



TGGGS Academic Affairs for Industrial Internship

Document containing:

- **Internship Guidelines and Procedures for the TGGGS International M.Eng. Courses in Engineering**
- **Brief TGGGS Internship Outline for Industry Mentors**

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(Adapted from R.H. Jansen August 5, 2005)

The Sirindhorn International Thai-German Graduate School of Engineering (TGGGS)

TGGGS Academic Affairs for Industrial Internship

Internship Guidelines and Procedures for the TGGGS International M.Eng. Courses in Engineering following the RWTH Aachen Model

The following guidelines are based on the common set of rules for engineering internships on the graduate level in the leading German Technical Universities (TU 9 Group) and approved by the standing conference of the Faculties of Engineering in the German system (Technical Universities)

- First Revision: August 2005, R.H. Jansen -
- Second Revision: March 2014, TGGGS Committee -

Please note: All documentation for the internship file has to be prepared in English

Introduction

In the context of developing industry-oriented engineering education on the Master's level in Thailand, the internship has to be an integral part of the course of study in the respective field of engineering. With the main focus on engineering innovation, science driven technology development and learning towards engineering leadership, engineering students have to be educated to come along with enhanced problem solving capability. In general, this kind of internship is aimed to widen the subject-related theoretical knowledge of the student through its practical application in a company, to achieve this by contributing to the solution of engineering problems in the workplace environment and to learn to understand the timing, economic and organizational boundary conditions for such work in a company. Because of this orientation of the internship and because of the benefits which participating companies should obtain from this, it is placed into the final year of the education just before the master thesis. In order to achieve the outlined objectives, the Master's level internship must build on an undergraduate internship or individual professional experience by which the student has obtained already a first industrial training. Further, in this graduate level internship, the student will be backed-up by his university supervisor (and his RWTH Aachen counterpart, if necessary) regarding technical know-how in the respective engineering field, by which mechanism, university – industry links in Thailand will be strengthened as a side effect.

In detail, the students have to conduct technical work with duration of at least 18 weeks under supervision of suitable engineering staff (industry mentors) in the hosting company in order

- to become acquainted with the activities of engineers in enterprises in different areas, in particular development, production and applications-oriented research, equipment and production optimization as well as project planning, acquisition and organization,
- to get insight into the structure, organization and operation of enterprises considering aspects of quality, economy, ecology, acceptance of products by the market and adherence to delivery dates,
- to learn to contribute to the development, production and quality assurance of goods, components and systems in the field of study,
- to become acquainted with company cultures, social structures (among other things team work, hierarchy, social situation) and safety at work, from the point of view of a higher level employee.

Furthermore, the internship is aimed to develop the students' own initiative and problem solving capability, taking into account the boundary conditions under which industry operates. Apart from these educational aspects, it offers to the student the opportunity to analyze possible professional career perspectives and eases for him/her and the hosting company a later transition into firm employment. Enterprises in return, should take an active role in helping to qualify students in the field of engineering. Doing so, they will further raise interest in the issues the enterprise is dealing with to their own benefit. In due course, the company gets into contact with talented students, which could be recruited after completion of their study. Such recruitment has (in Germany) proven to be a rather effective knowledge transfer mechanism from university to industry which in Thailand is expected to support technology upgrading and competitiveness of the enterprises.

By joint supervision of the internship by a member of both the enterprise (industry mentor) and TGGs (university supervisor), links between those are developed, which may lead to co-operation in areas of mutual interest (joint projects in development and industry-oriented research, mutual exchange of experience and expertise, as well as advanced training of employees). After a well-conducted and successful internship, the hosting industry mentor and the university supervisor should envisage a follow-up master thesis project, which fits to the enterprises needs, but gives also room for science-based creativity on the graduate student side.

Content

In contrast to the basic internship during undergraduate studies, the graduate level internship during the last part of the Master's study serves to make the student familiar with career-specific and advanced engineering activities in an enterprise.

The list of specific qualifying internship activities depends on the field of study and is part of the prevailing internship regulations for each course. This list may be supplemented by individual agreement between the prospective industry mentor and the university supervisor, if activities shall be covered which are not listed as standard topics. Such non-standard topics have to be approved in writing by the TGGs course coordinator.

