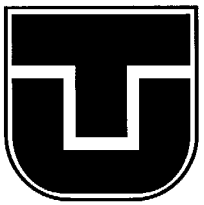
Technical University of Košice, Slovakia
Faculty of Electrical Engineering and Informatics



Annual Report

1994

Department of Electrical Drives

This brochure gives an overview of activities of the Department of Electrical Drives with special attention to the current year 1994. It contains the basic information about structure of department, its position within the faculty and university, information about under- and postgraduate courses in the new academic year 1994/95. It outlines research activities and projects with industry, gives list of publications and more information about the staff members - teachers, research workers, and postgraduates, information about scientific and other events organized by the Department during year 1994.

The description is necessarily brief and further information can be obtained by contacting either the department or the person concerned.

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Introduction

Electrical drive presents a complex electro-mechanical system serving for energy conversion. It is aimed to fulfill required working conditions in the technological process. Its application area is very wide from small drives for printers to drives of large ratings for hot strip mills. To design the drive, it is necessary to have knowledge not only about electrical machines, but also from microelectronics and power electronics, control theory, computer techniques, and, of course, to know peculiarities of the controlled technological process. At present also other applications of power electronics find their reflections in every-day life.

The staff of the department is capable to solve all tasks concerning optimal design of electrical machines, power converters, drives, and control systems of the technological processes.

1. General Information

The Technical University of Košice (TUKE) was established in 1952 to serve the needs of Eastern Slovakia for education and research in technical fields. The University is a publicly supported institution. At presents the total number of students of the university amounts to about 6600. The TUKE consists of seven faculties:

Faculty of Mining, Ecology, Control, and Geotechnology Engineering
Faculty of Metallurgical Engineering
Faculty of Mechanical Engineering
Faculty of Electrical Engineering and Informatics
Faculty of Civil Engineering
Faculty of Specialized Studies (in Prešov)
Faculty of Economics

The Faculty of Electrical Engineering and Informatics - FEI (new title since April 1994 for former Faculty of Electrical Engineering - FEE) was founded in 1969 and in this year it celebrated the 25th anniversary of its foundation. During this time more than 5500 graduates successfully finished their study and left the faculty. Currently there are about 1700 undergraduate and 111 postgraduate students; some of them are from abroad. Teaching is provided by the staff of 10 Full Professors, 51 Associate Professors, 140 Assistant Professors, and 20 researchers.

The FEI offers a full university education in five-years courses. After finishing two years of study filled by basic general subjects and main subjects from electrical engineering, in subsequent years the students can select their own specialization. At the end of the engineering courses, students defend graduate theses (diploma works). The FEI offers also other types of education, above all the Bachelor of Science degree in three-years courses and postgraduate education in four-years courses.

2. About the Department of Electrical Drives

The Department of Electrical Drives (abbr. the Department in following text) is one of the 10 departments of the FEI and it is the largest department within the Faculty. The Department was established simultaneously with the faculty foundation in 1969 by transformation from the original Department of General Electrical Engineering which was founded among the first departments of the

TUKE in 1953. In that time it belonged to the Faculty of Mechanical Engineering. Since the beginning, Prof. František Poliak was appointed on the Chair of Department (till 1979). He also devoted much effort for foundation of the Faculty of Electrical Engineering where he also acted as the first dean (1969-1972).

The Department of Electrical Drives is responsible for education in the field of Electrical Engineering. The main aim is to prepare students for their career in industry and for research. The Department offers Bachelor of Science degree (Bc.), Master of Science (Ing.) and Doctoral (Dr.) degrees. Since the FEE foundation in 1969, in total 1237 students finished their graduates' theses (diploma works) at the Department and successfully graduated (yearly approximately of 50 - 80 graduates). In the eighties, two longer postgraduate courses in duration of four semesters and several other short courses led by the Department were organized for staff from industry. It is intended to continue in this tradition in following years on a qualitative new level.

