



SAPIENTIA
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A few considerations on dual education.....

..... Learning.... Innovation Production.....

Ideas and experience of SC PLASMATERM SA Tg.Mures (Marosvásárhely) Romania

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The state of art:

what is missing :

- **general knowledge on fundamental disciplines, especially physics and chemistry –**
- **the logical connection between the theory and practice**
- **the logical relationship between “what...why ...how.. when “ the time-gap between innovative ideas and industrial application is alarmingly increasing**
- **interdisciplinarity in both the gradual- and post gradual education is almost disappearing**

What the industry wants:

with special emphasis on SME-s

- **“engineers” and not just graduated people of „fictional” specialities**
- **solid basic – general- knowledge which may fundament specialization in a selected field of interest**
- **young graduates with dedicated professional interest**
- **a general view –at basic level- on the system shaping industrial activities**
- **understanding the permanent need for learning and innovation**
- **understanding the system and reasons of work discipline**

A general problem of our era

.....IT, communication, management, etc. seem to be more attractive though all these are practically **part of a “second level” in the industry, which may not survive without the “hard core” of creating goods..**

Engineers have to find the optimum in applying all known scientific theories and technological solutions for solving a problem...

...nothing can be out of interest, if it may result in a better solution.

(Kocsis Maria Baan)

The state of art:

what we see and experience:

- **Strong orientation towards informatics without the knowledge to select and prioritize- tendency to accepting artificial statistics as the gospel**
- **A firm belief, that the computer (internet etc) can solve anything and thus there is **no need to learn specific elements** or nuances within each discipline**

Characteristic of our era on a scale of the society

- The scale of values has lost its sense, the only “parameters” of significance are money and position

Consequence for young people after graduating

- Too much interest for the money from the beginning of the professional carrier prevents a serious, deep training for a more general interest creating real values later
- Lack or incorrect view on the general trends of the society

In education

- **too many, too specific disciplines and lack of a more general approach to the science and applied science.**

The pillars of a successful economy :

- solid professional knowledge
- **innovation –in a strong connection with applied research and development**
- efficient logistics
- efficient and stable legislation

*Innovation and applied research need a **strong collaboration between companies and universities** involving students as well*

Should be a solution –at least partially- a more generalized dual education system?

Problems with the dual education system

- mostly the “dual education” system is formal and the students are not really interested . Most of the companies - especially SME-s - have no system or personal for an efficient mentoring and training



“Plasmaterm SA “ with 140 employees is a non-typical SME following the tradition of a previous research institute established in 1965-1973

The activity profile:

- precision investment casting in a niche-market for short to middle series of highly sophisticated castings
- plasma surface engineering covering nitriding/nitrocarburizing
- R&D activities in the related field
- testing materials
- special development and production activities for high-tech locks for the US market covered by the SGI partner in New York



An experiment:

The experiment considered three steps:

- 1. Students from the last two years are part-time employed in the company with a well shaped program**
 - a kind of a dual system is created combining production and R&D activities
 - the students have the possibility to be involved in international research projects with specific tasks based on the support of both the university and the company.
 - students are part of a “bridge” connecting company's applied research with that of the university
- 2. Depending on the dedication (!) and performance after finishing the studies at BS level these students may be employed by the company**
 - the company is ready to support their MS studies in conditions of a mutual agreement

3. A kind of a “domestic” post-graduate training is organized.

- once a week all the young engineers and students involved in the system attend a “scientific training meeting” (absolute compulsory!) lead by the managing director of the company
- the meeting has a pre-defined object concerning one of the problems of interest for the company and for the attendees as well
- presentations are prepared by one of the participants or by invited speakers of recognized professional authority
- foreign partners involved in research projects are “special invited speakers”
- free discussions follow the presentations

Observation: a great interest of the participants is beyond any doubt!



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Examples of R&D project with joint company/university/student involvement:

- ***Technology of preformed ceramic cores for investment casting***
- ***EU funded international joint research project LoCoLite (EU acronym) for the automotive industry –project coordinator the London Imperial College***
- ***Active screen plasma nitriding/nitrocarburizing with the support of the Miskolc University and the Sapiientia in Tg.Mures***

...an R&D project originated in the need of solving production problems:
Preformed ceramic cores for investment casting



The team....



Summary

- **The education has to be based more on a general need of society and more “user friendly” for SME-s and not only of multinational giants**
- **More efficient contact between companies, universities and R&D sector**
- **Financing R&D programs has to be more “problem solving” correlating with the universities Less bureaucratic and more globally cooperatively oriented strategies; more ‘bottom up’ generation of proposals for support, instead of the present ‘top down’ approach to selection of projects;**
- **Better understanding of the science and technology issues by governments and international organizations**
- **The politics should be more concerned for the future of society then that of the multinationals**