



## *Contributions to Enhance Manufacturing Industry's Competitiveness*

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IN A COMPETITIVE WORLD, Maltese manufacturing firms ranging from SMEs to multi-nationals, continuously strive to reduce operational costs and time whilst at the same time attempting to deliver products and services of a higher quality. In this scenario, local manufacturing firms need to constantly endeavour to improve these and other performance measures associated with their manufacturing processes and products, such as environmental, risk and recyclability. The departments within the Faculty of Engineering are aware of these challenges and collectively strive to provide excellence in both teaching and research that contribute to Malta's industrial needs. Of particular relevance to contributions made in this respect is the Department of Manufacturing Engineering (DME), a fairly young department that explicitly considers it as part of its mission to develop appropriate skills in local engineers that enhance Malta's industrial competitiveness. The Department of Manufacturing Engineering provides future engineers with 'product development' technological and methodological skills since when properly integrated, these collectively contribute substantial improvements in the overall business performance of manufacturing organizations. Fortunately, forward looking Maltese firms have realized and benefited from the potential offered by DME graduates and staff members, with the result that they have forged strong links with the department to help them exploit the resources and services available.

Due to the dynamic nature of knowledge in the manufacturing engineering domain and in the quest to provide quality training to its students, staff members of DME keep abreast of advances being made by regularly attending and actively participating in international conferences and training sessions. The Department's web page is not only utilised to impart information about its activities to the public in general, but is also employed as a means through which instructional material can be easily reached by students. In addition, the department is gradually phasing-in where appropriate, computer aided learning facilities that allow students to grasp at their own pace, deeper knowledge of certain topics. In 2002, in terms of amplifying the knowledge transfer mechanisms available to its students, the Department made a number of Socrates Erasmus agreements with Universities such as Lancaster (UK), Strathclyde (UK) and Bergamo (Italy) through which both academic staff and students benefit. Furthermore, students and also engineers in industry gain engineering knowledge from external visiting lecturers who visit the Department. One such 2002 visiting staff member was Professor Marton Balazs from Richmond University who during his visit also delivered a public lecture on Artificial Intelligence in Engineering. The Department of Manufacturing Engineering is aware that engineers need to undergo continuous professional development beyond their degree. For this reason in 2002, DME was active as in previous years in the provision via MUS Ltd of several short evening courses such as those related to Computer Aided Design (CAD) and Programmable Logic Controllers (PLCs). From a teaching point of view, DME is also involved in postgraduate training, with two M.Phil. students during 2002. One M.Phil. student is focusing on slip sensing and force control in robotic grasping whilst the other is working on developing a time-compression technology that enables engineers to rapidly convert their paper-based 'form design' sketches into 3D virtual and physical models.

Conscious of the need to forge theory with practice, the Department of Manufacturing Engineering acquires new equipment that provides students with hands-on experience. An important acquisition made in 2002 is a Cincinnati Vertical Machining Centre equipped with

an automatic tool changer and a Siemens controller providing graphical tool path simulation. To fully exploit the facilities provided by this machine, academic and support staff of the department attended training at Cincinnati's dedicated training centre in Birmingham (UK). This new machine, besides opening up new opportunities for training at both degree level and via short courses, will enable the department to amplify its related research activities whilst at the same time providing, where appropriate, research support to the local industry.

It is of great satisfaction to the department to note that year after year, more industrial firms approach it for assistance in one way or another. As a step towards formalizing such collaboration, the department setup agreements for industrially-partnered final year projects. Firms benefiting from such final year projects reported that they were very pleased with the results arising from this collaboration as it proactively enabled University students and staff to positively contribute to the firm's engineering challenges. For example, Baxter Ltd partnered with DME in a final year project entitled *Conceptualisation and Prototyping of a Flexible Mechanism for the Placing of Stopcocks into Pouches*. The project *Design of a Material Handling System for a Complete Manufacturing Unit* carried out with Methode Electronics (Malta Ltd.) concerned the generation of alternative design solutions that achieve a reduction in the distance and automated handling operations of a class of automobile switches. Another project with Methode, *Knowledge Re-use From Assembly System Design* concerned developing 'ATL brake pedal switches' automated assembly system concepts whilst simultaneously capturing knowledge used to generate formal *Design for Automatic Assembly* guidelines in order to improve designer support in future Methode automation projects. Also relevant for 2002 from a University-industry collaboration perspective is the fact that Toly Products Ltd. worked closely with DME to develop innovative solutions related to its cosmetic compact cases, with this work considered beneficial by Toly that further collaborative research and development is still going on.

DME is fully aware that new discoveries and innovation are a driving force for economic development since they contribute to entrepreneurship and new employment opportunities. For this reason, following a joint initiative by the *IPSE Kordin Business Incubation Centre* and DME, a scheme to foster innovation in students enrolled in the department's Engineering Design module was setup in 2002. The student teams that participated in 2002's design module were involved in designing a staircase climber wheelchair, a modular case for cosmetic make-up powder, a gas cylinder loader/unloader, an innovative solar heater and a domestic waste management system. When presenting the awards and certificates, Mr Joe Zammit Tabona, Chairman – KBIC Programme congratulated all students and urged them to effectively utilize the professional design skills acquired to promote the generation of more innovative product solutions and entrepreneurship in Malta.

From a research perspective, DME staff are proactively involved in both basic and applied research concerning product development technologies and methodologies. Research output and quality is evident from a number of results accepted for presentation in international conferences and for publication in international journals, details of which are available at: [http://www.eng.um.edu.mt/~dme/dme\\_res.html](http://www.eng.um.edu.mt/~dme/dme_res.html). In terms of research, 2002 was a rather busy year for DME. The department was invited by the *International Federation of Information Processing (IFIP)* to locally organize and chair, the 5<sup>th</sup> International Workshop on *Knowledge Intensive CAD* which besides local academic and industrial participants also welcomed participants from different continents worldwide. An exchange visit took place with the *Institute of Applied Mathematics and Information Technologies of CNR*, Genova. Of particular satisfaction, is the fact that in August 2002, a team of researchers from DME and others from within the Faculty, won the best paper award during the *NordDesign2002*

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conference held at Trondheim University, Norway concerning a product development time-compression technology being developed in Malta. DME staff members are also actively involved in expert committee meetings held in Brussels concerning the EU FP6 research programme.

It is evident that the Department of Manufacturing Engineering through its staff members is making various direct and indirect contributions that enhance Maltese industry's competitiveness. Given appropriate financial and human resource support, DME is keen to make even more contributions to the country by amplifying and improving its activities to cover emerging challenges to industry such as those of flexible and rapid manufacturing together with cleaner production technologies. Last but not least, it is worth mentioning that DME staff members make several contributions to Malta via their expertise made available to various national entities such as the *Malta Standards Authority, EneMalta Corporation, the National Commission for Sustainable Development, the Technology Venture Fund* and the *Malta Council for Science & Technology* to mention but a few. □

DMEs webpage: <http://www.eng.um.edu.mt/~dme/>

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