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On 1st October, 1960 the former Faculty for Electrical and Mechanical Engineering, University of Ljubljana dissociated into two independent faculties: the Faculty for Electrical Engineering and the Faculty for Mechanical Engineering.

The "Mechanical Journal" devotes this issue to the new independent Faculty for Mechanical Engineering.

**Dr. Sc. Zoran RANT, full professor and dean of Faculty for Mechanical Engineering, Mech. eng.:
AT OCCASION OF INDEPENDENCE OF
FACULTY FOR MECHANICAL ENGINEERING,
LJUBLJANA**

In the scholastic year 1950/51, 496 students were matriculated on the Faculty (then Department) for Mechanical Engineering, ten years later, viz. in the scholastic year 1960/61 there are 1169 students. Of this number 969 are ordinary students, 200 extraordinary. This increase is fully motivated by our economical development. So as abroad, the economy and all other man's activity becomes also in this country by leaps rapidly technicalized. The engineering and with it associated machines intrude from all parts into almost all domains of modern life with much greater speed than it is possible to prepare and school professionals, which are absolutely necessary for the creation and maintenance of the more and more complicated technical mechanism.

The problem of disagreement between the number of people trained and the necessities and the development of technical plants is particularly sensible in this country in the domain of mechanical engineering. Therefore our pedagogical tasks are enormous without exaggeration.

The Faculty for Mechanical Engineering took charge of this very difficult task with assurance, and in parallel to the efforts of people's authorities widely opened its doors to all which fulfil the conditions of enrolment in spite of the heavy lack of room.

For this aim we have engaged ourselves for a thorough reorganization of the study programme and regime. The studies in three stages will be useful for the economy as well as for the students.

The first stage of studies will produce that great number of academically qualified people which are needed in the technical practice for the immediate guidance of various procedures or operations. On the upper stages of studies we will easier and thoroughly deepen the theoretical and practical knowledge directed into specialization or scientific work.

The extraordinary study facilities which were introduced this year by the Faculty bring the faculty nearer to working people.

The widened and renewed work of the Faculty is associated with a radical regulation of the material basis and an increase in number of the teaching and administrative personnel.

Nande NIKLSBACHER, lecturer on Faculty for Mechanical Engineering, Mech. eng.:

**SURVEY OF DEVELOPMENT OF COLLEGE
STUDIES OF MECHANICAL ENGINEERING IN
LJUBLJANA AT ITS 150TH ANNIVERSARY**

A great number of university institutions which signified an organic preparation of the people of that time for the growth of a complete university, joined in the same and the next centuries the secondary school which was founded in 1563 in Ljubljana. In the very early years of the 18th century the philosophical and theological academies were established, in 1760 also the academy of general physics with a cathedra for special physics. In 1767, the cathedra for mechanics was created.

The academies of Ljubljana received the first blow in 1785 when the Austrian government dissolved in excess of other also the philosophical faculty which comprised all professorships of the existing engineering sciences.

It is characteristic that the country diet of that time demanded a study programme according to the programme of the reorganized studies of the Vienna university. But it happened that that what the Carniolia country diet tried to obtain from the Austrian government of Vienna was fulfilled in another form and in a changed sovereignty in 1810 in Napoleon's Illyria. The studies of engineering and architecture then lasted four years. From that time the oldest study programme of engineering studies on the Ljubljana university is known. Therefore we can state with authorization that university studies of mechanical engineering appeared on the central school of Ljubljana already accurately 150 years ago.

Unfortunately the period of this cultural progress and independence lasted for 15 years only — till the recommencement of Austrian domination. Engineering studies ceased entirely. Slovene engineers were forced to study on Austrian engineering colleges, viz. partly on German colleges of Vienna, Graz and Leoben and partly on Czech colleges of Brno, Praha and Příbram. In these cities the revolution after World War I in 1918 found several engineering students of this country.

A number of scientists and of technical experts which hitherto worked in other places but wished subsequently cooperate in their native country gathered at that time in Ljubljana. But parallelly the need for new engineering personnel also increased. At the very beginning of 1919 the idea arose that a technical university be established in Ljubljana. On 23rd July, 1919 the founding of the University of Ljubljana passed into law. Then the University comprised the philosophical, law, medical and engineering faculties. The technical faculty was divided into civil-work, architectural, mechanical-electrical, mining and chemical departments and a geodetical course lasting two years.