The students are studying at the Department since the third year of their study. In 1994/95 academic year there are 38 students in the third year, 42 in the fourth and 59 students in the fifth year of study. Due to recession in industry, number of students has temporarily decreased in last years. The education is supported by modern teaching methods and laboratory equipment. Special attention is devoted to application of information technologies in control of power converters, electrical drives and industrial plants. Various CAD systems for design of electronic and power electronic circuits, electrical machines and control systems are utilized in the education process.

The Department offers also postgraduate education. Since its establishment, 31 postgraduates have defended successfully their dissertations and were awarded by the CSc. degree (equivalent of Ph.D. degree). Total number of the supervisors within the Department, who are specialized in different fields of electrical engineering, is 12. The present number of full- and part-time Ph.D. students is 12 who are supervised by 8 staff members. Five other teachers and one researcher from industry (not involved in the previous number of doctorate students) are writing and finishing their dissertation.

The research carried out at the Department of Electrical Drives, covers a broad field of interest. It is concentrated on CAD of electrical machines and apparatus, controlled electrical drives, power electronics converters with improved dynamic properties, applications of the latest knowledge of control theory to the control of complex drive systems (multi-motor drives of manufacturing lines, control of

industrial plants, drives of robots and manipulators) based on microcomputer implementation of control algorithms and their hardware realization.

The Department of Electrical Drives has many contacts with industrial enterprises in Slovakia and with universities abroad. The details of all presented activities are given below.

3. Structure of the Department

At present the total number of staff members is 44; among them 33 full academic staff, 4 researchers and 7 supporting and technical staff. Internally the department is divided into 5 divisions:

1. Division of Electrical Drives
2. Division of Power Electronics
3. Division of Electrical Machines and Apparatus
4. Division of Automation of Electrical Equipment
5. Division of General Electrical Engineering

Personnel

Head of the department:
Assoc.Prof. Jozef Fedor Ph.D.

1. Division of Electrical Drives

Head:	Prof. Ladislav Zboray Ph.D.
Members:	Prof. Jaroslav Timko Ph.D.
	Assoc.Prof. Ján Fetyko Ph.D.
	Assoc.Prof. Jaroslav Tomko Ph.D.
	Assist.Prof. František Ďurovský Ph.D.
	Assist.Prof. Marcela Halušková Ph.D.
	Róbert Šándor - research worker
	Peter Košč Ph.D. - research worker

2. Division of Power Electronics

Head:	Assoc.Prof. Jozef Ondera Ph.D.
Members:	Assoc.Prof. Imrich Pokorný Ph.D.
	Assoc.Prof. Juraj Oetter Ph.D.
	Assoc.Prof. Jaroslav Dudrík Ph.D.

Assoc.Prof. Irena Kováčová Ph.D.
Jaroslav Kinlovič
Peter Višnyi Ph.D. - research worker
Rastislav Uhrín - Ph.D. student
Pavel Pokrivčák - Ph.D. student

3. Division of Electrical Machines and Apparatus

Head: Assoc.Prof. Michal Kostelný Ph.D.
Members: Assoc.Prof. Jozef Fedor Ph.D.
Assist.Prof. Želmíra Ferková Ph.D.
Assist.Prof. Bartolomej Fedor Ph.D.
Assist.Prof. Pavol Struckel
Assist.Prof. Ján Kaňuch
Miroslav Tvrdoň - Ph.D. student
Vladimír Kolcun - Ph.D. student

4. Division of Automation of Electrical Equipment

Head: Assoc.Prof. Pavol Fedor Ph.D.
Members: Assoc.Prof. Viliam Fedák Ph.D.
Assoc.Prof. Michal Girman Ph.D.
Assist.Prof. Juraj Haluška Ph.D.
Assist.Prof. Stanislav Fedor
Assist.Prof. Daniela Perduková
Assist.Prof. Peter Bober Ph.D.
Rastislav Harčarufka - research worker
Do Quoc Vu - Ph.D. student
Ján Skonc - Ph.D. student
Marcel Polák - Ph.D. student

5. Division of General Electrical Enginnering

Head: Assist.Prof. Stanislav Kovalčin Ph.D.
Members: Assist.Prof. Juraj Németh
Assist.Prof. Eva Dobošová
Assist.Prof. Dionýz Milly Ph.D.
Assist.Prof. Vladislav Maxim
Assist.Prof. Jaroslava Žilková

Note: This division is responsible for teaching of subjects from electrical engineering on other faculties within the Technical University.