Supervision

The internship should be supervised carefully in order to be as effective as possible. For this purpose, the university (the course coordinator) as well as the company nominate a supervising staff member/mentor responsible for the student's guidance and performance.

The industry mentor in the respective enterprise should be an experienced engineer preferably with at least having a Master's degree him/herself. Since currently the South East Asian industry will not yet employ engineering masters to a sufficient extent, an industry mentor with a Bachelor's degree, 5-10 years of experience in the respective technical field and with engineering development background is acceptable as a transitional alternative. This person serves as an advisor and point of contact for any problem arising within the enterprise. He is responsible there for the fulfillment of the internship guidelines and for issuing the final reference letter.

The university supervisor should be a professor actively engaged in the respective engineering field of study and qualified to supervise the master thesis (must have a Ph.D. degree in engineering). He is the contact person for the industry mentor if a problem with the student and his internship arises. At the end of the internship, the industry mentor has to issue a written approval statement and brief judgement of the student's performance. The TGGs Academic Affairs for Industrial Internship in conjunction with Program Coordinator and Department Office then is responsible for a final check of the internship record (report with list of daily activities, company reference letter, and supervisor's technical judgement), for completeness and formal correctness and will then give the final approval signature and stamp for the acceptance of the internship as part of the studies.

Enterprises

Because of its important role in cooperative education on the master's level, the enterprise for an internship should be chosen carefully. The focus group is engineering-and technology-related industry with a sufficient number of engineers (minimum of 5). In the respective branch/department selected for the students internship work; SMEs with less than 50 employees qualify only under exceptional circumstances (e.g. if the SME is an entrepreneurial high-tech company) to be recorded in writing by the university supervisor. These enterprises should typically provide opportunities to get acquainted with development and industry-oriented research, simulation and design (in particular CAD, Computer-aided Design), conceptual planning, construction, production, assembly, machine operation, maintenance and testing.

Trade companies, computer shops and university departments are not suited and do not qualify for the prevailing internships. Enterprises owned or managed by a student's family member do not fulfill the requirements either, unless exceptionally approved by the TGGG Committee.

Reporting

During the internship, two reports have to be prepared: A technical report (TGGG Industrial Internship Report) and a daily list of activities as work record (TGGG Internship Weekly Report).

The technical report (like a mini thesis with introduction, technical content, results and summary) has to be written by the student him/herself to document the engineering work, problem solving and development results of the internship in order to learn to present technical facts. It can describe processes, facilities, tools, etc. and include notes about his experiences and activities. Sketches, workshop drawings and circuit diagrams are often more descriptive than a longer text. The use of photocopies and company brochures as well as other imported material should be avoided. If necessary and unavoidable, such material should be included into a separate appendix of the technical report. The text (maximum of 30 pages) should mainly refer to the activities that the author has carried out by him/herself.

In addition to the technical report, a list of the daily activities carried out (e.g. summarized each month day by day in an excel table) and the time used to conduct them has to be filed and is a necessity for the evaluation of the internship. The total work record should be comprehensive, precise and clear.

At completion of the internship, the industry mentor in the respective company should sign the technical report and complete list of daily activities, then issue and sign the final company internship reference and judgement letter (ca. 1 page length). When later looking for qualified employment, the company reference letter also will be a useful document for the student's job applications.

Internship Reference Letter and Final Approval

As outlined already, in order to recognize the internship activity of the student as part of his master studies, a reference from the enterprise (the responsible industry mentor) is required. This reference letter must contain

- personal information of the student (first name, family name, date and place of birth)
- name of the company, the department and the company location
- time and overall duration of the internship and the number of days absent
- short description and duration of the student's internship tasks

- a brief evaluation and judgement of the student's work and of the content of the technical report.

