

ROLE OF TECHNICAL UNIVERSITY, BUDAPEST IN THE DEVELOPMENT OF EDUCATION AND RESEARCH IN TEXTILE MECHANICS IN HUNGARY

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Summary

Since 1898, education of textile specialist engineers at the Technical University, Budapest has developed alongside, and in interaction with the industry. Education had been delivered first by the Department of Mechanical Technology, then, for over 30 years, by independent departments. Paralleling the post-war development of the Hungarian textile industry, the scientific and educational profile of the departments embraced all the textile and clothing industries, shouldered relevant research work, created an educational base for scientific cadres, published educational and postgraduate educational matter, as well as research results in books and papers in Hungarian and in foreign languages, and/or delivered lectures at conferences. Achievements of the staff have been rewarded by several distinctions, and acknowledged abroad.

Some data on the development of Hungarian textile industry

In 1977, 42% of the textile production all over the world come from socialist countries, 50% from developed capitalist countries, and 8% from developing countries [6]. In Hungary, textile industry belongs to light industries, a branch responsible for one fifth of industrial production, for 17 to 18% of the national income from socialist industry, for 12 to 13% of all the industrial export, and having engaged nearly 30% of all the industrial workers in 1978.

Within light industries, textile and textile clothing industry yields 47.5% of gross production value, 61% of exports, and in 1979 it has engaged 62% of the 458 thousand workers, technicians and employees [6].

By the time of the Austro-Hungarian Monarchy, textile industry developed but slowly, only boosted by Act III in 1907 forwarding the establishment of companies for the production of new or up to then imported amenities, motivated by essential interests of national economy.

The Act was effective in establishing new textile companies and in inducing existing ones to important developments. Nevertheless, in 1914, the Hungarian textile industry produced as little as some 100 million sq.m of cotton fabric, engaging about 46,600 persons [2].

In World War I, Hungary lost all but 15% of spindles and 40% of looms of her pre-war stock. The textile and textile clothing industries employed then about 17,000 persons, increased to 78,780 by 1938. Of the about 78 thousand textile workers in 1942, only 56,000 were left to 1946, 80% of the pre-war number.

After the liberation, the textile industry has abruptly developed. As seen in Fig. 1, the number of those engaged in the textile industry has grown by 1970

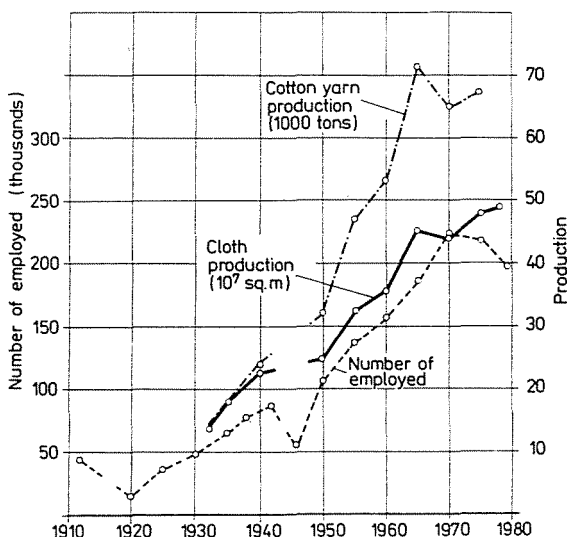


Fig. 1

to 2.08 times, the textile production to 2.18 times, and the cotton yarn production to 2.03 times that in 1950.

Up to 1965 or 1970, textile industry exhibited an extensive development. Reconstruction of the textile industry starting in the fourth Five-Year Plan involved the investment of some 25 milliard Forints to make it possible for the textile industry of great traditions to join the international niveau through technical-technological development, organization, and, of course, efficiency.

Undeniably, in this country, just as in other socialist countries, textile industry though underwent even development, that lagged, however, behind

that of industry as a whole. The actual trend of development is to import simpler goods, while letting products at high technical and mental niveau prevail in the product composition. By now, application of highly productive machines has become a rule, just as boosting of the efficiency of labour through up-to-date organization.

Reconstruction of the textile industry involved fast introduction of up-to-date machines and equipment, and of latest technology.

Technological updating resulted in aggregating 90% of all cotton spinneries from bale breakers to carders.

Cotton spinnery has got revolutionized by open-end (OE or BD) spinning technology. In 1970, Hungarian cotton industry only experimented with BD spinning. By 1978, about 30% of the gross yarn production has been made on 38 thousand BD spinner heads, 6% of all the end spindles.

