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Projekttitel:	EMVeM (Energy efficiency Management for Vehicles and Machines)
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Mission Statement

In the effort of reducing the ecological footprint of machines and vehicles along with the growing social awareness of the energy problem leading to an increasing social pressure to reduce energy consumption, effective and efficient analysis techniques and adequate measurement technologies are required to produce world-leading products with a high energy efficiency, without compromising functionality/safety/performance/etc. This demand is not only driven by social awareness, but also by economic reasons, such as rising energy price. Combined with the increasing trend towards virtual design and prototyping, to reduce costs and development times, this need for designing 'green' products creates an urgent industrial need for robust and volatile simulation and experimental validation methodologies in machine and vehicle product design.

EMVeM wants eventually to contribute to the road towards a Green EU economy by training the engineers of tomorrow in the field of energy efficiency and by providing them with tools and methodologies for the development of new, innovative products with a reduced ecological footprint.

Lösungsweg:

Since nowadays products are getting more and more multi-disciplinary by the constantly increasing integration of added functionality and product intelligence (i.e. mechanical systems work together with electronic systems, linked through control schemes which are steered using embedded soft-

ware, etc.) and since energy is a global design attribute which is influenced by all disciplines, the development of energy analysis methodologies, both numerical and experimental, requires an integrated research strategy. In next machine and vehicle generations, mechatronically inspired concepts will be needed to reduce the ecological footprint without losing performance. This means that manufacturers will have to start taking energy efficiency features into account during the design cycle.

In other words, the design process should move from a purely performance and capacity driven approach to an approach that includes energy efficiency as a key parameter. Such a new approach leads to substantial energy savings during the products' lifecycles and as such strengthens the industrial competitiveness of EU machine and vehicle industry.

EMVeM is aimed to increase the competitiveness of EU industry players in the machine and vehicle building sector by the development of virtual design methodologies for energy efficiency optimization.

This EMVeM ITN brings together research and industrial partners who will collectively train early stage researchers, drawing together skills and expertise in a range of different technical approaches. The industrial partners put forward specific applications, behind which are generic difficulties associated with energy efficiency analysis. The academic and research centre partners bring a diverse range of potential research approaches and the capability of research training, provision of courses and dissemination and outreach to the wider community. Eventually, the consortium develops and promotes research, knowledge and application of energy efficiency management analysis within EU industry.

The EMVeM project is made up of 12 full partners (4 academic, 4 public research, 4 private sector with 1 SME) and 7 associated partners (4 academic, 2 private sector and 1 association) who will host and train 14 Early-Stage Researchers (ESRs). The general objectives of the project are to:

- create a platform for structured training and transfer of knowledge, both within the network and towards the wider community, crossing inter-sector boundaries; essential to promote the use of modern CAE tools, to ensure that there is a sufficient number of people trained in the field of energy analysis to meet the challenges ahead, and to ensure the competitiveness of EU industry;

- provide young researchers with the possibility to pursue a doctoral degree through an intensive training-through-research programme as well as a transferable skills training in order to become future trainers in a multi-disciplinary field of academic, industrial and societal importance; and as such improve the young researchers' career perspectives;
- draw together academic research teams and industrial partners from different sectors with diverse multi-disciplinary skills and expertise and with common interests in the field of energy efficiency analysis and design tools to confront two emerging challenges, i.e. the growing socio-ecologic-economic demand for energy efficient products and the growing importance of CAE technologies to support modern design processes in a global framework for sustainable and green product development;
- execute an innovative research programme that encourages cross-fertilisation of the ideas behind various approaches for energy analysis and steers them towards the development of novel technologies, innovative solutions and their application in real-life engineering cases through a close cooperation with industrial partners;
- bring together the research groups in order to remove fragmentation of the existing analysis efforts towards energy efficiency management of machines and vehicles and to achieve a critical mass of research effort unparalleled anywhere in the world;
- progress the state-of-the-art and disseminate and outreach knowledge in the design of 'green' mechanic and mechatronic systems to the larger EU community.

The corresponding task which belongs to ITA-3T is to develop a proper and generic methodology in order to evaluate and design textile production machines from a strictly connected energy efficiency point of view. The main purpose is to develop such modelling and validation schemes aimed to optimize energy usage in textile machines, and therefore trying to figure out how to improve the relative energy consumption. In particular, air jet weaving machines will be the main application field to figure out the efficacy of the developed method. New concepts of the relay nozzles, studying inner and outer flow and investigations of the flow field through the reed will be carried out.

Objectives	Development of a generic methodology to evaluate and to design textile production machines in temrs of energy efficiency
Tasks and Approach	Analysis, categorization and design Models evaluation and development
Results	Achievements of the objectives: - Using Hardware-in-the-loop systems for energy - Development of an integrated design environment for energy efficient drive lines in machines - Modelling schemes and validation for energy optimization of textile machines

Danksagung

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