

The Excellence System Application in Higher Education

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Abstract - This paper presents positive results obtained at the Faculty of Mechanical Engineering, VSB – Technical University of Ostrava, Czech Republic, with the Quality Management System, which was certified in the year 2005. The next step has been done with the application of the Excellence system, according to the EFQM Excellence Model in the year 2006. The benchmark project, realized with many technical faculties from the Czech Republic and other countries, as one of important steps for faculty management improvement, is also presented in the paper. The presented paper describes acquired results of the QMS and EFQM systems and also shows the main goals, which can be obtained by all other universities and educational organizations.

Index Terms - quality, QMS, excellence, EFQM, model

INTRODUCTION

During the last decade Czech universities have passed an array of important changes connected both with the change of political orientation and with the convergence to the principles and legislation of EU. Many things have changed – the goals, the sources, the requirements and the conditions. The present management systems of universities do not reflect these changes, and still utilize the traditional principles and therefore are deficient of any element of modern management.

The management of universities is being based on the principles of “common law” that don't correlate in most cases with the actual requirements of a dynamically developing society. Many problems and nearly standard situations are dealt with the ad hoc way approach. In many cases there are not clearly defined responsibilities and authorities. The management systems are without the desired level of transparency and formalization.

Currently, the universities are situated in a competitive environment. It is the principal reason why they have to be identified as organizations providing services that satisfy their customers. To lead and operate an organization successfully, it is necessary to manage it in a systematic and visible manner. The implementation of Quality Management System (QMS), as an inherent part of university management, is the way how to reach this aim. The new management of VSB – Technical University of Ostrava (VSB – TUO) decided to implement QMS after their election and appointment in first half of 2003.

VSB – TECHNICAL UNIVERSITY OF OSTRAVA

More than 150 year history of VSB – Technical University of Ostrava is closely connected with the development of mining and metal extraction, which was the oldest industry in the Austro-Hungarian Empire. That is why the Emperor Frantz Josef I. decreed (1849) that a mining vocational school would be set up in Příbram for the northern countries, and another in Leoben for the southern countries of the Empire. In 1904, the Příbram Academy was given the status of University – *Vysoká škola báňská* (VSB). The President of the Czechoslovakia, E. Beneš, issued Decree No. 49 on 8th September 1945 by which the university was transferred from Příbram to Ostrava. This ended the history of Příbram and opened a new era in the history of the university in Ostrava, the centre of a widespread chemistry, heavy engineering and mining region.

The 17th November 1989 was a historic event in the life of Czech universities and in the whole society. Significant changes have been made at VSB – Technical University of Ostrava (VSB – TUO). The reorganization of all courses and the new provision of modern branches of study transferred VSB –TUO to a modern polytechnic university.

VSB – TUO currently consists of seven faculties:

- Faculty of Economics,
- Faculty of Civil Engineering
- Faculty of Mechanical Engineering
- Faculty of Electrical Engineering and Computer Science
- Faculty of Mining and Geology
- Faculty of Metallurgy and Material Engineering
- Faculty of Safety Engineering.

There are more than 19 000 students in bachelor degree, master degree and doctoral degree programs in daytime, distance and combined studies.

QUALITY MANAGEMENT SYSTEM APPLICATION

The Faculty of Mechanical Engineering joined the project focused on applying the Quality Management System at the VSB – Technical University of Ostrava at the end of the year 2004 in the concurrence with the pilot application of QMS at the Faculty of Electrical Engineering and Computer Science, which was the first faculty in the whole Czech Republic with a functioning QMS system. At the end of the successfully QMS system certification at the Faculty of Mechanical Engineering in May 2005, it was clear that it would be a long

way to fully implement all management instruments, especially those used by all faculty members at all management levels needed a lot of work. The university management system is different from a typical company management system.

