RE-ACCREDITATION OF THE FACULTY OF METALLURGY, UNIVERSITY OF ZAGREB

Date of the site visit:

15-16 May 2012

July, 2012

COMPOSITION OF THE EXPERT PANEL

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INTRODUCTION

Short description of the evaluated institution

The Faculty of Metallurgy, a constituent unit of the University of Zagreb, is the only higher education institution in the Republic of Croatia active in the field of Technical Sciences with a specialty in Metallurgy. It has evolved from the Faculty of Technology which was founded in Sisak in 1960 containing the Department of Metallurgy and the Department of Oil Technology and Industry. The Faculty of Technology in Zagreb experienced restructuring in 1974, when the existing departments in Sisak were abolished and the Faculty of Metallurgy transformed into a self-managerial organizational unit, as one of six such organizations with the Faculty of Technology. After much further reorganization, a new Scientific and Educational Committee of the Faculty of Metallurgy was founded in 1987. Since then, the Faculty of Metallurgy fulfils all the prescribed requirements and conditions for undergraduate and post-graduate teaching as well performing research.

The Faculty develops its area of expertise through educational, scientific and expert activities. Teaching activities are conducted through the education of highly competent experts at undergraduate, graduate and postgraduate doctoral studies in Metallurgy. Scientific and research activities are conducted through scientific projects increasing the general level of fundamental, applied and developmental expertise in Metallurgy. Expert activities enable a quick and efficient transfer of the latest scientific breakthroughs into the economy and other areas of general and public interest. The Faculty cooperates with institutions at an international level by enhancing its mission through the transfer of know-how, as well as student and faculty mobility. At the same time, the Faculty raises general social awareness on the position and role of its field of expertise, i.e. current issues and achievements from the field of its own scientific, educational and expert activities which have broader social implications.

The Faculty of Metallurgy consists of three departments: Process Metallurgy, Mechanical Metallurgy and Physical Metallurgy. Teaching and research is conducted in two buildings in the same location in Sisak which provides and efficient cost-base as well as good communication between members of the Faculty.

The Faculty of Metallurgy introduced ECTS system and a curriculum of four-year undergraduate study in the field of Metallurgy in the academic year 2000/2001. In accordance with the Scientific Activity and Higher Education Act from 2003 based on the Bologna Protocol, new curricula of three-year undergraduate and two-year graduate studies were introduced in 2005 for the university study in Metallurgy. Upon the completion of undergraduate studies students are awarded the academic title of Bachelor of Science in Metallurgy (univ.bacc.ing.met.). Upon the completion of graduate studies students are awarded the academic title of Master in Metallurgy (mag.ing.met.). The new curricula of undergraduate and graduate studies, in accordance with the Bologna Process, indicated the need for introducing a new postgraduate doctoral study in Metallurgy, constituted in a way that it can also represent a continuation of the study of Metallurgy and/or a similar graduate study in a related field. The duration of the doctoral studies is six semesters, and it is completed upon a public presentation of the thesis to an expert committee, after the procedure proscribed by the Regulations on Postgraduate Doctoral Studies in Metallurgy. The acquired academic title is PhD in Technical Sciences, Field of Metallurgy. Regular student evaluation of courses is being regularly used when assessing the quality of teaching.

The Faculty is implementing a quality assurance system which enables monitoring and improvements of study program quality, as well as quality of teaching, public access, drafting of quality system regulations.

Scientific and research activities of the Faculty are also achieved via projects mostly financed by the Ministry of Science, Education and Sports, multilateral projects (EUREKA) and bilateral projects, as well as direct cooperation with businesses. The Faculty is prominent for its tradition of organizing an international counselling in the field of casting which gathers respected experts in the field.

The work of the Expert Panel

For its work the panel drew upon the self-evaluation report, prepared by the Faculty of Metallurgy of the University of Zagreb. They carried out a site visit to the campus of the Faculty at Sisak, on 15 and 16 May 2012. During the visit they saw the premises and physical resources and held meetings with the following groups:

- Faculty Management Board
- The Self-Evaluation Group and the QA Committee
- Teachers (assistant professors, associate professors and full professors)
- Teaching assistants and junior researchers
- Students
- The Vice-Dean for Teaching
- The Vice-Dean for Science and Finances

They also visited a few classes, in one of which they held a brief question and answer session with the students.

