8th Joint CORNET Call for Transnational Collective Research Proposals

--- Project Idea ---

Subject:	**Rapid Prototyping & Manufacturing- R.P.M.**
Coordinator: Other applicant(s):	CNA Artigianato Pratese (Toscana) **ITALY** PIN Scrl –Università degli Studi di Firenze (Toscana) **ITALY**
Sector/target group:	European home industry, biomedical, aerospace, automotive, electronics, small furniture, gift and art products, mechanical production
Proposal summary:	The expression "**rapid manufacturing**" means the possibility of manufacturing, by means of **additive techniques** (commonly known as "**rapid prototyping**") the **final** production directly from the mathematical (CAD) model of the product to be built, using directly the **final material** and **without the use of other production tools and equipments**. Thanks to the increasing number of practical applications, rapid manufacturing, until now considered as "the next century production technique", is progressively becoming a **feasible and alternative productive approach**. Nevertheless, in the industrial world and particularly when dealing with SMEs, rapid manufacturing is often **ignored or misunderstood**: some think of it as "the fastest production method among the available ones", some other think it is simply the introduction of an additive process somewhere in the productive chain. Rapid manufacturing, instead, involves dramatic changes in product style, design, production, distribution and sale. For such a reason it has to be considered as a new **industrial revolution**. It proves to be very difficult to imagine a productive approach as flexible as rapid manufacturing, in which the same manufacturing means can be used in many different production fields: home industry, biomedical, aerospace, automotive, electronics, small furniture, gift and art products, mechanical production. The key of the revolution introduced by rapid manufacturing is represented by the suppression of **dies,** which are the least flexible elements (from the point of view of product and process variations) in products of mass diffusion manufacturing. In fact, all manufacturing equipments (and dies in particular) inevitably constrain both product style and design: overtaking such limits frees the designer's imagination. Anyway, it has to be considered that, in order to fully exploit rapid manufacturing, it is necessary to design the product directly thinking it will be built by means of rapid manufacturing techniques. Using them for a product devised for conventional productive process is a great mistake. Practically speaking, the introduction of rapid manufacturing involves a deep company reorganization and, consequently, the need of overtaking the inevitable resistance to change. Companies demonstrating promptness in changing their design and production strategies will be able to take great advantage both on global and local markets. This project proposal directly originates from the situation described

	above. The goal of the project is the definition of a guide-line for rapid manufacturing-oriented product design. Such guide line will be proposed as an alternative (and more efficient) design tool with respect to conventional design methodologies, which are inevitably constrained by conventional productive processes (moulding, etc.) and which prevent to obtain the expected benefits when introducing rapid manufacturing techniques. The design guide-line is expected to be derived from the individuation, analysis and solution of a set or representative product case studies proposed by the project partners. For such selected studies, products will re-designed from scratch, taking care to avoid any influence related to conventional production processes. This approach will be possible thanks to the wide experience and skill of the project research partner in industrial design and rapid prototyping. Starting from the CAD modeling phase to the choice of optimal materials and production parameters, the products will be completely re-engineered and actually built by using rapid manufacturing techniques. Furthermore, a comparison in terms of both time to market and costs, will be performed for each single case study in order to quantitatively assess the impact of using rapid manufacturing-based strategies instead of conventional ones.
Advantages for trade and industry:	It is needless to say that the results of the proposed research project represent a great opportunity in terms of time to market reduction for all the companies involved in design and manufacturing of mass-diffusion products. In addition many other benefits are achievable by designing products oriented to rapid manufacturing: - possibility of producing objects with arbitrarily complex shapes (impossible to obtain by conventional production processes); - elimination of all the intermediate phases and equipments to proceed from the CAD model to the product manufacturing phase; - opportunity of almost completely automate the production process employing commonly skilled personnel.
Dissemination concepts:	The dissemination will be arranged via an online community. This will improve communication and information sharing among the project partners, while at the same time remaining accessible to additional applicants. In addition to that, publications, workshops and seminars will be set up by the project partners
Profile of additional partners:	- Association of companies providing the case studies willing to assess and introduce rapid manufacturing based productive processes - research center
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