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## The contractors involved in the project are the following:



Universidade do Minho

RTD1 - Universidade do Minho  
Guimarães, Portugal (Coordinator)  
[www.uminho.pt](http://www.uminho.pt)



RTD2 - ITA, Inst. für Textiltechnik  
der RWTH Aachen, Germany  
[www.ita.rwth-aachen.de](http://www.ita.rwth-aachen.de)



RTD3 - LABOR S.r.l. Industrial  
Automation, Rome, Italy  
[www.labor-eu.net](http://www.labor-eu.net)



RTD4 - IAITI, Instituto Agilus de  
Inovação em Tecnologias de  
Informação, S.A., Matosinhos,  
Portugal  
[www.iaiti.pt](http://www.iaiti.pt)

SME1 - P & Maia, Lda  
Guimarães, Portugal

SME2 - SAMDAL Engineering  
Gjettum, Norway  
[www.svemar.com](http://www.svemar.com)



SME3 - SPOLSIN, spol. s r.o.  
Ceska Trebova, Czech Republic  
[www.spolsin.cz](http://www.spolsin.cz)

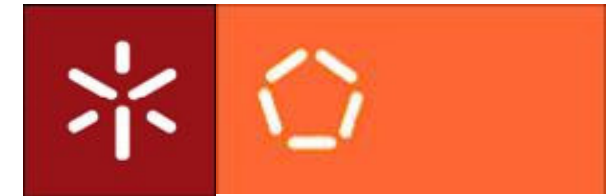
SME4 - MAGEBA-Textilmaschinen  
Vertriebs GmbH  
Bernkastel-Kues, Germany  
[www.mageba.de](http://www.mageba.de)

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# University of Minho Portugal



## MULTIWEAVE

### Weaving Machine for Producing Multiaxial Fabrics

[www.tecminho.uminho.pt/multiweave](http://www.tecminho.uminho.pt/multiweave)

## Summary

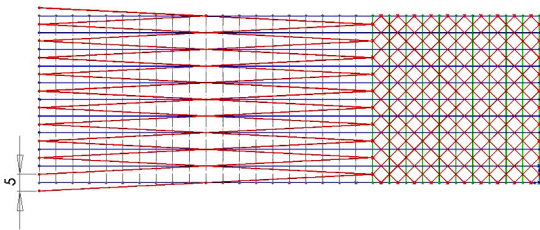
Technical textiles are products for applications where technical performance is more important than aesthetics, such as the reinforcement of composite materials. In this case, the possibility to reinforce in several directions is of paramount importance for a wide range of applications, such as aircraft fuselages, boat hulls, yachts, etc.

A conventional fabric interlaces two sets of yarns, the warps and the wefts. A multiaxial woven fabric can be obtained by interlacing 4 sets of yarns:

The warps (**blue**);

The wefts (**green**);

The bias (**red**), two sets of yarns at +45 and -45 degrees.



Geometric model of the multiaxial structure

The aim of this work is to investigate the feasibility of a multiaxial 2D woven structure able to provide specified strengths in different directions and develop a manufacturing process for its production.

## Objectives

The main objective of the MULTIWEAVE project is to develop a new manufacturing process that can take advantage of the possibilities of new woven structures.

One of the most important characteristics of technical textiles is the possibility of providing a specified strength in multiple directions.

To achieve this objective the research is oriented towards the development of a new concept that could produce a multiaxial fabric.

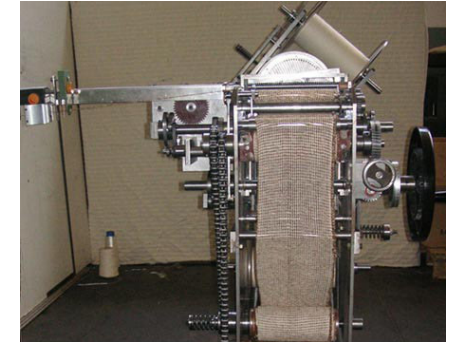
This kind of fabric is designed to boost the reinforcement in bias directions, by the insertion of interlaced yarns between the weft and warp in a woven structure.



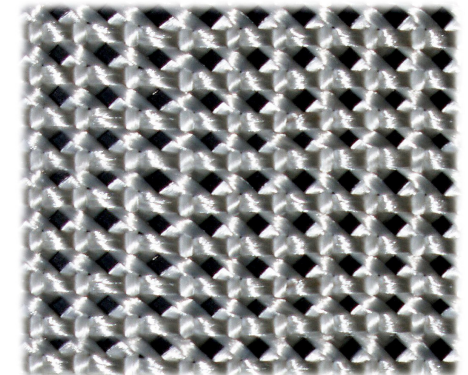
Technical fabric being produced

## Results

A development prototype has been designed, developed and manufactured, producing multiaxial fabrics from commercially available yarns.



Multiweave development prototype



Detail of a Multiweave fabric sample

Future work is to manufacture multiaxial fabrics from technical yarns and to test them in order to access their properties. A scale-up prototype will be the final objective.