DETAILED ANALYSIS BASED ON STANDARDS AND CRITERIA FOR RE-ACCREDITATION

1. Institutional management and quality assurance

1.1. There was insufficient data in the Self-Evaluation Report (SER) to indicate to the Panel that the Institution had consulted with its stakeholders, both locally and nationally, in defining its vision, goals and strategy. The panel would like to see some evidence on the extensive consultation – many companies are listed, but there should also be impact of the national authorities. The Faculty should define an exhaustive list of who stakeholders are – if there really exist companies who will be interested in their students in the future – and national authorities might be crucial for the program in ecology.
It is recommended that a database be created to identify the primary and secondary stakeholders at both the regional and national levels. The terms 'primary stakeholders' and 'secondary stakeholders' refer to metallurgy-based and other materials-based industrial sectors respectively.

1.2. The diagram included in SER gives a clear indication of the organisational structure of the Faculty. However, it was not clear to the Panel if the various Commissions that report to the Faculty Board had autonomy or power.
Consideration should be given to the composition of the various Commissions to limit the representation by senior management. It is also recommended that these Commissions/Teams should have both autonomy and power to recommend changes or improvements.

1.3. The evidence presented to the Panel suggested that the University was not involved in a proactive manner with regard to ensuring that the quality assurance (QA) goals of the Faculty are aligned with those of the University. The University positions itself more like a passive recipient of what the Faculty produces and we did not manage to find out what the University goals are.The Faculty QA needs to have a voice at the university level, other than the Dean, which currently seems to be the only link.
Recommendation: (i) the Faculty QA Commission should be formally represented at the appropriate University Committee; (ii) the University should adopt a proactive role in ensuring that the QA documents and strategy are in compliance with those of the University; and (iii) the QA goals of the University should form a part of any future SER.

1.4. The Panel accepted that the general aspirations of the Faculty were consistent with its stated mission. However, the availability of an English version of the study programme would have assisted the Panel in its deliberations.
Recommendation: It is recommended that any future SER provide web-based links to key documents in English.

1.5. The Panel accepted that all learning programmes have a mandatory learning outcomes stated that are in compliance with the Croatian Qualifications Framework (CroQF). However, it would have been of some assistance to the Panel if an English version of the study programme was available.

It is recommended that an English version of the study programmes be made available on the internet.

1.6. The Panel recognised the fact that the QA system of the Faculty was set up recently and that significant time and effort has been spent in producing documents of high quality. The need for the QA Commission to have direct representation on an appropriate University Committee was highlighted previously. The implementation of the QA system has to be monitored by collecting evidence in order to truly make it effective in the future.
It is recommended that: (i) the efforts and output of the QA Commission be supported by the Faculty and the University in a pro-active manner; (ii) the QA documents be implemented; (iii) a strategy be adopted to enable implementation to be monitored and appropriate data to be gathered and recorded formally; and (iv) the QA data are cited in any future SERs.

1.7. The Panel established that the primary mechanism for monitoring the teaching quality was via an online student feedback questionnaire. However, it was also evident that the number of students who filled out the questionnaire was very low. The Panel would like to see QA implemented at the course level, with detailed lists of study materials etc. It was not clear to the Panel if a formal mechanism was in place to enable changes or improvements in the teaching quality. On a positive note, the Panel was of the view that the Faculty does implement those protocols and procedures that exist at both University and National levels. Moreover, the Panel recognised the QA efforts and the following recommendations are made:
(i) The QA procedures should be implemented at the course level where details of the course details and study materials, etc are made available.
(ii) A formal QA procedure should be implemented for monitoring and improving teaching quality.

1.8. The Panel recognised the fact that the data presented in the SER cite a number of publications in respected journals. However, there was no evidence to indicate that the Faculty had a formal policy or strategy for promoting research excellence.
A formal procedure should be implemented for monitoring and improving research quality.

1.9. The Faculty representatives are represented on the University Ethical Committee. Appropriate Faculty systems are fully implemented and operational for monitoring ethical behaviour. The Ethics Commission is making every effort to introduce the rules and regulations governing ethical behaviour to staff and students.