Supported staff:
Katarína Gočová - technician
Veronika Majerníková - secretary
Viera Svetozárovová - technician
Anton Nagy - technician
Vasil Graban - technician
Gabriela Brečková - technician
Maroš Ondrej - technician

4. Educational Activities

The Department of Electrical Drives is responsible for education in the field of electrical engineering. It offers two types of undergraduate courses leading to. Bachelor degree (Bc.) and Master's one (Ing.) and postgraduate course leading to the Dr. degree.

4.1 Bachelor's Degree (Bc.) Undergraduate Course

The Electrical Engineering Course for Bachelor's (Bc.) degree, offered by the Department of Electrical Drives, arose during solution of the TEMPUS Joint European Project No 2177. The Bc. course offers a wider specialization (including business and management) with the aim to educate the students for industrial requirements. The course is already prepared although in academic year 1994/95 it has not started due to missing legislation for the Bc. graduates employment. In the following, the short characteristic of the course is presented.

The general education aims of the course are:

a) to give the students a wide basis in electrical engineering, power electronics and electrical drives,
b) to develop the students' practical skills in application and in failure diagnostic, mainly with power semiconductor converters, motors and control systems of the drives,
c) to make the students familiar with the latest trends in electrical drive components and drive systems,
d) to provide the students by knowledge about computer techniques so that they would be able to solve tasks using the CAD and CAM systems,
e) to provide students with adequate knowledge of economics and business, so that they can also find application in industry as managers,

f) to develop their ability to design circuits and systems with regard to the technological and economic requirements of the equipment,
g) to give to students adequate knowledge of the theoretical basis (mathematics, physics, theoretical electrotechnology) and of other fields of the electrical engineering, so that the graduate will be adaptable to industrial requirements,
h) to encourage students to selfstudy and necessity for whole-life education,
i) to stress the language preparation enabling the mobility flow of undergraduates to cooperating EC institutions within the framework of mutual exchanges and common projects.

Into the academic year, the two practices, called engineering applications (EA), are involved:

EA I. in duration of four weeks in the first academic year where students work at the department,

EA II. lasting six weeks in the second academic year (3 weeks at the department + 3 weeks in industry).

Their aim is to develop the students' practical skills and to prepare them for solving individual final project.

Course Program and Assessment Schedule

First Year

Duration: 14 + 14 weeks + 4 weeks EA I

Subject	1st Sem. Lect/Lab	2nd Sem. Lect/Lab	Hours total
Fundamentals of the Electrical Engineering	2/1 ex		42
Mathematics I., II.	4/4 ex	3/3 ex	196
Computers and Programming	2/2 ex	0/2 ca	84
Technical Documentation	2/2 ca		56
El. Engineering and Measurement I., II.	3/3 ex	3/3 ex	168
Electronics		4/3 ex	98
Physics		2/2 ex	56
Total:	13/12	12/13	700
Hours per week:	25	25	
Number of examinations:	4	4	
Foreign Languages:	0/2 ca	0/2 ca	
EA I. in duration of		4 weeks	