The problem of rooms was particularly difficult. Three halls and two small rooms were then allotted to the technical faculty in the building of the technical school, the drawing room and the chemical lecture room of the modern secondary school for several hours weekly. In the cellar of the latter school, a chemical laboratory was established with an equipment very up-to-date for that time. With the assistance of banking institutions and industrial enterprises the committee for building the technical faculty was able already in August, 1920 to place the order for civil works to the builder. In the fall of 1921 the building at Aškerčeva street was ready for moving in.

When in the fall of 1927 a new wing was erected at the building of the technical faculty, among others — the Institute for general machine engineering moved in.

The following decade could be characterized by the struggle for the survival of the unrestricted university against attempts of the government of Beograd to dissolve one or another faculty, institute or department. In spite of the relentless battle of all concerned parties, some semesters of the medical faculty were cancelled and the studies of mechanical engineering were reduced to four semesters on the then existing Institute for mechanical engineering. The government bodies of that time did not have (or did not wish to have) the comprehension that the former Austro-Hungarian practice had to be discontinued and care be taken that professionals be trained at home and that foreigners should not be given several important jobs.

Then professor Mr. Lobe had already prepared to the last details the plans for the institute of

mechanical engineering. Several interventions and trips to Beograd and searching for contacts in various governmental bodies were necessary before also competent ranks began seriously to discuss upon the building of the institute for mechanical engineering. In spite of all these difficulties the case of the institute nevertheless moved from the dead center. By an amendment to the budget law for the year 1938/39 the minister of education was authorized to raise a loan for building the institute for mechanical engineering on the technical faculty, University of Ljubljana. In the fall of 1938 civil works were started, in the summer 1939 the skeleton of the building was erected up to the top so that outside plastering was begun in 1940. But till the outburst of World War II the building nevertheless was completed and consigned to its aim.

All this time the struggle for a complete 4-year faculty was continued. Finally on 5th April, 1941 in Beograd the decree was signed wherein it was determined that a department for mechanical engineering be added to the technical faculty of Ljubljana. But the very next day Yugoslavia was seized by the wave of fiendly attacks — World War II intruded with all violence also in this country. The inauguration of the complete department for mechanical engineering remained therefore existing only on paper, and the building of the department for mechanical engineering was used as barracks by the conquerors.

In new Yugoslavia the building was completed in less than one year and on 15th March, 1946, the institute for mechanical engineering was inaugurated for its purpose. This day marks the first possibility for full studies of mechanical engineering on the University of Ljubljana.

The next decade can be marked as a period of incessant growth and strengthening of the department for mechanical engineering which passed through several forms of organization. With the beginning of the scholastic year 1960/61 finally the actual form was developed of an independent Faculty for Mechanical Engineering on the University of Ljubljana.

Miran OPREŠNIK, lecturer on Faculty for Mechanical engineering, Mech. eng.:

NEW IDEAS OF STUDIES OF MECHANICAL ENGINEERING

A hasty view back defines the last period as a period of incessant searching for more convenient working forms and of adapting these forms to the incessant increase of production possibilities and the associated improvement of the standard of life. For equal reasons, our society is devoting a still greater care to the development of schools. Similarly as other school types, also university studies entered a period of deep reorganizations.

The reorganization of university studies is being discussed already over a long period. All these discussions show clearly, that the development of production and the change in social relations inevitably demand for certain changes in the system of college studies. And even more: Several considerations point at the necessity of a thorough reorganization of professional schools.

Already on an inter-faculty meeting of delegates of all faculties for mechanical engineering of Yugoslavia in December, 1958 the opinion took shape that not all engineers do need the highest faculty education. We would need:

1) a great number of practically oriented engineers which would occupy key posts in our industrial undertakings particularly in the works for application of developed and introduced working processes and

2) a small number of theoretically deeply educated engineers for the introduction of new working processes for designing big machines and plants, for the technical management of great machine works and finally for pedagogical work on technical schools.

