Appendix 2: Guideline for industrial internship

Guideline for the practical training of students in the Bachelor's and Master's Degree Program Aerospace at the Technical University of Munich

Department of Aerospace and Geodesy (LRG)
Technical University Munich

Valid for all students who start their studies during the winter semester 2019/2020 at the Department of Aerospace and Geodesy of the Technical University Munich.

1. Purpose of the practical activity

Aerospace engineers work in various fields of research and development; they plan and they lead, they supervise complex systems, coordinate their operation, this also includes maintenance, and handle corresponding commercial and sales related tasks as well. Different disciplines and aspects form a synthesis, which is characteristic for their work. This synthesis should also be reflected in the industrial internships, by acquiring complementary professional knowledge and experience – particularly through workshops – in addition to their scientific engineering studies. It is not only a matter of getting to know certain techniques and processes, but also of gaining practical insights into activities and fields of work.

Grasping the sociological side of processes within the institution is another essential aspect. The trainee must also get to understand the company as a social structure and experience the relationship between managers and employees in order to classify his/her future position as well as his scope of efficacy, often as a superior, correctly.

Overall, the internship is an important component of experience for acting responsibly later on and part of education.

2. Duration and time frame

The industrial internship includes a mandatory internship of eight weeks minimum in manufacturing. This may be followed by an internship in engineering of nine weeks minimum.

The total duration of the internship is therefore either at least 8 or 17 weeks. The manufacturing internship must be at least 8 weeks. These regulations concerning timing apply to Bachelor's and Master's degree courses alike. Contrary to the rules as stated before and as an exception, for admitting newcomers with a Bachelor's degree into a Master's degree the Aptitude Assessment Commission may require an industrial internship of up to 8 weeks if the applicant's previous internship background differs significantly from the content or time period of this guideline.

2.1 Practical training in manufacturing

The practical training in manufacturing serves as an introduction to industrial production and by this is meant to convey essential basic knowledge. Through guidance by technical supervisors, the intern should become familiar with the materials in their machinability and processability and gain an overview of production equipment and processes. The trainee shall also gain insight into quality assurance and testing.
2.2 Engineering internship

The engineering internship is set to provide general insight into future professional life, into technical economic or organizational contexts or into the importance of technology and engineering in our society as well. In line with the students’ inclinations and the opportunities available this part of the internship allows for a high degree of freedom of choice based on substantial individual responsibility.

This allows the intern to design the engineering internship individually in accordance with the activities listed in the training plan. The engineering internship of 9 weeks may be completed as an alternative to the “Project Seminar with Soft Skills” (5th semester) and is rewarded with 12 credits.

2.3 Timing structure

The manufacturing internship of eight weeks minimum has to be completed before the beginning of the study program (pre-internship “Vorpraktikum”). In particular cases – when justified (e.g. Federal Armed forces, i.e. German “Bundeswehr” or alternative community service “Zivildienst”, Federal Volunteer Service “Bundesfreiwilligendienst”, stays abroad, language classes) the previous practice may be postponed in whole or in part. An informal but justified request for postponement must be submitted to the Internship Office for this. Proof that the production internship has been completed fully (8 weeks) is a prerequisite for being admitted to the Bachelor’s thesis.

3. During the internship

3.1 Training plan

The training period in one company must be at least one continuous week. The weekly working hours are aligned with the amount of working hours in accordance with the collective labor agreements valid in Germany. Production and engineering internships are divided into the following areas:

3.1.1 Manufacturing internship

This kind of internship must contain at least three out of the six areas of activity listed below, with at least two out of F1 - F4. The duration the activity in each of the selected areas of activity has got to be one week minimum.

F1: Casting processes:
Constructing and cracking of a model, assembling box parts and model cores, mold making, hand molding with models and templates, getting familiar with wet and dry casting, work in the core making facility, machine molding and casting (sand casting, chilled casting, pressure casting, centrifugal casting, mold masks and fine casting), sintering, powder metallurgy and plastic injection molding.

F2: Cutting processes
Rolling, mechanical forging and rough drop forging, cold forming/impact extrusion, drawing, sheet metal forming, pressing, bending, shearing, laser cutting, stamping.
F3: Machining processes
Filing, chiseling, sawing, thread cutting either manually or by lathing, planing, milling, drilling, countersinking, chafing, stripping, grinding, honing, lapping.