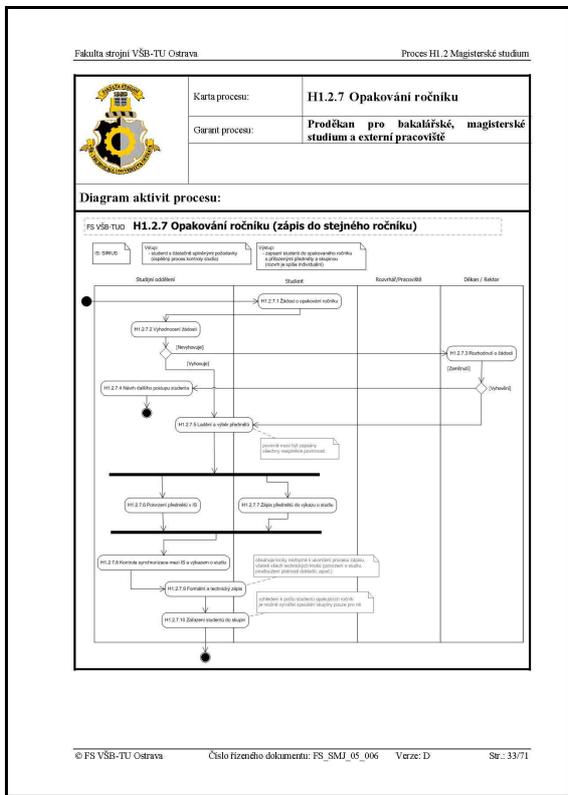


FIGURE 1
PROCESS DESCRIPTION EXAMPLE

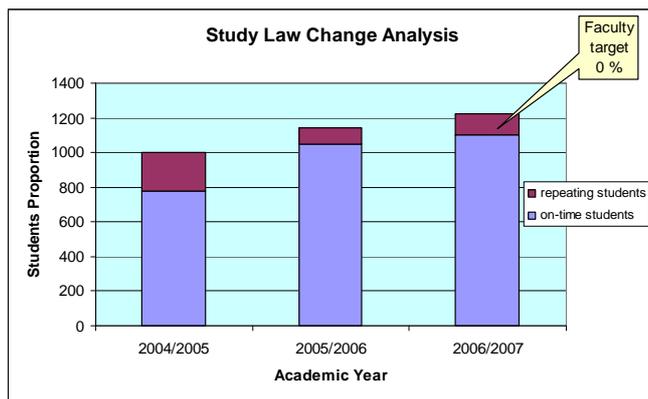


FIGURE 2
DECISION MAKING SUPPORT

All teachers and researchers are deeply involved in many teaching processes like preparing study plans, modernization and realization, grant projects, etc.

It was very important to define the Faculty mission, vision and quality management needs. It was also very helpful to establish a special working group "Quality Group" to join the faculty members focused on the QMS system. Students, the educational authorities and employers have been identified as faculty customers and study plans, R&D projects and industrial projects as the main products. The main goal of QMS seems to be a process oriented management system. We have to identify six main processes, nine auxiliary processes and four management processes. Most work had to be invested in a detailed process description. The UML (Uniform Modeling Language) Activity Diagrams have to be used as a suitable instrument for the process description. Now we have very clear process descriptions, which are easy to understand and which respect all legal regulations and step-by-step describe all important university processes, teaching processes, grant projects and all other areas. Figure 1 shows an example of a process description.

Quality management standards include many powerful principles, which can help a faculty to prevent risks and improve its management system. The most important seems to be the internal audits, because all auditors had to be trained and certified to do the audits. All processes have been checked and many problems have been found and also eliminated during revision of the process descriptions. This instrument also corresponds to the self assessment system, which is enacted on all universities by the Czech law and which is a very powerful method to improve the university management system. The most important instrument is the factual approach to decision making. Every weighty decision must be supported by substantial analysis. For example, Figure 2 shows the result of some study law change analysis.

The obtained results from the faculty QMS system have been very interesting also for all other technical faculties. The main goals were presented at the International Conference Principia Cybernetica 2005 [3], the International Conference on Engineering Education 2006 [4] and 7th International Conference of Quality Managers 2006 [7] as a part of the faculty Excellence System (best practices), described below. It was very satisfying when representatives

of two other technical faculties from the Czech Republic asked for cooperation meetings to transfer our results to their faculties.

THE EXCELLENCE SYSTEM

Simultaneously, with the application of standard management instruments included in the ISO 9001 norm, like the process risk analysis based on the FMEA (Failure Mode and Effects Analysis), SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis of important decision-making, the consequent use of preventive and corrective actions, people involvement and authorization, we looked for other forms of improving the management system. The ISO 9001 management model is focused on supplier relationships and customer needs, but the university management system needs to be very strongly oriented also on the employers, students, industrial partners, government. Therefore, we were looking for some more efficient instruments for faculty system assessment, which can describe faculty life in a more complex way. Because we have been from the beginning of the management improvement focused on the use of industrial standards, it is not surprising that we have chosen a very complex industrial quality assessment system based on EFQM (European Foundations for Quality Management) Model, see Figure 3. This model was described many times in many places. The main description is available on the EFQM web [2] and a few years ago this model was rearranged for teaching process specificities, described in [6].

