

FUTURE OF DEVELOPMENT OF MODERN TRENDS IN SURFACE ENGINEERING

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Abstract

One of the important product specifications currently required by Industrial Production and Sales is a good quality of material surface. Product surface is deliberately amended (finished) to prevent corrosion attacks and to amend its appearance / colour shades /. The surface processing also improves its mechanical properties / hardness, scrape resistance / and increases product lifetime period. The principle of the Surface Engineering is to combine functionality, decoration and the symbolism of products and constructions.

The future of development of modern trends in Surface Engineering lies not only in the technology of application of protective coating but also in the education process which helps to familiarize with this industry sector together with its problems.

By including a material surface processing module in colleges for teaching means that future primary and secondary school teachers will be qualified to teach pupils and generate an interest to pursue this in college themselves.

This article reflects the experience of future teachers and shows their results from the study of the technical subjects, inclusive the Surface Engineering, in the Department of Technical and Vocational Education in the Faculty of Education, University of Ostrava.

Keywords: Surface engineering, educational process, future

1. INTRODUCTION

The future of development of new trends in the area of Material and Surface Engineering inspires to develop the technical and art areas, especially the product design.

High quality material surface is an important product specification currently required by Industrial Production and Sales. As the environment gets worse, the industrial products, machines and constructions are exposed to more aggressive corrosion. Material surface is deliberately amended (finished) to prevent corrosion with intention to increase the lifetime period of products and the constructions. At the same time this also amends the product appearance and improves the surface mechanical properties. The Surface Engineering combines functionality, decoration and the symbolism of products and constructions/equipment.

The decrease of natural sources of traditional materials, for example noble metals required for production of alloyed steel or special alloys, eliminates the range of options for production of anti-corrosion materials. The offer of these materials becomes subsequently more limited and its production economically disadvantageous. All types of the engineering spheres, especially the energy and ecological engineering and the car industry, depend on the corrosion resistant materials used in low, regular and mainly high temperatures. All areas of

human activity of such engineering, electrotechnology, astronautics as well as medical science increase their demands for new sorts of materials with special properties.

The materials used for production must meet technical requirements including high surface quality. The products quality depends on the level of education of the people who build and design them and who work on the entire technology process which also includes a selection of the surface amendment resp. coating and the final surface appearance which is necessary for the product completion. The education of teachers is another essential aspect which cannot be skipped on the way to obtain a modern product of high quality. Teachers should mentor children in a way that they are able to pay attention to what materials are used for the products surrounding them and also explain to them the difference between the materials used for construction and materials used for the surface finish. The young students usually gain only a small amount of knowledge about surface processing as part of general subjects such as physics and chemistry. It is therefore necessary for teachers to get a complex knowledge of technical subjects which should include the surfacing engineering as well. The teachers lecturing technical subjects must be educated on a level of contemporary knowledge with the ability to pass this knowledge on pupils and young students. This is required for teachers on all levels of the educational system including primary and secondary schools and colleges but most importantly the Technical Specialized secondary schools. The surface processing knowledge and inclusion of the familiarization with this subject into the secondary school schedules can help the students to choose the following study in college or ease their decision for their direct choice of occupation.

By including a material surface processing module in colleges for teaching means that future primary and secondary school teachers will be qualified to introduce this area to students and this way will generate an interest so the young students would continue developing this knowledge in universities with the relevant accreditation. For instance nanotechnology belongs to a group of growing technologies and can be applied in many industrial branches. By exploring the micro world, the humankind gains a new type of knowledge which can further support the development of all kinds of our activity.

Apart from the process of education and preparation of new teachers, also the technical universities schedule the Surface Processing lectures and provide relevant research. This is an opportunity for the graduates from the technical universities who found jobs in both the primary and secondary schools and also for those working in the colleges and Technical Specialised secondary schools as they can further develop their teaching skillset by the additional study in the "Department of the Technical and Vocational Education" with an option to focus on the Surface Processing module shown in **Figure 1**. This improves their qualification for introduction of the new trends to students and to encourage them to carry on studying this subject. This is a good way to introduce the Surface Engineering and its modern trends to the young generation and a way to expand this technology and ensure the progress will continue in future.

2. FUTURE TEACHERS AND THEIR PREPARATION FOR THE TECHNICAL SUBJECTS

The preparation of the teachers with the focus on the technical subjects in the Faculty of Education in the University of Ostrava is a long-term process and has a structural form. The goal is to provide technical qualification for teachers so the study modules reflect the needs of the relevant technical schools in the educational system. They are most likely to get employed in the technical specialized secondary schools.

The scope and goals of this preparation balance with the individual profile of each student. The study modules are designed for the facilitation to understand and learn the specific subjects as well as teaching and psychological disciplines. Based on the study goals, the programme with its modules is built to suit the individual profile of a student. The building of the programmes interconnects the knowledge, structure of the study and its logical sequence and also considers the relationships between the subjects. The study programmes use the modern educational methods which involves the students to become proactive and they are also required to work independently on their projects. The system has been implemented and established

and has a long-term tradition. It meets the needs of society and receives positive feedback from the educational system shown in **Figure 2**.