1.10. The staff and the students are acquainted with the rules for ethical behaviour, as stated above.

2. Study programmes

2.1. The Faculty does consider the local needs and contacts the stakeholders, but it is beyond their reach to actually adapt the quotas to the quick-changing local market which is

currently dominated by the local steel company. If the steel factory is really bought by a new company, the need for graduates will soar; otherwise, it will be diminished unless there is the emergence of a more general materials sector in the region. No faculty in Croatia seems to have a real needs analysis available, and thus we are not in a position to make an authoritative ranking based on the criterion. **It is recommended that the Faculty considers the needs of society across the whole spectrum of Materials Science and considers broadening the scope of the material covered at undergraduate level.**

2.2. The institution has the best T:S ratio ever witnessed by the Panel. Much of this stems from the very high drop-out rate in the first year. The pass rate is analysed, however, a huge portion of students does not have interest in continuing studies, and the students are often of low quality, and it is not truly in power of the Faculty to change this. Given the number of teachers, the quotas could be much higher, but given the quality of students, they could also be lowered; the Faculty is in a difficult position here. Although much of this is societal, **the Faculty should be encouraged to explore ways to address this – for example by changing the order in which material is taught in order to better engage with the students.**

2.3. The learning outcomes are defined at the level standard in Croatia. We have been satisfied with what was presented to us, however, we are not able to comment directly on the courses which have their learning outcomes in Croatian only. **The English version of the study programmes, with attached outcomes and course details, should be available online, as also recommended in the quality audit. This is crucial for attracting foreign students and making the job of foreign reviewers possible.**

2.4. Regarding the teachers' assessment of student learning, the Panel can only refer to what has been said under the criteria 2.3.

2.5. The students seem satisfied with the allocation of ECTS; the only issue is that some students, as mentioned in SER, lack some basic knowledge of maths and physics, and thus find these courses more difficult than reflected in the ECTS. This might be addressed by the zero semester which aims to bring all students up to an acceptable background level. **It is recommended that the Faculty considers some realignment of ECTS to provide greater motivation for the students to master essential background skills.**

2.6. Again – the syllabi which we were able to see seem satisfactory, and the content has been aligned with programs in similar foreign schools; the student mobility seems to indicate that the level is similar. However, not being able to look at syllabi in detail, we cannot comment further on the international recongizability of the study programmes. **It is recommended that the Faculty adopts a standard policy of placing English versions of all course syllabi on-line, both as a recruitment tool and to aid future assessment.**

2.7. A range of different teaching methods is used, including significant practical laboratories and formal lectures and examples classes. The students seem satisfied with professors' teaching methods. However, the panel did not see evidence for any significant innovation in teaching methods.

2.8. The traditional in-house facilities, including the library and laboratories are of good standard and appreciated by the students. Electronic access seems more limited: for example it seems that, although the faculty has the opportunity to put their materials online,

this has not been done for all courses, and we are not sure if the Management is aware of this. **It is recommended that the Faculty institutes a formal policy for placing course materials online.**
In addition to this, the access to journal databases has been cut by the Ministry, but the students did not complain, and this is likely only to impact post-graduate students.

2.9. Students have a compulsory practice period at the third year, which is commendable; this can also be done in companies abroad. However, they were not informed on the possibility of internships upon their own initiative, or voluntary work. Students commented that the opportunities for industrial visits were limited and would prefer more. This may again reflect the state of local industry, but it is **recommended that the Faculty explores other opportunities for industrial visits (for examples to metals users in addition to processors) in order to expand the breadth of students' understanding of the sector**.

2.10. The institution has had a new study program on industrial ecology approved in line with the University regulations; the only thing missing is the formal evidence of stakeholder involvement.

3. Students

3.1. With reference to the Panel's meeting with the students, they were aware of the course details, requirements and assessment procedures, etc. They were also pragmatic about their current employment prospects in industry.
In addition to "open days", the Faculty is involved in visits to secondary schools in the region to promote their study programmes.
It is recommended that: (i) the Faculty continues with the above-mentioned activities to publicise its study programmes; (ii) an English-language website should be created; and (iii) the above-mentioned publicity activities should be advertised on the web.