The internship as an integral part of the TGGS Master's course will only be accepted and approved if the following requirements are fulfilled:

- it is related to the engineering field of study and can be related to the specific list of topics relevant for the course
- it is performed as full time work (part-time internships are not accepted)
- the company fulfils the minimum requirements as defined in these guidelines
- the number of days absent are less than 3% of the internship duration (even caused by illness of the student), otherwise the internship has to be extended to compensate for the time absent
- the technical report, daily activities list as work record, and the company reference letter have been checked and countersigned by the university supervisor
- the student has given a 20 min. presentation on his internship activities, time and location to be agreed with his supervisor (e. g. in the frame of a seminar in the respective TGGS technical group to promote soft skills)
- the TGGS Academic Affairs for Industrial Internship in conjunction with Program Coordinator and Department has made the final check for completeness and formal correctness of the internship documents.

Contract

TGGS and the companies participating in the Co-operative Engineering Education program will usually confirm their mutual responsibilities in a brief letter of agreement, unless the enterprise is a proven TGGS partner anyway (who is already familiar with this internship system).

Alternatively or additionally, the relations between the company and the student during the internship may be regulated by a specific internship employment contract, which determines all rights and duties of the student and the company.

On the demand of the enterprise, confidentiality regarding sensitive company issues like Intellectual Property should be agreed upon in a separate Nondisclosure Agreement (NDA) to be signed by the company, the university supervisor and the internship student.

Insurance

With respect to insurance, the legal status of the student may be of importance. Since the practical activity during the internship in a company is a firm part of the Master's level curriculum, he/she maintains the legal status of a student for which a medical insurance, accident insurance and third-party liability insurance is part of the university registration. (*)

Additional health and/or accident insurance during internship may be provided by the enterprise as part of the employment situation (or specific contract) into which the internship student enters.

(*)

(to be checked by the legal department of the university)

Miscellaneous

As some of the Master's students may have passed a phase of professional engineering employment already following their Bachelor's degree, the recognition of this professional experience-instead of conducting the Master's level internship as outlined here – can be considered as an exception. In such case it is the responsibility of the university supervisor to check the equivalency and consistency of this previous professional experience with the guidelines. In order to approve such an exception, the supervisor has to evaluate in detail the company references (profile of the company, employment references of the student, etc.) forwarded by the student, have an interview on this with the student and justify the exception in a detailed written statement to the TGGS Academic Affairs for Industrial Internship in conjunction with Program Coordinator and Department Office. In order to develop or improve soft skills, the student should give an oral presentation about his/her work experience in a TGGS seminar to his/her supervisor and the other students in his/her Master course. This statement of equivalency will become part of the student's study file to serve as a substitute for the usual internship documentation.

The TGGS Academic Affairs for Industrial Internship in conjunction with Program Coordinator and Department Office continually updates and keeps a list of companies qualifying for internships as defined in these guidelines. Based upon this and upon consultation with his prospective university supervisor, the student is responsible him/herself to choose and find an adequate company, enter into the internship and fulfill the internship regulations and requirement as outlined here. The university staff engaged in the TGGS Master courses will provide their support for this, if necessary. In case the student proposes to his supervisor a company of his own choice willing to accept him/her, he has to provide the necessary company profile and information material, which allows the TGGS Academic Affairs for Industrial Internship in conjunction with Program Coordinator and Department Office in consultation with the supervisor to decide whether the chosen company is qualified as an internship partner and will be listed as such by the TGGS Academic Affairs for Industrial Internship in conjunction with Program Coordinator and Department Office.