But those were not the first hints. For the solution of these problems hints were given also by single branches of the Society of Mechanical Engineers and Technicians. Thereby we should not forget the discussions of the VIIth Congress of the Association of Communists of Yugoslavia which emphasize the duty of our science to contribute as much as possible to the development of production. The reasons enumerated induced the study commission of the Faculty for Mechanical Engineering to take the decision regarding the reformation of studies of mechanical engineering already at the end of the scholastic year 1958/59. Let us give a brief survey thereupon:

1) The new study programme is divided into three stages. The complete faculty education of the first stage which lasts actually two years and is intended for all those which are talented practically will produce a great number of mechanical engineers capable of solving such general tasks which today are most pressing for our economy.

2) In the second stage, viz. in the following two years we shall obtain a reduced number of qualified engineers, thoroughly skilled in theoretical fundamentals which will resolve important technical tasks linked to a solid theoretical base.

3) The third stage, viz. the post-graduate study may last one or two years. This stage will produce a professional expert which will become very highly qualified in a given domain or it will serve as preparatory course for the degree of a doctor of science.

4) The studies in stages on the same scholastic institution will result in reduced financial expenses than in the case if a particular new school would be created for the first stage since the majority of laboratories and educational appliances would serve simultaneously all study stages. Moreover, a great number of students will finish the studies already after the first stage and that will result undoubtedly in great financial savings.

5) Since by this type of studies the education of an up-to-date engineer is entrusted to the most responsible institution, this will warrant also the quality of the teaching personnel, because the faculty lecturer must have according to law an inaugural dissertation acknowledged.

6) The inversed study programme will facilitate to our working people proved in practice, to improve further their professional knowledge. The former study programme with difficult theoretical subjects at the beginning of studies has not made it as easy to them.

7) The programme involves also the social-economical education the lack of which has been deeply felt in the always broader accomplishment of selfmanagement in our social life.

8) Since there will be less students in higher stages it will be more opportunity for individual work which will lead to a better quality of engineers qualified.

9) The new study programme is enough flexible and devised in the widest frames for eventual extensions or accommodations to momentuous or prospective study needs.

Of course, we must consider the circumstance that no school can educate a perfect expert. The school can give thorough fundamentals and a preparation, it can form the thinking (for engineers technical thinking is also important), but the man is finally formed by practice. Correctly conceived engineering vocations are indeed really much demanding because the conditions for them are: a critical and towards reality directed intelligence and a strong psychic constitution. The aptitude for quick and clear decisions as well as gladness and readiness for responsibility are of equal importance as a thorough analysis of problems. The aptitude for a right social insertion into the productive community, for a judicious obedience against superiors and more experienced, for collegial relations with equals and particularly cordiality and love for all those who are dependent on him and which he must in the best way lead to the fulfilment of tasks, those are the properties which cannot be missed by anyone who wishes to be an engineer. Those are mostly properties and aptitudes which cannot be learned at in the school but must at least essentially be inherent to man as the right moral capital for the vocation.

Albert STRUNA, full professor of the Faculty for Mechanical Engineering, Mech. eng.:

WHAT IS THE MATTER WITH EXTRAORDINARY STUDIES?

According to the general law upon faculties and universities and upon recommendation of the University Administration and the University Council, the Faculty for Mechanical Engineering on the University of Ljubljana has founded at first two so-called Centers for Extraordinary Studies in Koper and Goražde which were followed by a similar institution for Ljubljana and surroundings and the Center in Kranj.

It is comprehensible that the beginnings of extraordinary faculty studies with their numerous extraordinary facilities which are open particularly for the acquirement of engineering personnel for the industry, have provoked great attention and therefore it is not surprising that subsequently also other industrial domains were awakened.

The extraordinary studies received in the prescriptions of the law upon universities and faculties throughout new bases which stem from pressing needs of our development and progress with the aim to educate as quickly as possible the new technical staff acquired already from the practical work.

The extraordinary studies are by their quality and extent fully identical to ordinary studies on the faculty which of course does not mean that by this way they opened a fully general or perhaps even eased and shortened way to the engineer's title.