3.2. The criteria for admissions to the Faculty are clear and are stated publically. With regard to recruitment, the Faculty has a limited pool of students. To compound the problem, the SER suggests that the grades for some of the new recruits tend to be below average and this may account for the high dropout rate. The Panel recognised the fact that raising the entry grades may adversely affect the recruitment campaign. The possibility of providing student accommodation was raised during the visit, and the Faculty is encouraged to explore this as a means of increasing the pool of potential students.
It is recommended that: (i) an efficient procedure be implemented to identify students running into difficulties with their study programmes early on in the semester; (ii) the proposed zero-semester course should be implemented formally; and (iii) the resourcing of remedial tutorial activities are formalised.

3.3. The Faculty has introduced a zero semester to improve the student competencies. The recommendations made in Section 3.2 apply.

3.4. The Faculty promotes student participation in annual "Technology Games". The Faculty does do something to invite students to conferences and other events, however, they do not have sports facilities, nor do students seem to have schedules full of activities. Additionally, the information provided in the SER suggested that the students do not have any formally organised extra-curricular activities.
It is recommended that the Faculty: (i) continues with its successful Technology Games; (ii) conducts a review of the nature and extent of the extracurricular activities offered at other national universities and make appropriate provisions for its students.

3.5. The Faculty has appointed a mentor for each year of the undergraduate programme. It was not clear to the Panel if each student was allocated a personal tutor. The students were very confident that the Professors in question offered them all necessary personal and academic support. However, the impression given to the Panel was that the pastoral care and academic support on offer were voluntary and not formalised.
It is recommended that the pastoral care and academic support be timetabled and formalised.

3.6. Issues relating to the entry grades for the students and the recommendations were discussed previously. The students were of the opinion that a dormitory would enhance the studying experience and raise the number and quality of the students, however, this is not within the powers of the Faculty. The Panel felt that this would also aid the recruitment drive for the Faculty, although it could also have less impact than the Faculty holds. The Faculty has repeatedly requested funding from the Ministry for funds to build a dormitory. The Faculty has been supportive of student requests; for example, the provision of a canteen.
It is recommended that due consideration be given by the Ministry to repeated requests by the Faculty and its students for a dormitory.

3.7. The institution is fully supportive of the Student Council, and students are represented at all possible levels as equal participants.

3.8. The procedure of appeal is in place for the assessment procedures and the students are well informed on them.

3.9. The institution does have data on a small number of graduates; however, the statistics are kept informally and are not presented well in the SER.

3.10. The Faculty has recently formalised and established contact with its alumni; the Panel commends this initiative. However, as stated previously, the Panel was not provided with any evidence to indicate the level of consultation and the nature of feedback collected about various activities, including activities associated with the design of new study programmes.

3.11. The students are extremely satisfied with their participation in decision-making, which appears to be an example of good practice.

3.12. The institution does invest efforts into public promotion, however, **the English website should be introduced as soon as possible in order to attract foreign students, as well as attract potential partners for international projects**.

3.13. The Panel was impressed with the students' loyalty and support for the Faculty. The students were of the view that they can approach the academic staff for academic support, to suggest improvements, or to lodge complaints, etc.
There is also very few of them, which increases their importance for the institution.

3.14. The inadequacies of the computer-based student feedback questionnaire were mentioned previously. However, the students were satisfied that they had other channels to express their opinions. In summary, the student population that the Panel interviewed seemed motivated and satisfied.

4. Teachers

4.1. The teachers seem sufficiently qualified and there are a sufficient number of them; they produce textbooks, however, these are used internally only. The institution also seems well prepared to deliver the newly introduced course, and they have agreements with other faculties on this topic

