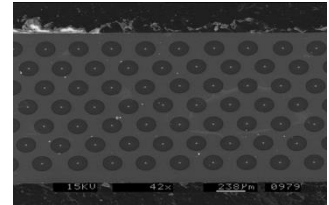
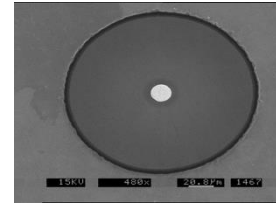
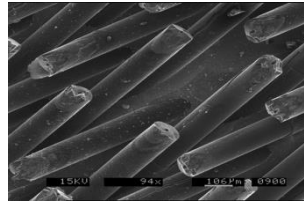
# LCV Objectives

- TISICS is looking for development partners for the Innovate UK and OLEV calls
- We need to develop and demonstrate the performance potential to show future value in meeting emission targets.
- Lighter parts = greater efficiency
- Current materials are nearing limits.
- Primary target is an engine programme for pistons, con-rods, gudgeon pins etc. for higher temperature and pressure downsized engines.

# Parts



20mm diameter  
300mm long  
0.6mm wall  
5MT compression!



# Thank You Any Questions?

Please visit us in the Innovate UK  
materials exhibition

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