Abbreviations: ex = exam, ca = continuing assessment

Second Year

Duration: 14 + 14 weeks + 6 weeks EA II

Subject Lect/Lab	3rd Sem. Lect/Lab	4th Sem. total	Hours
Economics	0/2 ca	0/2 ca	56
El. Machines and Apparatus I., II.	4/3 ex	3/3	182
Power Electronics I., II.	3/4 ex	2/3 ex	168
Microprocessor Techniques	2/2 ex		56
Computers in Electrical Engineering I., II.	2/4 ex	2/3 ex	154
Electrical Drives	-	4/4 ex	112
Total:	11/15	11/15	728
Hours per week:	26	26	
Number of examinations:	4	4	
EA II. in duration of		6 weeks	

Third Year

Duration: 14 + 14 weeks

Option	Subject	5th Sem. Lect/Lab	6th Sem. Lect/Lab	Hours total
	Business and Management Studies	0/2 ca	0/2 ex	56
	Power Engineering I., II.	2/2 ex	3/1 ex	112
	Project	0/7 ca		98
* *A*	Automatic Control Drives I., II.	3/3 ex	3/4 ex	182
* *B*	Power Semiconduct. Systems I., II.	3/3 ex	3/4 ex	182
* *C*	Electrical Drives Design	2/2 ex		56
* *C*	Industrial Drives	2/2 ex		56
* *C*	Control Systems	2/2 ex		56
* *C*	Robots and Manipulators	2/2 ex		56
* *C*	Control of Quality and Reliability	2/2 ex		56
Total:		9/11	6/14	560
Hours per week:		20	20	
Number of examinations:		4	3	

*) Optional Subjects: Students choose one subject from *A*, *B* and two subjects from group *C*.

4.2 Master's Degree (Ing.) Undergraduate Course

The course covers five years of study. In the first two years of study a wide basic knowledge of engineering is given to students at other departments of faculty and university. Students are specialized according to their interest since the third year of study when they are taught under the supervision of the department. The specialized line of study is given by choice of optional subjects. The students may choose one of four specialized lines of study at the department:

1. Electrical Drives
2. Power Electronics
3. Electrical Machines and Apparatus
4. Automation of Electrical Equipment

Note: The presented structure of subjects will be changed during academic year 1994/95 together with the introduction of the credit system in 1995/96.

1. Electrical Drives

Students are prepared for the design and operation of electrical drives used for the drive of various working machines and mechanisms. During the study period the students are made acquainted with a knowledge of power and control electronics and computer techniques.

2. Power Electronics

Beside the basic subjects the students are prepared for analysis, modeling, design, construction, and control of power semiconductor converters.

3. Electrical Machines and Apparatus

Within the framework of this branch of study the students are taught theory, design, technology, and construction of electrical machines and apparatus using computer - aided design methods.

4. Automation of Electrical Equipment

The stress is focused on the subjects concerning electronics, control theory, computer technique, control and regulation of motion systems and technological lines, and design of control system, both from the HW and SW points of view.

Subjects Taught by the Department in 1994/95 Academic Year

Specialization: *A*) Electrical Drives, *B*) Power Electronics, *C*) Electrical Machines and Apparatus, *D*) Automation of Electrical .Equipments

Third Year

Duration: 14 + 14 weeks

Option	Subject	5th Sem. Lect/Lab	6th Sem. Lect/Lab	Lecturer
	Electronics	4/3 ex		Oetter
* *ABC*	Electrical Machines I.	4/3 ex		Kostelný
* *D*	Individual Project	0/3 ca		-
* *D*	Logic Control of Electrical Drives	2/2 ex		Girman
	Applied Electronics		2/2 ex	Haluška
	Power Electronics		3/3 ex	Dudrík
* *ABC*	Electrical Machines II.		3/3 ex	Kostelný
* *ABC*	Computers in Electrical Engineering		2/3 ex	Girman
* *D*	Electrical Machines for Automation		3/3 ex	Kostelný
* *D*	Microelectronics		3/3 ex	Haluška
**	Control Systems Software		2/2 ex	Girman
**	Modeling and Measurement of Control Circuits		1/3 ex	Kováčová

* *ABCD* Students choose subjects *A*, *B*, *C*, or *D* according to the specialization
** Students choose one from the compulsory optional subjects