Studies of this kind are intended for technicians and experts in general which during long years have developed into good practitioners on a certain working post, but which miss a more widened theoretical and professional horizon for a better success in their work.

By extraordinary studies, the student attains after four semesters the final phase of the first-stage study programme with academic qualification. As the sole relief hereby a prolongation of the ordinary studies duration to twice the ordinary period may be allowed. But this studies period, double in time, can be even shortened if this is feasible because of talent and/or assiduity and of already shown performances of the student.

Regarding pecuniary resources for covering the expenses of extraordinary studies there are possibilities of most different arrangements, so e. g. an enterprise or an institution can take in hand the payment of fees for a student without obligation or conditionally i. e. according to his study results shown. Finally, the student can decide by himself to undergo extraordinary studies. In this case the student himself must take financial and temporal obligations.

Parallely with the first-stage and extraordinary faculty studies and the lecturing on

technical colleges it was necessary to approach the problem of a mutual pedagogical and professional help. The detailed agreement upon this matter concerns the exchange of directions for keeping the same professional and scientific level, the use of lecture books and other teaching aids and the concordance of technical terminology and not at last also a direct pedagogical help of lecturers with ordinary and extraordinary lectures.

The first beginnings of extraordinary studies have started a series of problems, some already touched at and even more there will outgrow yet in the subsequent development. We are convinced that it will be possible to adapt them anyway to the needs, but in their solution, in any case the main purpose should not remain in the background, viz. the acquisition of knowledge on an university stage.

Boleslav LIKAR, full profesor of Faculty for Mechanical Engineering, Mech. eng.:

NEW BUILDING OF FACULTY FOR MECHANICAL ENGINEERING

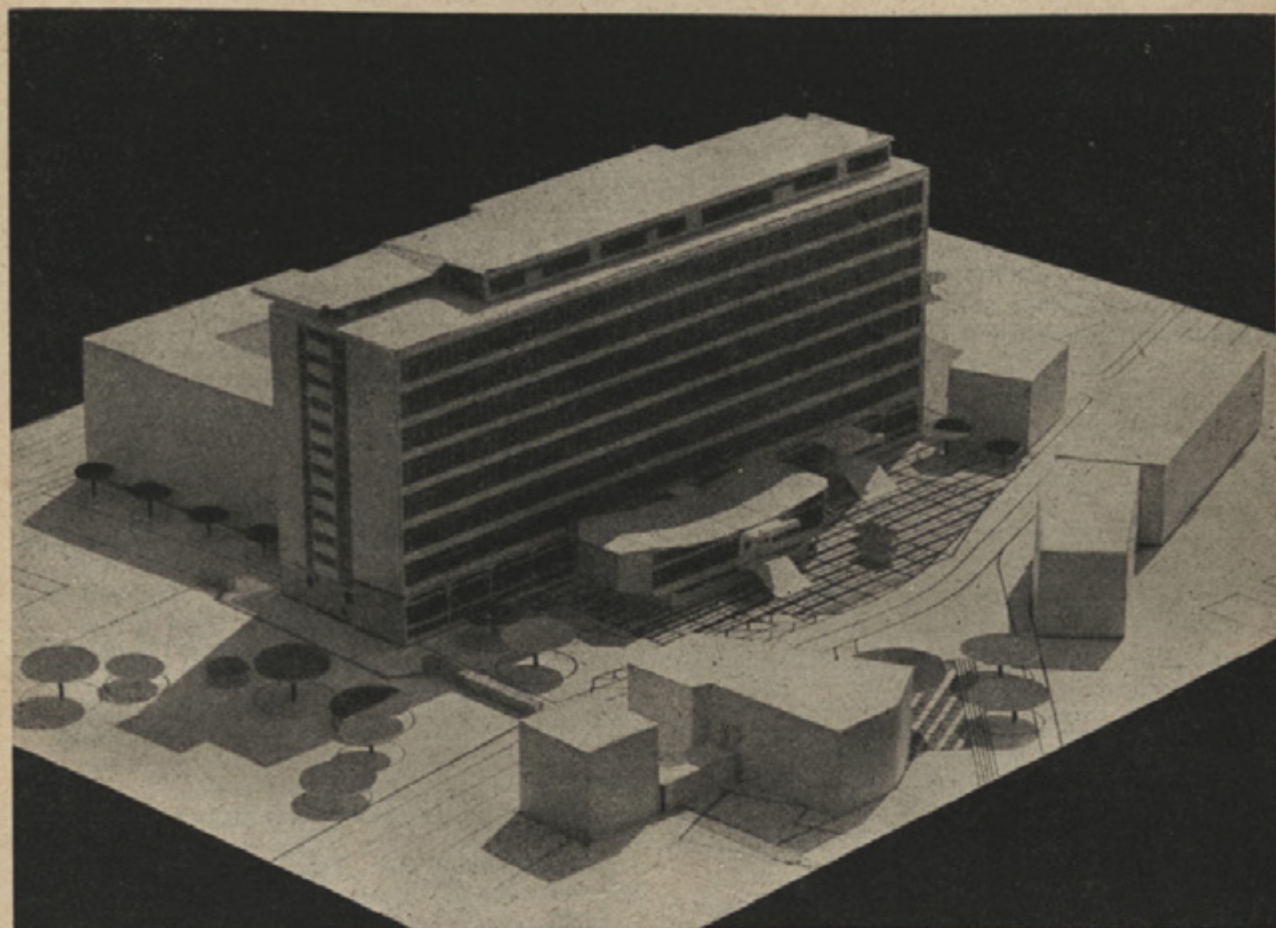
In the history of our faculty the past year was particularly important. In midsummer the faculty became independent, and in the past year also the action for building a new faculty building became a real touch because the building was embodied into the Five-year Plan for the erection of university buildings.

