1 Introduction
There is a drive towards sustainable low weight vehicles and renewable energy. This is driven by the need to reduce:
- carbon emissions from vehicles
- dependency on fossil fuels
The Institute for Energy and Environmental Research has found that by reducing weight by 100kg there are lifetime fuel savings of
- 300 to 800 litres for passenger vehicles, and
- over 2500 litres for mass transport such as taxis and buses.
In addition, the European Union has issued a directive that 95% of vehicles by weight must be recyclable by 2015.
The production of large wind turbine blades could also be improved and the cost reduced if a suitably lightweight easily formable material could be used.

2 Fibre-Metal Laminates
Fibre-metal laminates are sandwich structures which consist of layers from both a fibre-reinforced composite material and a metal alloy. They are currently used in low volume aerospace applications due to their excellent impact and damage tolerance. However, little information is known about the opportunity for rapid manufacturing of fibre-metal laminates.

3 The Challenge
Fibre-metal laminates have the potential to reduce the weight of vehicles and reduce the manufacturing time of wind turbine blades.
The challenge is to determine the formability of fibre-metal laminates and develop a predictive finite element model so that rapid stamp forming can be used.

4 The Solution
By modelling the formability of fibre-metal laminate using finite element analysis and comparing the results to experimental work, a fundamental understanding of the formability of the material can be obtained.
Modelling the forming process for a fibre-metal laminate has three considerations:
- modelling the material,
- modelling the mechanical forming process, and
- modelling the effect of process variables, such as temperature.

5 Conclusion
The finite element simulations can be used to predict
- the types of forming which can be performed,
- the failure during forming of fibre-metal laminates, and
- the quality of the formed part.
Results from the this work can lead to groundbreaking opportunities for the use of fibre-metal laminates for developing sustainable products.