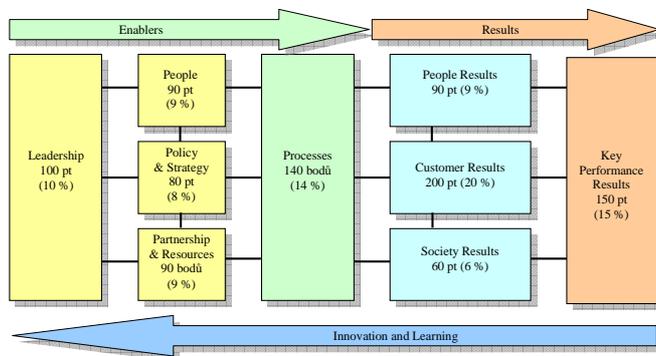


FIGURE 3
EFQM EXCELLENCE MODEL [2]

THE WAY TO THE TQM

Significant motivation for orientation on complete quality comprehension was also the Program of the Czech Republic National Prize for Quality, which was opened in year 2006 for first time for non-profit organizations and extended by two categories – based on the CAF Model and based on the EFQM Model. Orientation on the EFQM Model corresponds to our orientation on verified industrial standards. This model was also rearranged for education institutions [6], [8]. The main apparent goal was self-assessment and external evaluation. This evaluation includes also on-site visits, done by very professional evaluators, who have much experience

with the evaluation of industrial companies in the past years. The whole process can be divided into the next steps:

1. Assembling a realization team: faculty management, faculty senate members and other specialists were addressed to join the team called “Excellence Group”, to finally include 16 members.
2. Making the team familiar with the information sources and useful instruments (Pro Forma) for self-assessment.
3. All criteria (32) evaluation, available data interpretation, considering their number to be realized in smaller teams. Forms for 10 criteria, mostly focused on department life, are also filled in by every head of department; see an example in Figure 5.
4. Consensus meetings on every criteria, all data pre-processing, finding a common opinion.
5. Forming a self-assessment report, created by one person to obtain a unified result.
6. Self-assessment report review done by the discussion of the whole team and its distribution.
7. Waiting for external evaluation result, filled by the Changes Action Plan arrangement and its implementation.
8. According to good rating external evaluation on site. Very complex and detailed analysis.
9. Obtaining a very circumstantial Evaluation Report including a lot of concrete recommendations to improving the faculty management system and obtaining the prize during official meeting in Prague, see [9], [5].
10. Using the important recommendation to improve the faculty management system.

Many analyses were done during the self-assessment process and more than fifty interesting faculty performance and efficiency indicators were found. Figure 5 shows teaching process efficiency, analysis and results. Ten of them were selected as a base for the benchmarking project with other technical faculties from the Czech Republic and other European Union countries. Ten main criteria were chosen to compare the efficiency of the faculty management system:

1. Number of students in bachelor and master study programmes recounted according to a teacher.
2. Number of students in doctoral study programmes recounted according to the number of senior lecturers and professors.
3. Number of foreign students in months (for stages longer than one month).
4. Success of students from first bachelor class in percentage.
5. Financial volume of research projects (without follow-up activities) according to an academic employee.
6. Financial volume of follow-up activities per academic employee.
7. Percentage of senior lectures and professors from the total number of recounted all teachers.
8. 8.1 Average age of professors.
8.2 Average age of senior lectures.
8.3 Average age of assistant professors.
9. Investment pro-rata from the Ministry of Education, Youth and Sports calculated according to a teacher.

10. Number of patent applications and utility models in the year 2006 (we are missing older data).

Many interesting and helpful ideas for improving the faculty management system were obtained during the discussion with our partners. Unfortunately we are not authorised to publish the result of this benchmarking, according to the Benchmarking Code [1], see Figure 4.