Fourth Year

Duration: 14 + 14 weeks

Option	Subject	7th Sem. Lect/Lab	8th Sem. Lect/Lab	Lecturer
	Electrical Drives	4/4 ex		Timko
* *ABC*	Electrical Apparatus	3/3 ex		Fedor J.
* *ABC*	Power Electronics Laboratory Practice	0/2 ca		
* *A*	Methods of Computer Aided Design	2/4 ex		Kostelný, Struckel
* *B*	Control Electronics	3/3 ex		Oetter
* *CD*	State Control of Electrical Drives	3/3 ex		Zboray
* *D*	Control System Design	3/4 ex		Haluška
* *D*	Modeling of Drive Systems	2/2 ex		Fedor P.
	Individual Project		0/2 ca	-
* *A*	Electrical Machines Design I.		4/2 ex	Kostelný
* *A*	Electrical Apparatus Design		4/3 ex	Fedor J.
*B	Power Semiconductor Converters I.		3/3 ex	Ondera

* *B*	Variable Speed Drives for Automation	4/3 ex	Tomko
* *C*	Electrical Drives Design	3/3 ex	Pokorný
* *CD*	Variable Speed Drives	4/3 ex	Zboray
* *D*	Production Systems Identification	2/3 ex	Fedák
* *D*	Controlling Elements of Electrical Drives	2/2 ex	Fedor P.
**	Modeling of Converters	2/2 ex	Kováčová
**	Computer Aided Design	0/4 ex	Fedor S.
**	Controlling Electronic Circuits	0/4 ex	Fedor S.

Fifth Year

Duration: 14 + 10 weeks

Option	Subject	9th Sem. Lect/Lab	10th Sem. Lect/Lab	Lecturer
	Master Thesis Seminar	0/3 ca		-
* *A*	Electrical Machines Design II.	3/3 ex		Kostelný,Struckel
* *A*	Special El. Machines and Apparatus	3/1 ex		Kostelný, Fedor J.
* *B*	Power Semiconductor Converters II.	2/3 ex		Ondera
* *B*	Semiconductor Converters Design	3/4 ex		Pokorný
* *CD*	Complex Drive Systems Control	3/3 ex		Fedák
* *CD*	Control of Robots and Manipulators	3/2 ex		Fetyko
* *D*	Control Systems of Technological Plants	2/3 ex		Girman
**	Industrial Drives	2/2 ex		Tomko, Fetyko
**	Technology of Electrical Equipment	2/2 ex		Fedor S.
**	Microcomputer Control of Converters	2/2 ex		Višnyi
	Master Thesis (Diploma Work)		x	

The Department of Electrical Drives ensures the teaching of specialized subjects in other lines of study within the FEI and it is also responsible for teaching of subjects dealing with electrical engineering fundamentals at other faculties of the TUKE.

4.3 Doctor's Degree (Dr.) Postgraduate Course

Students with a Master's Degree can apply for a postgraduate course lasting four years. The postgraduate program is divided into two parts. In the first two years, deep knowledge of the branch followed is given. The work in the third and fourth year of study is concentrated on research. The course is finished by defense of the dissertation.

Course Program and Assessment Schedule in 1994/95 Academic Year

First Year

Specialization: Electrical Drives, Power Electronics, Electrical Machines and Apparatus

Subject	Hours per year		Lecturer
Mathematics	90	ex	Moravský,
* Mathematics	60	ex	Pirč, Petruška
* Physics of Magnetic Phenomena	30	ex	Zagyi, Ziman
Theoretical Basis of the Specialization	60	ex	supervisor
Foreign Language I.	30	ex	
Foreign Language II.	60	ca	
Total:	210 hours		
Number of examinations:	3 (4*)		