The need for a new faculty building became ardent because of the extraordinary development of mechanical engineering and the growth of mechanical industries, in the last time also because of new prescriptions for the matriculation of students to the university.

The actual building of the Institute for mechanical engineering has not enough space. The total surface of all three usable floors comprises 2550 m² (27500 sq. ft.) of which are used:

for pedagogical work (1 drawing room, 3 lecture rooms, library and reading room, rooms for exercises)	510 m ²
for cabinets (rooms for teachers and assistants)	404 m ²
for laboratories (mechanical technology and boilers and steam engines)	668 m ²
for offices	107 m ²
for auxiliary rooms (hall, stairway, corridors and sanitarries)	861 m ²

In order to be able to appreciate the value of these numbers it is necessary to know that this scholastic year there are 273 ordinary students in the Ist class, 187 in the IInd class, 185 in the IIIrd class and 119 in the IVth class, totalling 764 students, and moreover still 205 pre-graduates which work on final exercises, undergo examinations or work on their graduate work.



Model of New Building, Faculty for Mechanical Engineering, Ljubljana

The one drawing room which is in the building is occupied by seven courses of machine drawing and by design exercises for machine elements, which means that it is used by the first two classes only. The student is not entitled to work therein but in the time which is allotted for exercises by the study programme and thereafter he must leave immediately because another is waiting for his place. The students of both upper classes can make design exercises only at home, outside of the school, without temporary help of the teachers and the assistants. As well as the students make school exercises outside, so the pre-graduates work outside and visit the school only from time to time to consult, and take help from, the teachers.

No better is the situation with lecture rooms. The greatest comprises maximum 80 seats and therefore no one, of course, has room for all students even of the numerically least class. Many students cannot participate at lectures even if they would it do ardently.

Also the laboratories give not such facilities to the students as it would be desirable. The heat laboratory sure has a pretty nice collection of

machines but that is practically not more than a museum exhibition, because till now it was impossible to carry out final works on the boiler. Without steam, of course, the steam engines cannot run and the students cannot observe their operation. The situation of the technology laboratory is perhaps a little better. There are several even highly precise machines which are of a big help to students in doing their exercises and graduate works. These machines have also made it possible that so many specialists of technology have been educated on this school.

There are not enough teachers' cabinets. In some instances the teacher and the assistant occupy together one room. The dean has not his own office, but he must perform the dean's work in the secretary's office.