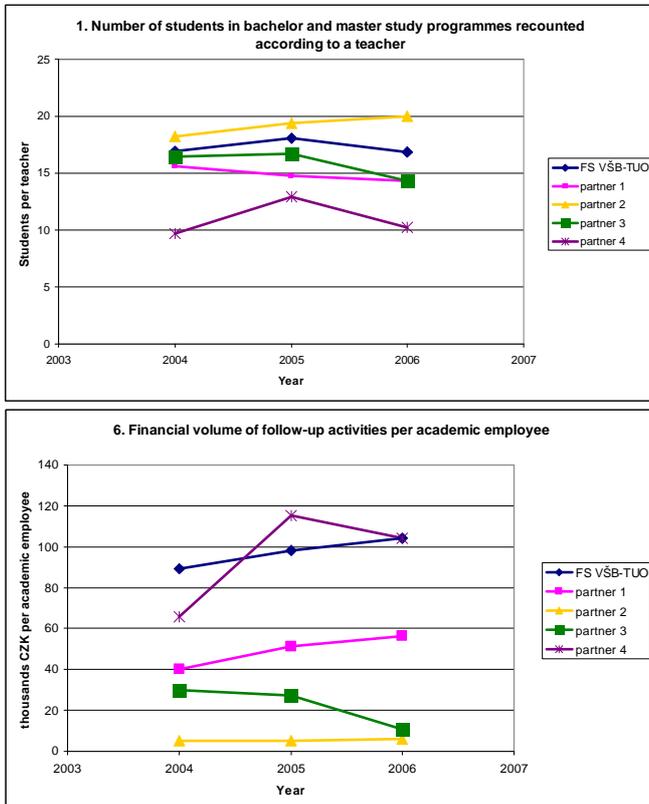


FIGURE 4
EXAMPLE OF BENCHMARKING RESULTS

Parallel to finishing the self-assessment report the most significant weaknesses and threats were selected, which were analyzed and activities for their removal were quickly done. Many uncertainties were eliminated by new analyses by questionnaires for graduates, new students and unsuccessful students, see Figure 6.

The next important area which was omitted in the past was collaboration with suppliers; this especially means collaboration with high schools. Figure 7 shows an analysis of graduate study results according to their previous high school. You can see very good results of some secondary schools and the very problematic results of graduates from some specialized schools, which graduates had very good results from high school which are inconsistent with their study results at university. A project called “Partnership with High Schools” was started at the end of year 2006 with the concrete offers for study support like special excursions to

the faculty labs, university teachers lectures focused on up-to-date technical problems and novelties and other real collaboration support.

PRINCIPAL FACULTY REWARDS

The implemented QMS brings benefits both for customers of the university (students, employers, society) and to the university itself. That’s the reason why we started this process at VSB – Technical University of Ostrava. The results of the implemented and certified Quality Management System at VSB-TUO are very positive. An orientation on a complex quality system and the use of the EFQM Excellence Model has improved university life, its processes and efficiency. Achieving official recognition for the Faculty of Mechanical Engineering from the *Program of the Czech Republic National Quality Award* and *Manager of the field 2006* award for our dean have been promoted by the other faculties of the university, see Figure 8. Thanks to this, I can recommend following this way to all other technical faculties and universities.

The presented results have been obtained during the completion of Specific Research at the Universities with students’ participation, supported by the Czech Ministry of Education, Youth and Sports.