4.2. The panel was extremely concerned about the forward planning to cater for the retired professors. The Faculty is aware of the magnitude of the problem associated with the retirement of a number of the senior Professors. However, at present there are only two "researchers" who will join the academic staff upon completing their research programmes. The Faculty has directed the Panel to understand that this is in part due to the Ministry funding which has been refused, yet is necessary to facilitate the hiring of new researchers. For example, the Faculty could have also submitted applications to international projects which would have enabled them to employ new people. **Recommendations: (i) It is recommended that an urgent review should be undertaken by the Faculty to plan for staff retirements and the resourcing of replacement staff. (ii) The Faculty needs to plan for the future taking into account the needs of the Local and Regional stakeholders, the views of the student population, the need to diversify the current range of metallurgy-based courses, a strategy for recruiting more students and mobility. (iii) With reference to the above-mentioned points, a pragmatic case should be made to the Ministry to secure funding to hire additional researchers.**

4.3. The Faculty has a sufficient number of suitably qualified full-time teachers. However, the continuity of this operation needs to address the retirement/recruitment issue mentioned in *Section 4.2.* It is reiterated that the primary problems are the insufficient number of students and the high dropout rates. **Recommendations: (i) In terms of the ratio of number of teachers to students and staff workload, a realistic elaboration of the workload composition of individual staff (in particular teaching and mentorship) would be useful for the Faculty policy. (ii) If the Faculty is considering an expansion of the study programmes towards new materials in addition to traditional metallurgy, a**

strategy and an action plan for developing the staff (for example research assistants) and attracting new staff in these areas should be developed, perhaps by twinning or cooperation with other universities or departments. (iii) The procedure of enrolment for former students of mechanical engineering and chemical engineering should perhaps be more transparent in terms of partial recognition of individual courses.

4.4. Please refer to *Section 4.3.*

4.5. The Faculty has introduced a new module in Industrial Ecology. The Panel was made aware that some members of the Faculty were supportive of further revision of the study programme to include classes of materials other than metallurgy. **The Panel was of the view that the Faculty should consider the merits of considering materials such as composites and ceramics, etc.** However, there was no indication that a strategy or procedure was in place to consider the introduction of non-metallic materials and associated technologies in the study programme. **Recommendations: (i) If the Faculty is considering an expansion of the study programmes towards new materials in addition to traditional metallurgy, a strategy and an action plan for developing the staff (for example research assistants) and attracting new staff in these areas should be developed, perhaps by twinning or cooperation with other universities or departments. (ii) The Faculty should study the diversification and reorientation that has already taken place at similar schools regionally and internationally, and consider adopting similar strategies if appropriate. (iii) The details of the module on Industrial Ecology should be publicised.**

4.6. The teachers seem to be very satisfied with the advancement procedure and the criteria, and the way that the national regulations are implemented. The Faculty applies the common procedure, however, does not have any additional criteria, like other institutions in Croatia.

4.7. The workload tables presented in the SER are misleading. The Panel could not reconcile the workloads cited with the number of students in the Faculty. The explanation offered by the Faculty was that the data included electives where projected figures were used because the students had not selected the modules when the data were compiled. The error in the tables was accepted by the Faculty. The Panel would have also liked to see workloads associated with research projects, as to prove that this is balanced. **Recommendations: (i) The error in the workload tables must be corrected. (ii) The procedure of reviewing the teaching materials should be formally introduced to the workload tables, as well as time invested in research.**

4.8. The Panel was not aware of any formal procedures for recording or reporting or managing the teachers' cooperation with external organisations. The Panel was also led to believe that the services offered by the Faculty to industry do not incur a cost to the recipient. Some of the Faculty members are engaged in teaching activities at other regional institutions; the Faculty encourages such activities. **Recommendations: (i) The procedure of reviewing the workload and the presentation of the data should be checked prior to issue. (ii) A formalised procedure should be implemented to monitor and report the cooperation**

with external organisations. (iii) The Faculty should retain its autonomy in deciding the cost-basis for charging for services to industry but a formalised procedure should be implemented to record such activities and associated generation of revenue. (iv)The Faculty should have evidence even of the services that are provided to the industry pro bono, at least in form of thank you letters , and it should consider capitalising on these. In exchange, they could ask for, for example: student internships, sponsorships, scholarships and employment. (v) The collaboration with other institutions should be encouraged.

5. Scientific and professional activity

5.1. The Panel was not provided with any tangible evidence of a strategic programme of scientific research, other than the mandatory publication data to indicate how the Faculty has defined success indicators. There is no doubt that there are a number of research-active staff in the Faculty. It should also be taken into account that due to a small number of students the staff workload in teaching is smaller than on the other institutions, which leaves them more time for research.