F4: Joining and cutting processes and physico-chemical treatment
Oxyacetylene, arc and resistance welding, gas cutting, special welding and cutting processes, soldering. Basic courses in gas fusion and electric welding of the "German Association for Welding Technology e.V." are recognized. Physico-chemical treatment: e.g. surface coating

F5: Installation, assembly, integration

F6: Testing and quality assurance
Geometry and functional testing, quality assurance component testing, production and product monitoring

3.1.2 Engineering internship
1Typical activities in this area are:
   • Analyzing, developing, constructing, calculating and testing of technical concepts, machines, components, materials, processes and methods
   • Production development and production planning

2We particularly recommend activities that specifically complement or extend university studies, such as
   • Project management, i.e. planning, coordinating as well as technical and economic monitoring of project processes
   • Technical supervision and operation of complex plants and systems
   • Tasks related to sales and marketing of technical products
   • Drawing up complex technical offers
   • Technically oriented corporate planning
   • investigating needs, requirements and effects of existing or planned technical systems and products with regard to the environment and society

3The above-mentioned tasks can be found in medium-sized and larger companies and, to some extent, in public authorities and organizations. 4In addition to a certain degree of variety within the activities, the aim should be to carry out the internship in various posts/positions in order to confront the intern with different cultures within the various departments or companies. 5However, most of the listed activities require a certain training period, as a result meaningful cooperation often requires an internship of several continuous weeks.

6We generally recommend doing the internship not only than after the fourth semester.

7Irrespective of the chosen area of activity, an overview of the services and products provided by the respective company as well as the technical-organizational classification of the visited departments, in which the internship is done, should also be obtained. 8 This is to be reflected in the internship report.

9The engineering internship may be replaced either in part or entirely by a manufacturing internship.
3.2 Reporting and proof of internship

The successful completion of the internship or of its parts is proven by:

- A report signed by the student, which for the manufacturing internship comprises about two pages for each selected activity group (F1, F3, etc.) (Continuous text, work steps, sketches, particularities ...); for the engineering internship, in addition to the information concerning products and organization given under 3.1.2. above of the company where the internship is carried out, a description of the work carried out (approximately five pages as a guideline); the latter may be dispensed with if, instead, a technical report on the work carried out by the student for the company providing the internship position is submitted for the internship period in question

and

- Corresponding certificates (internship certificate form) from the companies; additionally a separate company certificate must at least indicate the time period, the activities carried out and the social behavior of the trainee in the company.

Proof of internship performance shall be provided by submitting the certificate (form), presenting the original company certificates and inspection of the report by the Internship Office. The Internship Office reserves the right to check the reports randomly.

4. The intern in the company

4.1 Training companies

The knowledge of manufacturing processes to be gained by means of the internship, the observation of the economic way of working as well as getting to know the social side of working processes shall preferably be transmitted in industrial companies, that are also recognized by the Chamber of Industry and Commerce (IHK) as training company (anerkannter Ausbildungsbetrieb). The internship can be done in companies operating within the field of mechanical engineering, the automotive industry, the electronics industry and the chemical industry, the mining industry, the Federal railway services as well as larger craft businesses, provided that all conditions laid out in this document are adhered to. No matter their size, craft enterprises operating in the maintenance and service sector that do not carry out any manufacturing in the industrial sense are not suitable for the manufacturing internship. Consequently, work in higher education and research institutions is not recognized.

4.2 Supervision of the trainees

As a rule a training manager, who ensures that the trainees receive meaningful training in accordance with the training possibilities of the company as well as the regulations governing internships, supervises the interns in industrial enterprises. He/she also instructs the interns in conversations and discussions on the technical issues.

University interns are not required to attend vocational school (Berufsschule). Voluntary participation in lessons at the company school must not influence the time period of the internship in the specific departments, as that time is short already.

4.3 Behavior of the trainees in the company

Trainees shall not enjoy any special status during their practical work. They may gain respect and recognition from superiors and employees in the company if they conscientiously adhere to the
company regulations, stick to working hours and company discipline in an exemplary manner, and stand out by their eagerness to learn, their diligence, their good performance and by being helpful. 3In addition to the organizational context, machine technology and the relationship between machine and manual labor, they should also gain a deeper understanding of the human side of the company’s operations and their influence on the production process. 4They should learn about the relation between lower and middle management to the employees at the site and empathize with their social problems.

5. Legal and social status of the interns

5.1 Applying for an internship

1Prior to starting his or her training, the future trainee should familiarize himself or herself with the regulations that exist regarding carrying out the internship, reporting on the internship activity, etc., on the basis of this guideline or, in special cases, by contacting the Internship Office of the LRG faculty. 2As internship positions are not arranged, the interns must contact the companies themselves inquiring about possible internship positions. 3The Departmental Student Council LRG of the TUM can provide assistance in this respect.