Internship Timing Schedule

- In order to acquire additional theoretical background on the Master's level, the student must have completed the lectures (have passed the examinations) of the first and second semester, before entering into the internship.
- Generally, internships can be conducted in the August term or in the January term, depending on the start term of the respective TGGs Master's course and on the student's progress.
- Before the end of the semester preceding the internship semester (i.e. ca. 2 months before the start of the internship), the student should make him/herself familiar with the internship guidelines at the TGGs Academic Affairs for Industrial Internship in conjunction with Program Coordinator and Department Office, should select his favorite field(s) of technical activity and consult on this with one of the TGGs university supervisors.
- The university supervisor recommends one or more suitable qualified companies and, if necessary, supports the student's internship application(s) to these companies. However, it is finally the student's responsibility to choose and find a qualified company.
- One month before the start of the internship, the firm approval of the respective company should have been obtained and an industry mentor should have been nominated by that company in accordance with the guidelines.
- During this month, the university supervisor and the industry mentor will meet (preferably in the company) or at least communicate to discuss and define in more detail the internship activity (Internship Project), write down a brief note on this to be kept in the student's internship file and hand out a copy of this to the student.
- During the 18 weeks internship itself, technical progress is reported and the daily list of activities is filed as outlined in the guidelines. Ca. 2 – 4 weeks after the start of the internship, the student has to see his university supervisor to give him/her a feedback on how his technical work picked-up is moving on and if there are any problems seen. Later, closer to the end of the internship, the university supervisor will at least make one visit to the company and consult with the industry mentor on the status and finalization of the internship activities. This is the time also to discuss a possible follow-up Master's thesis project. At the end of the student's 18 weeks stay, the industry mentor provides his company reference and judgement letter after having checked and initialed the internship technical report and list of activities (work record).
- Close to the end of the internship, the student fixes with his university supervisor the date/location for his internship presentation to be given in the

frame of a seminar in his TGGGS Master's course. Immediately after the internship, the student delivers his technical report, list of daily activities and company reference letter to the university supervisor.

- Within two weeks after the end of the internship, the supervisor provides his judgement and approval statement (or disapproval) and passes on the internship file to the TGGGS Academic Affairs for Industrial Internship in conjunction with Program Coordinator and Department Office which will check the file and issue the final approval sheet, if all conditions are met.

- Successful completion of the internship is a prerequisite for starting the Master's thesis project. The topic and task description for the Master's thesis project will not be handed out to the student (and thus the thesis work cannot be started) before the internship file has been closed (final approval sheet) by the TGGGS Academic Affairs for Industrial Internship in conjunction with Program Coordinator and Department Office.

Brief TGGGS Internship Outline for Industry Mentors for the TGGGS International M.Eng. Courses in Engineering following the RWTH Aachen Model

- First Revision: August 2005, R.H. Jansen -
- Second Revision: March 2014, TGGGS Committee -

General

The following guidelines for the industry mentors in host companies are based on the TGGGS Internship Guidelines and Procedures (the primary ruling document). In general, this kind of internship is aimed to complement the theoretical knowledge of the Master's level student through a period of practical application in a company. During his/her Master's level internship the student has to contribute to the solution of engineering problems in the workplace environment and also learn to understand the timing, economics and organizational boundaries for working in a company.

During his/her internship the student will be backed-up

- by his/her **university supervisor** regarding technical know-how in the respective engineering field (if necessary, also by the respective RWTH Aachen counterpart),
- by supervision of a suitable engineering staff member acting as the **industry mentor** in the hosting company,
- by the TGGGS Academic Affairs for Industrial Internship in conjunction with Program Coordinator and Department Office regarding administrative issues.

Basic Responsibilities of the *Industry Mentor*

Proper supervision of the students by the university **and** the hosting industrial enterprise in concert is absolutely crucial. Therefore the student should be assigned to a person in the company who will act as mentor for the whole duration of the internship. This *industry mentor* in the hosting company has to take care that the internship student

- becomes acquainted with the technical activities of engineers in the enterprise for example in the areas of development, production and applications-oriented research,
- gets insight into the structure, organization and operation of the enterprise considering aspects of quality, economy, ecology, acceptance of products

- by the market and adherence to delivery dates,
- learns about further details of engineering work in the industry, deadlines, specific outcomes, and required reports,
 - learns to contribute to the development and production of goods, components and systems related to the field of his/her studies,
 - becomes acquainted with company cultures, social structures such as team work, hierarchy, social situation and safety rules at work,
 - gets the opportunity to develop initiative and creativity on his/her own, particularly with respect to solving technical problems (or proposing solutions) in the hosting company.

Thus the *industry mentor* should take an active role in helping to qualify the student in the various fields of the engineering profession and to make him familiar with career-specific engineering activities in the enterprise. The student should also be given the feeling to be part of the organization and that his/her work is appreciated.