Recommendations: (i) The Faculty believes it has a strategy for research, but it should be revisited in terms of scope, aims and objectives and the necessary steps in collaboration. The research has to lead both the mission and the vision, as well as the teaching content, as this is the core business of the institution. (ii) The Faculty should seek assistance from the University to ensure compliance with its long-term research scientific research strategy.

(ii) The QA procedures used in the University should be adopted and implemented in the Faculty with specific reference to scientific research.

(iii) The research output should be publicised. (iv) The panel recommends to diversify in the subject area regarding materials as a priority, and include cooperation with the national and international institutions and industry as a part of the strategy. There is little room for development in the field of metallurgy, and the scope of their work should be broadened. Just involving the institution in new projects, without abruptly changing the mission, might be a step forward.

5.2. It is recognised that some members of the Faculty are involved in collaborative activities at the national and international levels; for example, involvement in the COST programme. However, as stated previously, the SER did not give a clear indication of the extent to which the stakeholders were involved or consulted with in regard to the planning of the research agenda, nor were we able to see evidence of proactive cooperation with institutions beyond a very narrow field of metallurgy, in which the cooperation with stakeholders does seem commendable. The participation in the COST program might be an example of good practice at the level of institution, and such advances into new areas might become a part of the institutional vision.

Recommendations: (i) The autonomy of the academic staff in defining and pursuing their respective research agendas should be preserved.

(ii) The Faculty should adopt the QA procedures available at the University level with regard to planning and implementing its research agenda.

(iii) The Faculty should encourage and facilitate collaboration with other institutions and industries, both locally and globally.

(iv) The Faculty should take advantage of the infrastructure support that is available via the University; for example, the Technology Transfer Office.
Involvement of stakeholders, particularly local companies, is neither structured nor formalised.

5.3. Research is certainly acknowledged as a contributing component of the overall Faculty activity. Whilst accepting that explicit evidence was not provided in the SER, **the Panel felt that the Faculty could better utilise the infrastructure support that is available at the University, such as the Project and Technology Transfer Office.**

5.4. The two young researchers currently employed at the Faculty seemed very satisfied with their current position and career prospects, although they are at the beginning of their career, and lack time and funds for international travel.
Recommendation: (i) The Faculty should continue to support its young researchers and take appropriate measures to recruit more researchers to replace staff who will be retiring.
(ii) The Panel recognises the enthusiasm of the young researchers; and where possible, the Faculty should facilitate national and international networking at conferences and workshops.

5.5. The senior management supports research excellence. However, apart from promotions (as a reward for research excellence), the management does not seem to have any specific tools or incentives to reward individuals, nor a clearly effective strategy at the institutional level. **The mechanisms and protocols available at the University should be appraised and adopted by the Faculty where appropriate.**

5.6. In accordance with normal national and international academic practice, the Faculty members disseminate their research findings in national and international publications. The Faculty complies with National policies with regard to academic publications, however, their additional criteria should be checked for effectiveness in the future.
Recommendations: (i) With reference to any future SER, the Faculty should present the publications database in format that can be cross-checked.
(ii) The Faculty should adopt procedures that are operational at the University with regard to encouraging and regarding academic publications.

5.7. The Faculty is in compliance with the requirement to keep evidence of scientific productivity. However, **the Faculty could standardise the data compilation method; also, the institution might do better than simply accept the National Library data without looking into it into more detail.**

5.8. The Panel was divided in its views on the merits of not charging for consultancy-type activities undertaken by the Faculty members, as opposed to prospects of actually earning profits from companies which may not necessarily be micro start-ups in need of support.. One school of thought was that, given the economic climate in the region, the benefits accrued from free-consultancy outweighed the financial cost to the Faculty. The other view was that the Faculty should accrue some benefit (short or long-term) from the consultancy activities. However, there was consensus that any consultancy activity should be recorded and reported as part of the QA procedures. The Faculty could also look into possibilities of getting project funding for such cooperation – which are ample at the regional, national and

EU level – and use these companies for internships or guest lectures, or other forms of getting return on investment.