However, the system requires the continuous improvement and innovation with regards to subject matter, methods, organisation as well as the material and didactical devices used during the study and the potential changes of the study programmes (as per the requirement for the sequence of the disciplines). The continuous improvement corresponds to the new knowledge and findings in both the technical field and the educational disciplines and it always reacts to the content changes of the technical subjects which are presented in the Technical Specialized secondary schools.

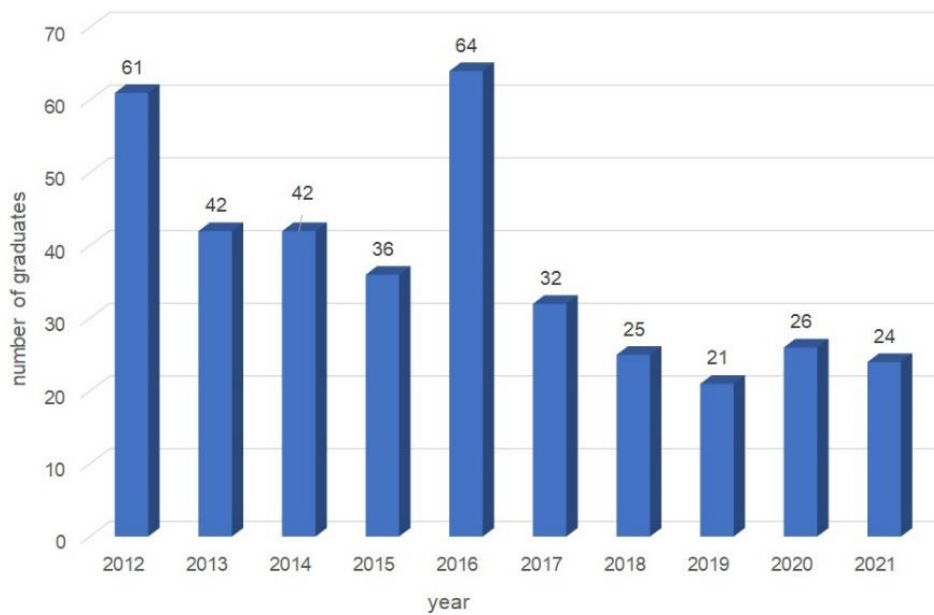


Figure 1 Number of Master's degree graduates Technical and Vocational Education

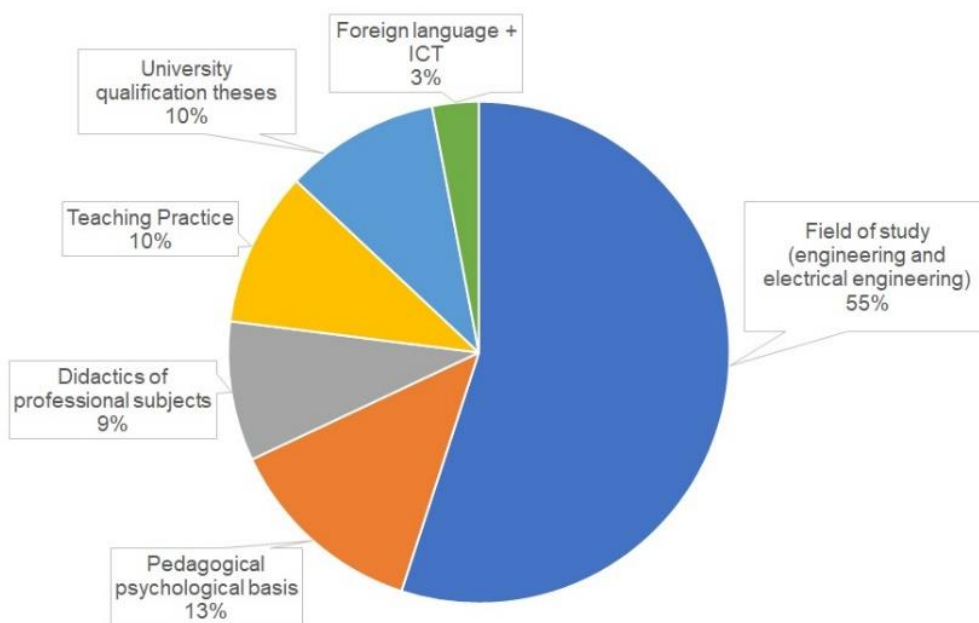


Figure 2 The concept of study in the field of technical education

3. CONCLUSION

The study programmes comply with the mission and the strategic purpose of the University of Ostrava while considering the study type and form and the student profiles. This has a positive impact on the Moravia & Silesian Region and helps to resolve some needs of this region as it is specific for a large number of pupils attending the Technical Specialized secondary schools and high figures are also guaranteed for future as declared in the strategic documents.

The graduates of the described study programmes have a potential to implement the knowledge of the modern technology of Surface Engineering into the educational plans for the school schedules.

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