



# MESA PROJECT

## ITIS "G. Cardano" – Pavia

### New Curriculum

The impact of the educational innovations of the MESA Project has brought some significant changes and improvements in the curriculum of the following subjects: Information Technology, Mechanics, Electrotechnics.

### Information Technology

The inclusion of the M.E.S.A. project in the curriculum for the professional profile of an Industrial expert in Information Technology has not been complicated since the development of the IT aspects identified in the aims of the MESA project are consistent with the technical topics covered by the program. Instead it had a permanent focus on the positive or negative consequences that could ensue. At the end of the project we can highlight the following positive aspects that constitute also possible improvements in the curriculum:

- Strengthening of the capacity of the organization and management of teamwork  
*The need to split the job into several teams to work closely together and, due to the complexity of the targets set, pointed out that the normal school activities cannot stimulate students enough so that they may experience situations similar to those they will face in the workplace after the diploma.*
- Strengthening of the capacity to search for online specific resources necessary to the development of the algorithms needed in the M.E.S.A. Project  
*The development of algorithms of heuristic research and the calculated position of the sun has required research and challenging insights, even with the support of an expert who has guided the students during some laboratory exercises.*
- Direct comparison with a real experience of "problem solving", not "controlled" by the teacher who then had to take the role of "tutor" more than "solver".  
*The teacher-solver model has been exceeded by the complexity of the objectives set by the M.E.S.A. Project so the teacher had to assume the role of "guide" to the solution rather than the depositary of the solution itself. In this way, students were able to observe the teacher in action in the same study and analysis of the problem and have collaborated in proposing solutions.*
- Improving learning motivation.  
*It was confirmed. The increase in motivation to study when it is to be applied not just to more or less standard exercises but rather to real projects, consisting in a "solid", concrete part. In this way, in fact, as already experienced in a variety of experiences of European robotics teaching, students are strongly encouraged by the possibility to check the consequences of their work in reality. It's a very different thing, indeed, for students working on software which does not directly affect the real world and that at most leads to a malfunction of computer or simulated environment, with respect to visible consequences in the real "solid" world, and also relatively "harmful" of a programming "bug".*



## Mechanics

The points of contact between the specific professional profile of an Industrial Mechanics Expert of our school and the activities carried out within the MESA Project mainly relate to the ability to address the specific problems of the mechanical sector. The students participating in the activities of the project have improved the knowledge to basic training in mechanical engineering and in particular:

- The characteristics of use, machining processes;
- The functional characteristics and use of machine tools;
- The organization and management of industrial production;
- The relevant accident prevention and safety at work;

and the students increased the acquired skills necessary to deal with problematic situations in systemic terms, choosing flexible solution strategies, in particular improvements in competence have been reported:

- Reading and interpretation of functional diagrams;
- Proportioning of the mechanical organs;
- The choice of machines and equipment;
- The use of IT tools for the design.

The needs arising from the design criteria for safety, the need to collaborate with other schools and companies participating in the project and organizational requirements typical of team work have allowed the students to greatly improve their ability to report, research and analyze the reference standards and work organization. The laboratory part of the M.E.S.A. Project was also an excellent test bench for putting into practice the knowledge and skills acquired and refine the manual dexterity needed to play faster tasks related to:

- Manufacture and assembly of mechanical components, with processing cycles;
- Planning, progress and control of production and the assessment of costs;
- Design of elements and simple mechanical units ;
- Sizing and installation of components of mechanical systems ;
- Control of materials, semi-finished and finished products ;
- Information systems for mechanical design and manufacturing ;
- Occupational safety and environmental protection.



## Electrotechnics

This is the job profile of an electrical expert who gets a diploma from our school:

"The electrical experts acquires, through a solid grounding also in computer science, different skills and usable in different production areas.

At the end of the course the electrical expert has:

- a wealth of knowledge of the electrical updated disciplines, supplemented with an organic preparation of scientific and technological disciplines;
- The ability to orient themselves in the profession and to grasp the economic dimension of the problems;
- an ability to deal with problems in systemic terms."

The participation in the MESA Project has:

- strengthened the electrical and technological knowledge and competence of a modern application of the subject which is undoubtedly the photovoltaic;
- allow the student to grasp the economic aspect also in terms of evaluation of the b.e.p. comparing the electricity produced by the Photovoltaic panel with the implicit costs of the same;

the systemic approach then was examined: the students have understood how the solution to the "problem" is never merely in technology or in engineering but in a multitude of factors that cannot be part of the evaluation of the best possible solution to the problem posed