Recommendations: (i) The Faculty should review and adopt the procedures available at the University with regard to professional activities and services.
(ii) The Faculty should investigate the feasibility of securing some return-on-investment for its consultancy activities (monetary and in-kind). These could include internships for students, industrial visits, guest lectures or sponsorship, etc.
(ii) The Faculty should investigate and identify national and internationals companies who may have a need for the expertise available within the Faculty.
(iii) The Faculty should seek the assistance of the University Technology Transfer and Publicity Offices.

6. International cooperation and mobility

6.1. There was limited evidence in SER to indicate that the Faculty had any arrangements to facilitate and promote the mobility of students from other higher education institutions. The Faculty is not networked with other national institutions with regard to the 'horizontal mobility' of students.

Recommendations: (i) A thorough comparison with related study programmes at a number of EU universities should be provided at the course level. This should also reflect student mobility and transferability of ECTS points.
(ii) Feedback from industry should be considered in terms of the offer of elective courses.
(iii) An evaluation of the prerequisites for more intensive student mobility towards the Faculty, including advertising available Faculty resources, as well as courses in English, and a well-designed English-language website should be included. Note should also be taken of programs such as Erasmus.
(iv) The Faculty should consider factors that can assist in horizontal mobility; for example, provision of accommodation, or a specific quota for such students.

6.2. The institution has developed good cooperation with institutions in Ljubljana and Slovakia, and two students have completed part of their studies in Slovenia.

Recommendation: Similar cooperation should be developed with other institutions.

6.3. The academic staff from the Faculty have cooperated with foreign institutions and have spent short periods abroad. However, we have not seen evidence of the way the results of such experiences are implemented to benefit the institutions.

Recommendations: (i) Time and resource permitting, the Faculty members should endeavour to establish cooperation with foreign institutions in areas of mutual interest and potential benefit.
(ii) The Faculty should draw on the experiences of these staff and make this information available to benefit other members who may be interested in developing international links.
(iii) The Faculty should take advantage of the infrastructure available at the University in setting up links with foreign institutions.

6.4. In this specific area, the specialised international organizations do not exist at the institutional level, which is why this point is only partly applicable.The members of the Faculty are members of a number of relevant associations.
Recommendations: (i) The Faculty could create a database of institutions abroad that have a common interest (Metallurgy, Materials Science, Advanced Materials, etc).
(ii) The Faculty could initiate links with selected institutions with similar interests, including societies and organisations that represent the interests of Materials.

6.5. Given the difficulties experienced in recruiting students, it is envisaged that significant effort will have to be expended if the recruitment of overseas students is desired. The previous discussion on enhancing the student learning experience applies here.
Recommendations: (i) The Faculty should create an English website where the details of the study programme are detailed.
(ii) The Faculty could consider offering courses in English to attract overseas students.

6.6. Regarding lifelong learning as such the Faculty has recently introduced a lifelong learning programme entitled "study as you work" on Casting Technology, however, we would expect even a larger number of workshops, seminars and such for the people from the industry..
Recommendation: The Faculty could consider the feasibility of extending its current initiatives to specified sectors of local industries whilst maintaining its academic duties and targets.

If this question is related to Erasmus, the institution has outgoing, but not incoming students, and comments to 6.5. also apply here.

6.7. Reference has been made previously to COST and Erasmus, and inter-institutional collaboration. **The Panel was of the view that the Faculty could advance its cause in this area by appointing a person who is made responsible for international projects. As mentioned previously, the Faculty should use the resources available at the University to greater effect.**

7. Resources: administration, space, equipment and finances

7.1. The general teaching facilities, including lecture theatres and teaching laboratories seen by the Panel were of good quality and provide a good learning environment for the students. The Faculty has a wide range of equipment, ranging from state of the art, to somewhat outdated. **The equipment should be updated, and more should be invested in this regard**; however, the students are able to achieve their necessary learning outcomes at the existing equipment, particularly the mechanical testing equipment. It was not clear the extent to which students could receive hands-on experience with all the equipment, **and this should be maximised where possible.**

