

EXPERIENCE IN INDUSTRY OF A MECHATRONICAL ENGINEER

Abstract presented by Holger THIEMANN

In summer 1998 I finished my studies at the University of Applied Sciences in Bochum. In this abstract I am going to give you an idea about the experiences gained during the studies, practice time in industry and diploma, but also about the requirements on mechatronic engineers in a real working environment.

I am going to separate my speech into four main chapters. At the beginning I will present the advantages and disadvantages of the course of study "Mechatronik" in Bochum. After this I will speak about the possibility of combining studies in Bochum with studies abroad, particularly in France. The third part deals with the experiences gained doing the diplomas in France and Germany. The following point clarifies industry's requirements on mechatronic engineers. In the end I will spend a little time on the Mechatronik@Network; a network founded by students in order to stay in contact with former students and to get in touch with international students and staff in universities all over the world.

The biggest advantage in Bochum is that the course is new therefore the content of the lectures is adaptable to the wishes of students and industry proposals. This gives the student lots of room for individual ideas and suggestions. Further there are a lot of practical courses which offer the student an image of a real working environment. In particular, the 6 month courses without strict control of a teacher, are a real experience for the later work during the diploma or as a young engineer. The course of study "mechatronic" is new for both students and professors, so both parties are in one boat. I've heard from other universities that the relationship between students and professors is moulded by hierarchic thinking. In my experience I found the professors to be open minded and approachable if there were problems to be solved. This is an important base for a good and successful time at university, but on the other hand, surely, there are also big disadvantages. In this short abstract I will only mention the most significant one: the missing specialisation! In the actual (and future) studies in "mechatronics" there is no specialisation planned. Nearly all subjects are fixed in the study-timetable. This brings one problem: all students are educated in the same way, regardless of their former life and career. I think a better way is to offer specialisation, so that the student can personally modify his preferred direction. The discipline "mechatronic" is composed of three main parts: mechanical engineering, electrical engineering and computer science (informatics) naturally there are going to be some students who have a higher education than others in one of the three parts. In addition to education, personal interests are different, so a possibility to set up priorities on some disciplines can improve the quality of education. In all application dialogues I have made, there was the question of my personal specialisation. For myself, it was clear, that my point of gravity was in software design and electrical engineering, but I can't highlight it with special or individual chosen courses. So an official specialisation during the studies could facilitate the applications.

The next point, I am going to mention, is the opportunity of combining studies in Bochum with one year of study abroad. In the fourth semester I had the opportunity to study on the first bilingual course „Mechatronik - Commandes des systèmes“. This bilingual study-project in the area of engineering-science between France and Germany combines the specialisation "Commandes des systèmes" of the Institut Universitaire Professionnalisée <Génie des systèmes industriels> at the Université Blaise Pascal, in Clermont-Ferrand, with studies in mechatronics at the Fachhochschule Bochum. The goal of this course of study is the double diploma Dipl.-Ing./Ingénieur Maître. For this it is necessary to study and practice in France and complete your diploma studies in Germany. The time in France is consequently separated in two parts: one semester of attending lectures at university

followed by finals. After this the student has to work approximately 6 months in the French industry and finish with a written report. To obtain the diploma he has to present the results of his practice work to the “grand jury”; a group of six representatives from industry and science. To have two diplomas at the end of study was very helpful in applying for jobs, therefore I recommend this year abroad to all students. Overall, personal and social skills, and experience of life develops enormously.

As explained before, I did two practice blocks during my studies, one for the French and one for the German diploma. Fortunately I had the opportunity to continue my work in France in a company in Germany. I worked in France at the Cemagref, the official French Institute for Technical Agriculture and Environment. The theme of this work was to examine the possibilities of the automatic guidance of agricultural machinery, based on 2D Laserscanners and to make a solution concept available. During this time at the Cemagref I became acquainted with the engineers of CLAAS –self propelled harvesting machines- GmbH in Harsewinkel. They gave me the opportunity to continue this work during my diploma. Consequently the theme of the work at CLAAS was the realisation of a runnable system and its implementation on a forage harvester. In addition there was a phase of orientation about the insertion of CASE-Tools in such a project. In both enterprises, Cemagref and Claas, I was able to work freely and without being strictly controlled. So you have to manage yourself as in a real working environment. In my opinion it's very important to spend the practice times in industry and not in the laboratories of the universities. The professional requirement may be the same, but in industry you are in real working conditions. You have to work in a team with new people and to organise meetings. There are lots of things to learn besides the main work and that's what makes practice in industry so important and interesting.

I don't think the gap between industry's requirements on mechatronic engineers is as big as the students think during the studies. The main problem again is the specialisation. The employer hears “mechatronic” and thinks you're a specialist in three disciplines. In reality you're not a specialist in the three categories but you have a really sound knowledge of these disciplines and a wide spread knowledge base. The capital of mechatronic engineers is the capability to get into a new job very quickly, independent of the subject. Students of classical disciplines, e.g. mechanical engineering, choose their specialisation during the time at university, in contrast to mechatronic engineers who specialise on the job ! Nevertheless I think a basic way of specialisation during the studies closes the gap between employer and applicant. In discussions with other students and engineers I noticed that nearly all young engineers get, more or less, in touch with CASE-Tools. It's the right way to teach the fundamental computer language knowledge like Assembler, Pascal and C but in this time of increasing import of internet technologies, new languages and tools, it's indispensable to expand the lectures teaching JAVA, HTML, SDL, UML or IEC1131. Also a subject, even as a free selectable workshop, in fundamental using of CASE-Tools is desirable. This need not be one particular CASE-Tool, but an introduction in general use of such tools and graphical programming languages.

Finally, I will mention a new founded association of mechatronic students and engineers: The Mechatronic@Network, short MNet. It's goal is to keep contact with former students and transfer knowledge between young engineers, current students, industry and universities. To get in contact with the MNet you can contact me directly or contact the FH Bochum.

All in all, I think that the course of study “mechatronic” opens a new vista in engineering and therefore I can recommend to all interested young people that they should take the chance and study mechatronics, particularly in a bilingual manner.

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