Before internship starts

Internships should be supervised carefully in order to be as effective as possible and companies are encouraged to take an active role in the solicitation of internships. For this purpose, each participating company will select a suitable engineering staff member as the industry mentor and counterpart to the university supervisor to take over the responsibility for the student's guidance and performance during his/her industrial work period in the hosting company.

About one month before the start of the internship the approval of the respective company should have been obtained and an appropriate *industry mentor* has to be named by the enterprise in accordance with the TGGs Internship Guidelines and Procedures. Before starting the internship, the university supervisor and the *industry mentor* will meet (e.g. in the company) or communicate in order to discuss and define the internship activities (technical field and direction) in more detail. University supervisor and *industry mentor* shall write down a brief note on this for the internship file (in English), a copy of which is handed out to the student.

Starting the Internship

During the first days of work the *industry mentor* takes care that the student is given a work place, an identification card, a briefing on the department's functions and responsibilities in the context of the whole company. Further, the student will be given a letter of acceptance which contains the work schedules, information on the company and the particular department, duties, rules on confidentiality, etc. The *industry mentor* discusses with him objectives and desired results, specific work schedules and periodic assessment and feedback. Together with the student, the *industry mentor* elaborates a realistic time schedule for the student's activities and

goals to be achieved/headed towards during the internship.

Qualified Guidance

The *industry mentor* in the enterprise should be an experienced engineer preferably with a Master's or Ph.D. degree. Since currently the South East Asian industry does not yet employ engineering Masters to a sufficient extent, an *industry mentor* with a Bachelor's degree, 5-10 years of experience in the respective technical field and with an engineering development background is acceptable as a transitional alternative. This mentor serves as an advisor and point of contact for any problem arising within the student's internship stay in the enterprise. He is responsible there for the fulfillment of the internship guidelines and for issuing the final internship reference letter. In particular, the *industry mentor* should keep close contact to the university supervisor with regard to the student's internship and related questions or problems. Finally, after a well-conducted and successful internship, the *industry mentor* in the hosting company and the university supervisor should envisage a follow-up Master's thesis project, which fits to the enterprises needs, but also gives room for science-based creativity on the graduate student side.

Reporting (in English)

During the internship, two documents, involving also the *industry mentor*, have to be prepared by the student:

- A technical report (TGGS Industrial Internship Report) and
- a work record with a daily list of activities (TGGS Internship Weekly Report) – for details see “Internship Guidelines” - to be initialed (signed off) weekly by the *industry mentor*.

At completion of the internship, the *industry mentor* in the company should sign the technical report and issue a reference letter as outlined below.

Internship Reference Letter (in English)

In order to recognize the practical industrial activity of the student as part of his/her Master's studies, the *industry mentor* has to take care that a final company internship reference and judgement letter is issued and signed by him and the enterprise. This reference letter (ca. 1 page length) will be issued at the end of the student's 18 weeks stay in the company and must contain:

- personal information of the student (first name, family name, date and place of birth)
- name of the company, company location and the department responsible for hosting the internship
- time and overall duration of the internship and the number of days absent

- a short description and duration of the student's internship tasks
- a brief evaluation and judgement of the student's engineering work and of the contents and quality of his/her technical report

Some Suggestions for *Industry Mentors*

The following rules and suggestions may help the *industry mentor* to make the student's internship more productive and also to get maximum benefit returned to the company.

- In the first days: A co-op student should be introduced to the work environment like any new employee. Ensure that the student gets clear directives and can start work.
- Put the work into perspectives: Let the student know how his/her work is expected to contribute to the overall project or the department's goals.
- Give responsibility: Let the student have room for self-control and self-confidence to complete his/her tasks.
- Reward and correct: When work is well done, just say so. When expectations are not met, cautiously correct. (Whenever possible, correct in private and praise in public). Students need feedback and recognition.
- Explain the rules: Students must know about work hours, safety, and confidentiality.
- Encourage students to ask questions: Especially Asian students may be shy to forward questions for fear of appearing incompetent.
- Whenever necessary, discuss problems concerning the internship without delay by contacting the corresponding university supervisor.