The actual building is too small for such a great faculty. As argument it suffices to quote that the surface available is only 2.6 m^2 (28 sq. ft.) per student whereas the Federal Government allows for University buildings 18 m^2 (194 sq. ft.) per student.

Comprehension of competent bodies and immense subsidies allotted by the society for the development of universities have contributed in ensuring also the construction of the new building for the Faculty for mechanical engineering.

The new building must chiefly provide enough room for students. Therefore it was our first concern to arrange lecture rooms. All lectures and all students can have their turn if the new building will contain two great lecture rooms, one with 250 to 300 seats and another with 150 to 180 seats. For lectures of the second stage with an essentially smaller number of students three lecture rooms in the actual building will suffice.

Furthermore the students need drawing rooms. The new building should be so arranged that each student has his own desk in the drawing room. There he can work all the time when there will be no lectures. Permanent help of assistants and other auxiliary teaching staff will ensure him quicker advance and thorough knowledge. Therefore we must provide in drawing rooms enough place for 1000 students indeed.

Not as easy as the decision upon lecture and drawing rooms was the decision in determining the space for laboratories. Potential possibilities were analyzed for any branch of our faculty separately and correspondingly the size and equipment of laboratories were determined.

Undoubtedly, the laboratory for mechanical technology and machine tools has grown to a high degree on this faculty. But this laboratory must be completed by other technology laboratories. Therefore priority in planning of organization, arrangement and equipment of the new faculty building was given to the technology institute which takes over almost the total existing building.

In the framework of our faculty the domain of heating holds the second place of importance. This domain needs laboratories too, viz. the laboratory for thermodynamics and heat engineering and the laboratory for steam boilers and machines. Till now, we did not have the first, yet the latter exists, but it comprises an incomplete boiler and therefore also the steam engines cannot run. The first quoted laboratory will be installed in the new building and the second will be increased. Particularly it must be mentioned, that the laboratory for steam boilers and engines has to be built all new. It will be enlarged inasmuch as to be worth of being arranged as a small district heating plant which will at last partly cover own needs for electric power and will produce the heat required for warming up all building groups of the two faculties.

Separately we have provided for special laboratories in which the students will learn to measure all quantities which appear in mechanical engineering and which can be measured at all.

But there are needed even more laboratories. We have foreseen new laboratories for machine elements and for friction and lubrication. There will be no complete laboratory for hydraulic machines, because such a laboratory is very well equipped in the Institute for turbo machines in the suburb Sentvid. We have found an appropriate room for testing pumps. The installation of a great automobile laboratory will facilitate testing of constructions and of newly designed parts and it will help the fastly growing automotive industry.

No separate laboratory is provided for the institute for hoists and steel constructions because its constructions, parts of derricks and steel structures will be tested in the laboratory for machine elements.

Together with the new building the following surface will be available for laboratories (approximately):

technology and machine tools	1,320 m ² (14,200 sq. ft.)
automobilism and internal-combustion motors	640 m ² (6,900 sq. ft.)
machine elements and theory of lubrication and friction	460 m ² (4,900 sq. ft.)
thermodynamics and heat engineering	490 m ² (5,300 sq. ft.)
steam engines, boilers, pumps, blowers	550 m ² (5,900 sq. ft.)
technical measurements	560 m ² (6,000 sq. ft.)

According to the now valid study programme the first two stages in the two departments will comprise precisely 100 branches of study with 292 hours weekly. We calculate that these lectures can be held by 39 lecturers who will have a total of 100 assistants and at least 30 to 40 demonstrators. For this personnel, the training-rooms and the administration we have foreseen rooms with a total surface area of 3567 m² gross (38,500 sq. ft.).

The Faculty for Mechanical Engineering will dispose with rooms:

in the existing building	2,550 m ² (27,500 sq. ft.)
in the new building	15,377 m ² (165,500 sq. ft.)
Total	17,927 m ² (193,000 sq. ft.)

At the work for the new establishment of the school we have only one fear: whether the new building will not become too soon too small for our needs with the rapidly growing development of mechanical engineering and of all industrial works and the lack of mechanical engineers thereby provoked.

(Translated by Branko Vajda)