Weaving mill development is decisively due to having installed new-system looms, increasing the labour efficiency to the 2 to 4 fold compared to traditional, shuttle looms, at an improved quality and increased ratio of more valuable pattern web. In spite of the leave of about 3900 weavers, from 1970 to 1978, the gross production of weaving mills has increased. In 1970, as few as 31.4% of all looms were up-to-date automatic looms without a shuttle, growing to 70% by 1978.

The range of products in the linen and hemp industry has been seriously affected by polyolefine processing equipment. Up-to-date package materials, cords are made from tapes extruded from polypropylene and polythene granules by weaving or knitting.

One third of the finishing equipment has been purchased in the recent eight years. The development contributed to increase the ratio of processed synthetics, at an increase of the technical, quality standard of the products.

Facilities due to reconstruction induced a significant work of product development. The new materials and processes provided the enterprises licenses to apply a number of trade marks (Diolen, Diolen Setura, Sanfor, Koratron, Permanent-Press, Nomex, etc.).

The process of technical renewal is not yet at its end. In spite of the completed developments, the technical standards of enterprises are far from being uniform. Besides of quite recent, or overall updated mills and factories, there are a number of outdated, obsolete equipment for preparing and finishing processes. For the economical operation of up-to-date equipment and technologies, the up-to-date production organizations could not be introduced everywhere, and there is much reserve in product development such as to make best use of recent technical facilities and of market demands at home and abroad.

Relations between the textile industry and the higher engineering education

1782 to 1850, engineering education in Hungary was offered by the Institutum Geometrico-Hydrotechnicum, fused at that time with Joseph Industrial School (secondary), founded 1846, promoted by royal decree to a high school named K. K. Joseph Polytechnicum in 1856, and granting the standing of a university in 1871, named Palatine Joseph Technical University.

As concerns theoretical knowledge imparted, the curriculum of the Faculty of Mechanical Engineering at the Palatine Joseph Technical University matched the world niveau by that time, but the practical subject matters of special subjects lagged much behind those offered by better equipped pilot plants at foreign universities and high schools. Besides, the small range of the Hungarian manufacturing industry induced the Technical University to deliver up-to-date fundamentals mainly for the design and operation of thermal, refrigerating, hydraulic, hoisting machinery and electromotors, fundamentals enabling graduate mechanical engineers to become eminent experts of their specialities after some years of practice [2].

Since 1898, the subject "Spinning and Weaving of Fibrous Materials" had been made mandatory for all students in mechanical engineering, then, initiated by Professor Sándor Rejtő, 1890 to 1924 professor of mechanical technology, practical training was offered in the weaving workshop established at the Institute of Mechanical Technology in 1909, a subject matter to be incorporated in lessons on "Metal and Wood Cutting" after 1921/22 [3].

In 1929, three specializations had been established at the Faculty of Mechanical Engineering, each devoting 2+1 lessons to the subject "Knowledge of Materials and Wares", while specialization C spent 4+1 lessons on textile technology a week.

After the liberation, the Technical University underwent fundamental changes. A State Technical High School was established, and independent textile specializations created both there and at the Faculty of Mechanical Engineering. In 1949, the Department of Textile Technology, headed by Márton Zilahi, has been founded to lecture on Textile Raw Materials, Weaving Technology and Fabric Design, and in 1951, the Department of Textile Technology II, headed by Alajos Vékássy, to lecture on knitwear and ready-made clothing.

After 1951, there was no enrollment at the State Technical High School, training of mechanical engineers was made at evening and correspondence courses.

In 1960, the Department of Textile Technology merged with the Department of Light Industries headed by Kornél Kunos, then, in that same year, Department of Textile Technology II merged to give rise to the Department of Textile Technology and Light Industries, headed by Alajos Vékássy until 1974.

The curriculum of the independent specialization of textile underwent reforms in 1950 and 1963 — just as did other specializations, — while in 1974, updating the education involved the change of the specialization of machine construction to section of light industrial engineering.

Figure 2 is a diagram of numbers of mechanical engineers in the specialization of textile, and in the section of light industrial engineering having graduated from regular and evening courses, and the total number.

During the recent 32 years, a total of 1071 mechanical engineers, textile and light industrial engineering specialists are seen to have been graduated from the Technical University, Budapest.