5.2 Internship contract

1By signing a contract of employment the internship becomes legally binding for both the company and the intern. 2The contract lays out all rights and obligations of the intern and the company as well as type and duration of the internship.

5.3. Federal Training Assistance Act (BAföG)

1The internship, including the pre-internship (Section 2.3.), is considered training in the tertiary education sector and is therefore eligible for support under BAföG. 2The trainee shall apply to the competent authority in his/her place of residence for funding.

5.4 Compulsory insurance

Questions of compulsory insurance are regulated by corresponding laws.

5.5 Holiday, illness, days off

1Absences of more than three days during the manufacturing or engineering internship have to be made up. 2This includes working time lost due to illness, vacation or other hindrances. 3Similarly, days of company closure count as days of absence. 4National holidays are the only exception. 5In the event of absences, the intern should ask the providing company for an extension of the contract in order to be able to carry out the ongoing training period to the necessary extent. 6If the intern can by means of medical certificates prove that he/she is not able to fully carry out the prescribed training in the manufacturing internship due to a long or permanent physical disability or chronic illness, the missing time may be compensated by working in design offices, production planning, material testing or in laboratories after consultation with the internship office.
6. Recognition of the traineeship

1. The Internship Office of the LRG faculty may recognize the internship. 2. For recognition, the original of the duly written activity report and the internship certificate must be submitted.

3. The type and duration of the individual section of activity must be clearly stated in the documents.

4. The Internship Office decides to what extent the practical activity complies with these guidelines whether it can therefore be recognized as an internship. 5. Training for which insufficient reports were submitted because they are incomplete or incomprehensible will only be partly recognized of its duration. 6. The Internship Office may stipulate additional weeks of training if internship certificates and reports do not show that individual parts of the internship were sufficiently completed.

7. Special regulations

7.1 Vocational training

1. Relevant work experience activities that meet the requirements of this guideline shall be credited towards the maximum duration of the work experience period of 17 weeks. 2. Apprenticeships shall be recognized to the extent that they comply with the Internship Guidelines.

7.2 Internship outside industry

General provisions

1. Internships in the non-industrial sector require the prior approval of the Internship Office. 2. Beyond that, the total of all activities in the non-industrial sector may not exceed 6 weeks.

Internship of conscripts in the Bundeswehr (German Federal Armed Forces)

3. It is the responsibility of university applicants to apply for instruction in a suitable technical unit before the starting their military service. 4. Training periods that were completed there can be credited to a maximum of 6 weeks after consultation with the Internship Office, if activities are carried out in accordance with Section 3.1. of these guidelines. 5. For recognition, the relevant reports and certificates (ATN and military service certificate) must be submitted to the Internship Office. 6. Per decree the Federal Minister of Defense has (see Ministerial Gazette of the Federal Minister of Defense 1963, p. 291, in the version of July 12, 1967, VMBI 1967, p. 213) permitted the keeping of internship reports and the issuing of internship certificates.

7. In addition to those performing basic military service, this crediting regulation applies mutatis mutandis to soldiers serving longer periods of time (temporary soldiers “Zeitsoldatinnen und -soldaten”) and to those performing community and alternative service.

7.3 Other industrial employment relationships

1. If the internship guidelines are complied with, an activity as a working student (Werkstudent) or any other occupational activity may be recognized as an internship. 2. However, a direct replacement of the course work to be completed in the course of further studies by an engineering internship and vice versa is not permitted. 3. While an internship is intended to provide insights into a broad spectrum of techniques and processes, student research projects require students to work on specific in-depth engineering activities on an increasingly independent basis 4. If there are uncertainties about the compatibility of an intended internship with these guidelines the Internship Office should be consulted in advance.
7.4 Internship abroad

It is advantageous for one’s professional life to carry out parts of the internship abroad. By this the aspiring engineer not only increases his or her professional qualifications, but also gains an insight into the cultural, social and economic structures of other countries. Therefore, students can complete their industrial internship in suitable foreign companies, provided that the knowledge to be acquired there corresponds to the prescribed training plan. The reports shall be written either in German, English or bilingually (German plus national language). The internship certificate must be submitted in the respective official language and in a certified translation in German. Certificates in English are the exception to this rule. No translation is required in this case. Up to 17 weeks are recognized.

8. Requests

Please address questions and individual requests concerning this guideline to the Internship Office LRG.

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Comment

The validity of these guidelines extends to students enrolling in the Department of Aerospace Engineering at the Technical University Munich starting during the winter semester 2019/2020.