7.2. Outside national regulations which require certain staff to be trained, it is up to the individual staff member to find additional training opportunities, which are then supported. **This might be done more systematically.**

7.3. The institution has limited equipment which does support their current fairly narrow research agenda, and they are also able to use the local steel plant laboratories, which is especially necessary in the case of mechanical testing laboratory. As far as possible, **this should be formalised to enable the development of non-teaching staff.**

7.4. The institution has a fairly high level of technical equipment but some is significantly outdated and unsuitable for modern research. **The Faculty should implement a strategic review of its likely equipment requirements and explore the potential for equipment sharing with other institutions and companies.**

7.5. The process of information collection and analysis is more informal, however, the level of equipment seems satisfactory. However, **this should be formalised, particularly regarding the utilization of the equipment by the industry, which might also be costed and used to develop the general standard of the Faculty facilities**.

7.6. The library is satisfactory regarding books and space available, the online catalogue has been recently introduced, and **the only problem is the lack of available databases, the funding for which is cut by the Ministry**.

7.7. The institution has almost the 1:1 ratio of teaching and non-teaching staff, which is connected to the number of laboratory technicians. We have seen no evidence of strategic planning regarding this ratio, which would generally be regarded as excessive.

7.8. As a public institution, the Faculty is obviously financially stable, although they could use more funds from the state, and income from the industry.

7.9. All research project funding is invested into equipment, and the institution seems quite effective in investing its own funds. As stated above, **it might do more on developing and monitoring funding from the industry**: equipment access seems to be offered to local companies on a pro bono basis. While this might be justified in the case of start-ups, it in effect represents a drain on the Faculty resources which should be accounted for properly so that strategic decisions can be made about charging policy in the future.

FINAL REPORT AND RECOMMENDATIONS BY THE EXPERT PANEL

ADVANTAGES (STRONG POINTS)

Resources for Learning

Concerning total area where activities of higher education are performed, the Faculty seems to be in very good position. Total area of more than 3000 sq. meters for less than 100 students and approximately 40 teachers & staff persons is fine.

T/S Ratio

The Faculty has excellent teacher/student ratio, especially comparing with other schools in Croatia and in the region. Unfortunately it is connected with some negative trends (see weak points).

Scientific activity of teaching stuff

Scientific activity of teaching staff visible through publications in scientific papers and conferences is on a level that is quite good.

Relation students – teachers

This relation seems to be very good. Strong student loyalty and support for the Faculty is present.

DISADVANTAGES (WEAK POINTS)

Study programme

Study program of the Faculty is oriented only to Metallurgy which is mainly caused by the needs of the local steel company. This company already passed through critical periods and the future of the company is, like everywhere in the world, not hundred per cent sure.

Dropout rate

The number of students who leave Faculty before graduation is too high, especially in the undergraduate study programme.

Cooperation with industry

Cooperation with industry, which is very important in this particular field, is present only on individual level. There is a lack of organisation and implementation of this activity on the institutional level.

Teachers' average age

Average age, especially of Full professors (62 years) is too high considering the number and age of the teachers on lower positions.

RECOMMENDATIONS FOR IMPROVEMENT OF QUALITY

1. The syllabus and the learning outcomes we saw are very encouraging; however, there is more work to be done in translating everything into English, and we would like to make sure that this will be implemented for all courses.

2. The students met during the visit all seemed very happy and motivated; however, this could be expected due to the very high drop-out rate, as only the best students are left. This drop-out rate was a concern to the Panel, and we would encourage the Faculty to explore ways of minimising this, both by better support of students and through greater selectivity in recruiting students. We would also like to see more support in extracurricular activities and practical experience, in order to continue with the current successful strategies and ensure that learning outcomes are achieved.

3. The main issue both in study programs and research is the current narrow focus on Metallurgy; it might be interesting to steer a couple of younger professors into other connected areas, launch joint projects with other institutions in connected field. This would to some extent protect against the closure of local industry and enable support of a wider industrial sector. In connection to this, the institution should work on encouraging mobility in order to attract better

motivated students, and should possibly employ a specialised individual for international cooperation in order to increase the number of international projects in the institution is involved in. The institution should also work more on promoting itself and its successes in public and to the prospective students and research partners.