* for Electrical Machines and Apparatus specialization only

Second Year

Subject	Hours per year		Lecturer
Subject of Specialization	30	ex	supervisor
* Electrical Machines and Apparatus	30	ex	Kostelný, Fedor J.
* Power Electronics	30	ex	Pokorný, Dudrík
* Computers Application in El.Engineering	30	ex	Girman, Višnyi, Haluška
* Controlled Drives	30	ex	Zboray, Tomko
* Complex Drive Systems Control	30	ex	Fedák
* Servomechanisms in Robotics	30	ex	Fetyko
* Electronics	30	ex	Oetter, Haluška
* Control Theory	30	ex	Krokavec D.
Foreign Language II. (individual preparation)			
Total:	120 hours		
Number of examinations:	5		

* Students choose three from optional subjects based on the supervisor recommendation and according to the theme of thesis.

5. Research projects

Scientific research is carried out in collaboration with national authorities and industry. The research covers all branches followed by the department:

- *Power Electronics*, dealing with the control and transformation of electrical energy from an available form into a required form,
- *Electrical Machines*: both their design using CAD systems and applications in conjunction with power electronic converters ,
- *Electrical Drives*: various control structures with the specialization to state-space control applications,
- *Control of Complex Systems* with the main stress to control the technological processes by electrical drives and power electronic converters applications.

Following current research projects are carried out at the Department of Electrical Drives (projects with industry are described in the end of this brochure):

1. State Control Design of Electrical Drives.
2. Progressive Control of AC Electrical Drives Fed by Power Semiconductor Frequency Converters.
3. Software and Hardware Development of Distributed Control Systems for Multi-Motor Drives and Drive Complexes.
4. Special Electrical Drives of Low Power Ratings.

1. State Control Design of Electrical Drives

Supported by Ministry of Education, Grant No 9413 of the A category.
Leader: Ladislav Zboray
Members: Jaroslav Tomko, Ján Fetyko, František Ďurovský, Juraj Németh, Róbert Šándor, Peter Košč (since 1/9/94)

Research activity of the group is concentrated on:

- State-space control design for nonlinear systems
- Nonlinear observer design for DC and AC drives
- Control of the two-mass drive system with elastic coupling
- State-space control of robot servosystems

Results achieved in 1994:

- Realization of state control for synchronous motor with permanent magnet
- State control design for synchronous motor with salient poles
- Adaptation of the singular perturbation method for cascade control structure
- Sensitivity analysis of a nonlinear observer
- Nonlinear state control of a DC motor with separate excitation
- Program debugging for drive controllers by means of a transputer
- Control design for a vibration mill
- State tension control

Publications (see section 6. "Publications in 1994"):
[J1], [J2], [C1], [C2], [C3], [C4], [C5], [C6], [C28], [C29], [O2].

2. Progressive Control of AC Electrical Drives Fed by Power Semiconductor Frequency Converters

Supported by Ministry of Education, Grant No 9409 of the B category.
Leader: Jaroslav Timko
Members: Jozef Ondera, Imrich Pokorný, Eva Dobošová, Jaroslav Dudrík, Irena Kováčová, Stanislav Kovalčin, Peter Višnyi, Dobroslav Kováč (33 % involverment)
Ph.D. students: Rastislav Uhrín, Jaroslav Kinlovič

Research activity of the group is focused on:

- Research and development of frequency converters with switched-off power semiconductor devices (bipolar transistors, MOSFETs, IGBTs and GTO thyristors)
- New control structures of AC drives
- Development and construction of laboratory prototypes of power frequency converters
- Realization of laboratory prototypes of control circuits of AC drives

Results achieved in 1994:

- Research of frequency converters with MOSFETs was finished

- Digitally controlled drive with asynchronous motor supplied by resonant frequency converter was designed and developed
- Realized vector controlled drive with asynchronous motor
- Designed and verified new switching models from power electronics with IGBTs, MOSFETs, and power diodes
- Designed digital control systems for electrical drives supplied by frequency converters
- Undergoing research of voltage and current converters with IGBTs
- Research on control of AC drives by method of variables structures has started