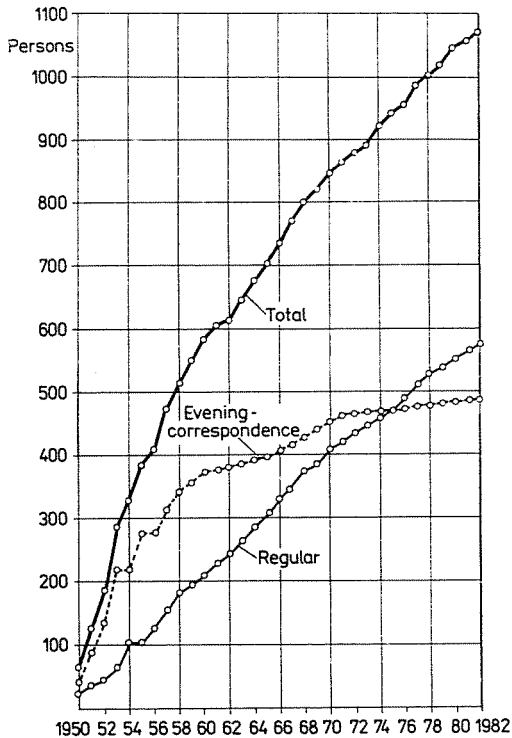


Fig. 2

The aim of specialist education has been to create forms of postgraduate education coping with the trends of industrial development, perspective, reckoning with likely trends of development at home and abroad, realized, in addition to systematic courses at the Institute of Postgraduate Engineering Education, by means of two-year specialist engineering courses. Special engineering courses have been organized in 1966 and in 1972 in spinning-weaving, and in knitting ready-made clothing, respectively, while in the years to come, a sub-sectional specialist engineering course in "Textile Production Planning" is being considered.

**Development of the education in textile within the frame
of mechanical engineering education.
Effect of education on the scientific development
of the textile industry**

Education in textiles at the Technical University, Budapest has always been strictly related to the science of textiles, to the industry, to industrial development and to the professional public life. Professor Sándor Rejtő, conferee of the first diploma in mechanical engineering issued by the Technical University in 1877, did pioneering work in this field by changing the descriptiveness of the subject matter of textile technology within the subject "Mechanical Technology" for theory of technology ("theoretical or pragmatic technology"). This innovation and his experiments had been fundamental for the science of textile technology. For three decades, the book by Rejtő on textile technologies had been an everyday manual for textile technologists and scholars [8].

During World War I, the Society of Hungarian Textile Technologists has been founded, first presided by Prof. Sándor Rejtő, followed by Prof. Vilmos Misángyi, then in 1934 by Győző Dischka, former co-worker of Prof. Rejtő.

For over two decades, the Society of Hungarian Textile Technologists kept its members informed on the technology and machinery development of this speciality, besides of being an organ for safeguarding the interests of its members. The Society held its meetings at the Technical University, in Rejtő's Institute of Materials Structure.

Also the co-workers of Rejtő contributed to the development of textile sciences in Hungary. As early as in 1911, the newly established Central Experimenting and Materials Testing Institute comprised a textile section led by Győző Dischka, co-worker of Rejtő. This Institute was the predecessor of the Institute of Technology and Materials Testing established in 1921,

predecessor, in turn, of the Institute for Quality Testing of the Textile Industry, founded in 1952.

The pioneering activity of Prof. Rejtő, development of scientific fundamentals and testing methods of textile technology, had been continued by Márton Zilahi, with lasting achievements in the fields of textile raw materials, materials testing, and theory of spinning. The books he authored are actually everyday aids for mechanical engineers, researchers and plant technicians.

Also Zilahi's achievements in sciences and in professional public life are worth of mention. He was chairman of the Technical and Scientific Society for the Textile Industry founded in 1948; he launched a postgraduate degree system in the textile industry aimed at educating scientific-minded, young specialists able to do up-to-date, high-niveau independent scientific research work and to the practical application of its results. Zilahi held important functions in the Chief Commission of Light Industries of the Hungarian Academy of Sciences, then in the Committee of Yarn and Fibre Technology. His activities were rewarded by the Kossuth-prize.

Education of engineers and of scientific cadres at the Technical University has been responsible for the establishment of the Textile Research Institute on January 1st, 1950; several of its scientific board members have been members of the staff of this Department.

The post-war development of the Hungarian textile industry was paralleled by that of research on materials testing and textile physics, striving, in particular, towards developing, improving and internationally standardizing up-to-date testing methods, measurements and instruments. Achievements contributed to the appointment of Hungary as leader and coordinator of activities to develop measurement methods for the textile industry at the 1960 COMECON meeting in Berlin.

