
REFERENCES


engineers who will look for a job but also to have entrepreneurial spirit where the target becomes creating jobs. ESPIRIT has reformed its curriculum by adopting a teaching strategy mostly entrepreneurship-driven. This approach has led the university to fit with the international standards in the term of teaching soft skills like management and marketing using active pedagogy while respecting the number of credits (15% of the curriculum) required by French CTI (Commission des Titres d’Ingénieurs) which allowed ESPIRIT to become officially accredited by EURACE last year (June 2014) [3].

The launch of an academic incubator is the most important proof that Esprit is working continuously on designing the whole university environment and not only the curriculum. This incubator select, in a collaboration with the engineering school board, the best of the best of project ideas owners with ready business plans to help them by mentoring them till the creation of their start-ups.

3. Companies’ needs. To prepare good profiles for good jobs and despite the good percentage of its working Alumni (Fig. 2), 72% of its graduates are active in medium and big enterprises [3]. Esprit has a Learning Factory that the students can integrate during the last year of their studies to do their capstones’ internships by developing their end of year projects from the design level to the test and validation of the solution.

This Learning-Facility is just near the campus and composed by 12 partners companies of the engineering school. These companies by involving students in some projects of theirs to develop, they allow to the university to detect more specifically the needs in human resources and train the future engineers to get in the professional environment easily. These internships prepare students not only by coaching them in technical skills but also on the soft one like interpersonal and communication ones.

4. International openness. Esprit has many partnerships with universities all over the world. There are different forms of collaborating to insure the international openness to face the economic crisis of the country. Research is one of the most important keys to empower the teachers’ staff ability in following the technological progress worldwide.

Esprit-Tech is the Research, Development & Innovation (RDI) entity of the university that is constituted by many teachers in many research fields who supervise students either in enterprises or in other universities partners. The objective behind this procedure is to develop their academic projects till their graduation. The curriculum is well designed with such an elasticity that allows future generations of engineers to be multipurpose, multitask and aware of the incredible fast rhythm of progress in the technology domain.

5. Conclusions. In front of all these details hidden behind the pedagogical and academic aspects of Engineering Education, it is primordial to build some roots of the university with the enterprises locally and also at the international scale. That’s why we cannot stop at innovating and designing curriculum without reforming the assessment methods measuring the learning outcomes. We’ve mentioned previously the PBL method and even the project validation but in Esprit, it is not only a question of obtaining marks but also to push engineers to participate to national and international challenges to value their efforts and competences. This challenge spirit begins with the validation of the academic realizations in an ambiance similar to the real one outside the school.
Shaping the Professional Competences of Undergraduates in Engineering Universities, Illustrated By the Investigation of Gas-Turbine Surface and Blade Via Its Axonometric Drafting

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The article describes a course example “Research-Graphic Practicum” oriented at reinforcing previous knowledge and skills in “Engineering Graphics” and further development of professional competences of undergraduates based on the illustrated investigation of the gas-turbine blade. The authors formulated assignments in designing a theoretical model and executing an axonometric draft of the gas-turbine vane.

Key words: engineering education, engineering graphics, gas-turbine blade, competences.

Introduction

One of the major requirements imposed on an engineering university graduate is professional competences. Professional competences embrace advanced knowledge level and cumulative achievement of both general professional and specialty courses. This means that in the beginning of prevocational education, a student should be able to execute theoretical models, projecting physical phenomena and understand how to apply them.

The shaping of such a competency is illustrated by the investigation of gas-turbine unit surface and blade including further axonometric drafting of the blade itself. This article describes the practical modeling of a gas turbine blade based on the gained knowledge through descriptive geometry and axonometric projection modeling rules. Surface 3-D model type based on three plotted blade plane sections was analyzed and the axonometric projection of this space blade was described. This research was conducted by undergraduates of the Power Engineering Faculty, Moscow State Technical University n.a. N. E. Bauman.

Ruled surface

Hands-on experience with ruled surfaces involves specific details of a gas-turbine unit – a blade.

In this case, a ruled surface is precisely determined by 3-directional lines. Arbitrarily, there are only two directional lines. The position and configuration of the third directional line is selected so it would be within the “body” configuration itself, which, in its turn, is determined by the data of two other directional lines, i.e. two directional ruled surfaces determine the third plane.

Based on the spatial directional line configuration and position dependence a surface is derived. In this case, five types have been defined:

1. Standard surface configuration (oblique cylinder with 3 directional lines) is formed in straight-line motion involving three curvilinear directional lines (Fig. 1).
2. Double-oblique cylindroid surface is formed in straight-line motion along two directional curves, while the third is a straight line (Fig. 2).

REFERENCES