1. Final publishable summary report

1.1. Executive summary

The main objective of WAVECOM project has been the development of a technology suitable for carbon fiber reinforced composites manufacturing based on microwave curing of its raw materials, which has included the selection of the proper additives (dipole organic molecules or nanostructured magnetic materials) and the set up of the system at pilot plant level. A better understanding of potential distortions and residual stress effects of microwave has been obtained by using Fibre Bragg Grating technology. Tooling materials and their geometrical limitations have been obtained as well. Homogeneous temperature profile across the composite cross section and precise temperature control and no deformation have been the key issues for the development.
Further optimisation and development of process in terms of costs, flexibility and sustainability have been evaluated.
Finally, an assessment on the final properties of the composites and the benefits of this technology in economic and ecological terms has been also carried out. These developments have been carried out with a view to up scaling existing technology and developing new technology for industrial implementation.

1.2 Project context and objectives

WAVECOM has addressed the following topics:

- Selection of suitable susceptors to enhance the absorption of microwave radiation. Therefore, heating time of the resin will be reduced.
- Assessment about the residual stresses and distortion of carbon reinforced epoxy composites by employing Fibre Bragg Grating (FBG) technology during microwave curing.
- Implementation of the microwave curing system on a robot within an isolated cell.
- Development of moulds and determination of its geometrical limitation depending on the type of antenna finally installed.
- Economic and environmental appraisal of microwave curing of carbon reinforced epoxy composites.

The main objectives of WAVECOM project are detailed as follows:

- Investigation of the influence of additives in the resin for microwave absorption and curing.
- Investigation of the influence of microwave itself on sample properties, including shrinkage and deformation of manufactured part.
- Determination of limitation of geometry and shape of a part for example maximum radius of curvature, maximum length of bar and maximum depth of holes for microwave curing purposes.
- Design of the mould and selection of mould materials for minimum deformation and abrasion wear for microwave assisted curing for the future step of the demonstration parts.
- Economical and ecological assessment in comparison to conventional cured parts.