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Kritérium 5d:	Procesy - Výroba, dodávka a servis výrobků a služeb			
Otázky - segmenty k zamýšlení				
1. Jak vysoká škola garantuje, že poskytování produktů a služeb (mimo vzdělávání a výzkum) je plně v souladu s jejich návrhem?				
<p>Důkazy - zjištění :</p> <p>Fakulta se kromě výuky a výzkumu věnuje doplňkové hospodářské činnosti. Tento proces je podrobně popsán v rámci SMJ jako H3.1 Spolupráce s praxí. Každá hospodářská smlouva podléhá schvalovacímu procesu, který garantuje dodržení všech důležitých parametrů smlouvy. Součástí je smlouva se zadavatelem, která garantuje dodržení požadovaných vlastností produktů a služeb. Předání výsledků řešení podléhá schválení zadavatelem, které je podmínkou ukončení řešení, často formou oponentního řízení. viz dokument http://iso.fs.vsb.cz/SMJ/FS_SMJ_05_010_H_3_1_Spoluprace_S_Praxi.pdf</p>				
2. Jaké marketingové aktivity, komunikování hodnoty a nabídky produktů současným i novým zákazníkům vysoká škola rozvíjí a uplatňuje?				
<p>Důkazy - zjištění :</p> <p>Fakulta nabízí své služby formou záznamů v Katalogu vědecko-technických služeb VŠB-TU Ostrava (http://www.vsb.cz/ctf/), dosažené výsledky a významné řešené oblasti doplňkové činnosti jsou pravidelnou součástí výročních zpráv pracovišť i fakulty, které jsou prezentovány na webovém portále fakulty a jednotlivých pracovišť. viz http://www.fs.vsb.cz/98/cz/vedavyzkum.asp</p>				
Hodnocení:	Přístup: 75 %	Rozšíření: 90 %	Posuzování: 75 %	Přezkoumávání: 60 %
Celkem:	60 %			
Silné stránky - seznam :		Příležitosti ke zlepšování - seznam :		
<ul style="list-style-type: none"> Fakulta tradičně řeší velké množství úkolů v rámci doplňkové hospodářské činnosti. Zákazníci se při zadávání úkolů často opakují, což svědčí o jejich spokojenosti. 		<ul style="list-style-type: none"> Fakulta nevyvíjí aktivní propagaci svých schopností. 		

FIGURE 5
EFQM EXCELLENCE MODEL [EFQM]

First year study results – bachelor study 2005/2006

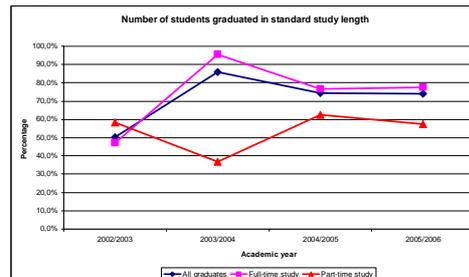
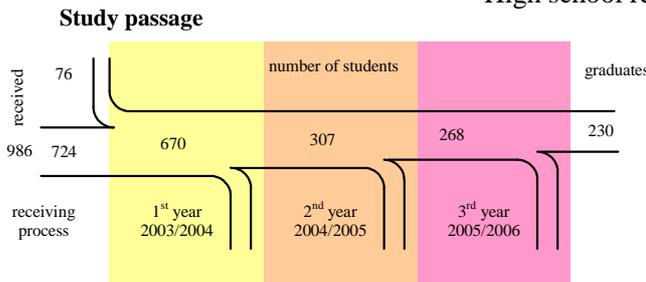
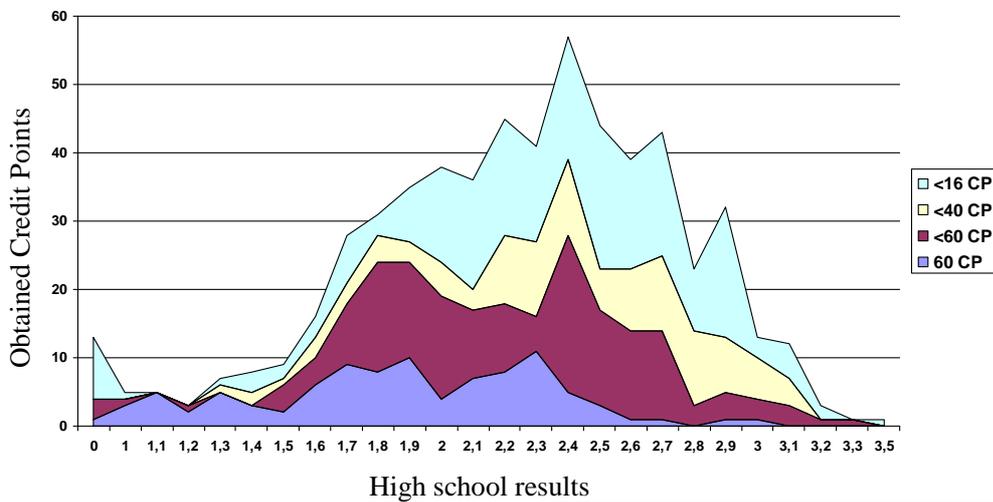