Under the guidance of Prof. Alajos Vékássy, the earlier scientific and educational activity of the Department of Textile Technology and Light Industries has tended towards knitting and ready-made clothing. The scientific and authoring activity by Prof. Vékássy is landmarked by his "Knitting and Ready-Made Clothing Industries", pioneering in its field, manual for specialist research workers and engineers.

Since 1974, our duties to update education brought about important changes in the profile of the Department of Textile Technology and Light Industries. The changed conditions induced this Department to strive to educational and research achievements in our speciality, competitive to those at other mechanical engineering departments. Therefore the staff of this Department has been completed with representants of respective fields — leaving the former staff of national fame and authority unaltered. This measure

has contributed to the formation and reinforcement of the new, interdisciplinary range of the Department, contributing to the acknowledgement by the industry of its research results involving new scientific methods, at the same time, introduction of research results, metrology, computerization and microelectronics raised the education niveau.

Features of the activity of the Department of Textile Technology and Light Industries

Since its establishment, this Department applied for ten patents relying on scientific research results, such as:

- Procedure for the acetylation of cotton yarns to produce insulating yarns.
- Procedure for the manufacture of filtering fabrics of a different web.
- Cloth governor.
- Method and device for the analysis of rheological properties of visco-elastic materials.
- Bursting fatigue tester for knitwear.
- Method and equipment for the determination and/or control of optimum (combined) velocity of one or more machines.
- Method and equipment for sensing the state processes of textile machines.
- Weaving method and special loom.
- Method and equipment for producing multilayer hoses of infinite length.
- Direct and indirect computer method and equipment for ornamenting woven or other cloth, and for the pattern control of looms.

Five Hungarian and two foreign fellowship holders had been working for their postgraduate degrees at this Department, and so had been three by correspondence. Candidate for Techn. Sci. degrees have been awarded to seven, and Dr. Techn. Sci. degrees to three teachers of this Department for theses elaborated in self-contained education. Doctor Techn. degrees were conferred on three textile specialists before the liberation, and on ten ones thereafter.

One member of the Department staff is member of EUQC (European Union of Quality Control), and two are members of IFKT (International Federation of Knitwear Technicians). Department staff members are holders of two Kossuth-prizes (divided), two Orders of Labour (silver class), two Orders of Labour, one Medal for Socialist Culture, thirteen are Eminent Workers of Light Industry, two are Eminent Workers of Education, three are holders of Medals for the Development of Textile Industry, one for his activity within the Society, and one is Eminent Worker of Foreign Trade.

The Department staff participates in the professional public life. Several take functions of section chairman, secretary or board member of the Technical and Scientific Society for the Textile Industry.

There is also a wide-range publication activity at the Department. Its essentials have been tabulated as follows.

Publications by the Staff of the Department of Textile Technology and Light Industry

Publication	1952	1962	1966	1971	1975	Total
	to 1961	to 1965	to 1970	to 1975	to 1981	
Books, textbooks	66	13	7	—	8	94
Papers in periodicals in Hung.	53	47	52	31	76	259
Papers in periodicals in a foreign language	17	30	16	20	25	98
Lectures at conferences	no data	17	8	10	12	

The over nine decades of educational, research and development work at the Department of Textile Technology and Light Industries have always been in a strict unity. Also at present, we are striving to point out, via our activity, the fineness of the engineering profession as concerns both scientific activity and production and technical-economical development.

References

1. BAKOS, Zs.: Main Targets of the Development of Research on Textile and Clothing Industries.* *M. Textiltechnika*, 28, 113 (1975)
2. DISCHKA, Gy.: Sixty Years in the Service of Hungarian Textile Industry.* *M. Textiltechnika*, 28, 133; 173 (1975)
3. ZELOVICH, K.: The Hung. Roy. Joseph Technical University, and History of the Hungarian Technical Development.* *Pátria*, Budapest, 1922.
4. DENTON, M. I.—TOWAENCL, P. P.: The Yarn Revolution. The Textile Institute and Industry, No. 9, 252 (1976)
5. ENDREI, W.: Hungarian Textile Manufactures in the 18th Century.* Budapest, Akadémiai Kiadó, 1969.
6. VÁMOS, Gy.: The Light Industries. Technical-Economical Fundamentals.* Budapest, Műszaki Könyvkiadó, 1981.
7. Data Bank for the Light Industries.* Central Statistical Office, Budapest, 1978.
8. DISCHKA, Gy.—ZORKÓCZY, B.: Our Great Technicians.* 5. Scientific Society for Machines, Budapest, 1981.

* In Hungarian.

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