FIGURE 6
EXAMPLE OF THE SYSTEM EFFICIENCY INDICATORS

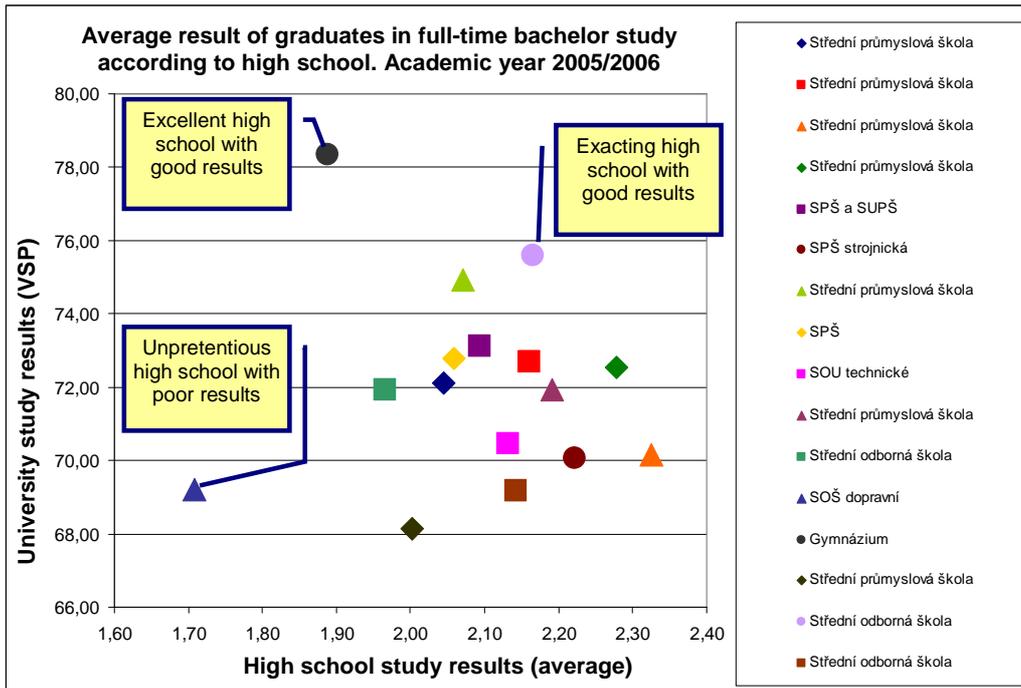


FIGURE 7
ANALYSIS OF GRADUATE STUDY RESULTS ACCORDING TO PREVIOUS HIGH SCHOOL

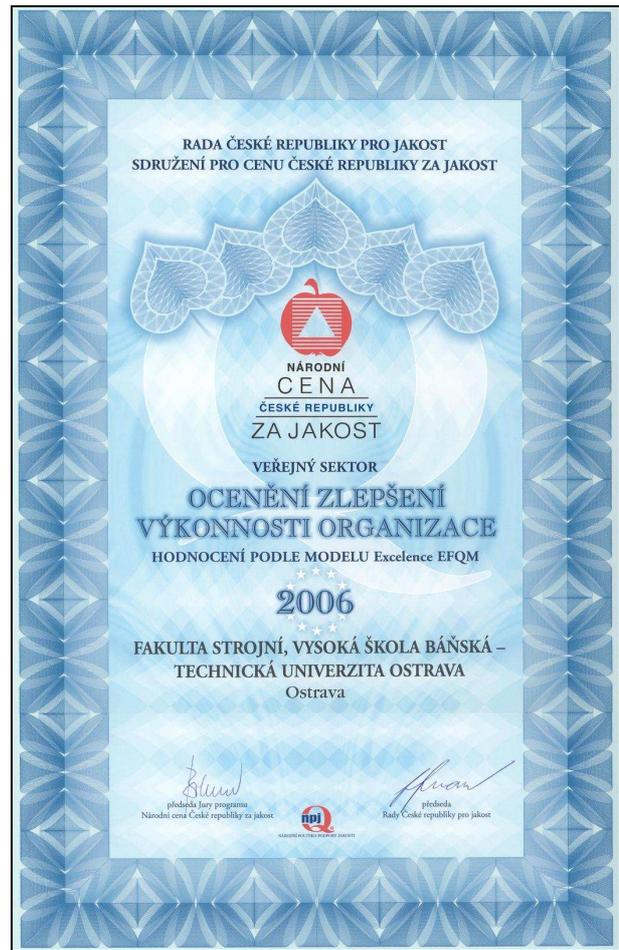


FIGURE 8
ACHIEVED AWARDS