Publications (see section 6. "Publications in 1994"):
[J3], [J4], [C7], [C8], [C9], [C10], [C11], [C12], [C13], [C14], [C15], [C16], [C17], [C26], [C31], [D2], [B1], [B2], [B3], [B4], [B5],[O1], [O4], [O6]

3. Software and Hardware Development of Distributed Control Systems for Multi-Motor Drives and Drive Complexes

Research project No 41 151 based on institutional granting.
Leader: Michal Girman
Members: Pavol Fedor, Viliam Fedák, Juraj Haluška, Stanislav Fedor, Daniela Perduková, Rastislav Harčarufka, Peter Bober, Peter Košč (till 31/8/94)

The project deals with two basic topics:

- Methodology of control circuit design for one- and multi-motor drives, synthesis of regulators for asynchronous motor drives using Lyapunow theory and applying fuzzy regulators for control of drives.

- Development of environment for control systems based on transputer network. The subject of this research lies in the design and debugging of software tools for modeling, monitoring and control of complex drive systems.

Results achieved in 1994:

- Realized model of HW for a transputer node
- Methodology of definition of virtual connection in the transputer net
- Methodology of controllers design for the multi-motor drive system with elasticity coupling

Publications (see section 6. "Publications in 1994"):
[C6], [C9], [C18], [C19], [C20], [C21], [C27], [C30], [B8], [D3], [O2], [O3]

4. Special Electrical Drives of Low Power Ratings

Research project No 41 152 based on institutional granting.
Leader: Juraj Oetter
Members: Jozef Fedor, Michal Kostelný, Bartolomej Fedor, Pavol Struckel, Dionýz Milly, Želmíra Ferková, Vladislav Maxim, Ján Kaňuch
Ph.D. students: Vladimír Kolcun, Miroslav Tvrdoň

Research activity of the group is concentrated on:

- Development and realization of the SRM with axial air gap
- Development and design of the step motor with axial air gap and a small step
- Optimization of the design based on monitoring of magnetic fields
- Converter with controlled recuperation
- Combined optoelectronic sensor
- Stability analysis of the drive with SRM

Results achieved in 1994:

- Investigation of magnetic field in the air gap of the switched reluctance motor with axial air gap using method of finite elements
- Parametric measurements of the inductance of phase winding of the motor with axial air gap were realized
- Theoretical analysis of winding inductance for different types SRM with axial air gap were performed
- Designed sensor of the position of rotor of SRM with optoelectronic elements of common production
- Performed analysis of transistor converter for SRM with DC link

Publications (see section 6 "Publications")
[C22], [C23], [C24], [C25], [C32], [D1], [B7], [O5]

6. Publications in 1994

6.1 Journal Papers

[J1] Zboray, L.: State Control Design with Observer for a Permanent Magnet Synchronous Motor. Journal of Electrical Engineering, vol.45, 1994, No 5, pp. 171-174

[J2] Zboray, L.: System Order Reduction for the Cascade Control Structure. Journal of Electrical Engineering, vol. 45, 1994, No 8, pp. 290-292

[J3] Dudrík, J. - Ondera, J.: Protection against Simultaneous Switching-on of transistors In Bridge Connection of Converters. Journal of Electrical Engineering, vol. 45, 1994, No 5, pp. 467-470

[J4] Košč, P. - Profumo, F. - Fedák, V.: AC Drives for High Performance Applications using Fuzzy Logic Controller. JIEE Transactions, Part D., Vol. 114, No 7/8 July/August 1994, pp. 101-107

6.2 Conference Papers

[C1] Zboray, L.: State Control Design for a Synchronous Motor with System Order Reduction. Proc. XII. Symp. EPNC Poznan 1994, pp. 279-284

[C2] Ďurovský, F.: Parameter Sensitivity Analysis of a Nonlinear Observer for CSI-fed Asynchronous Motor. Proc. IX. Symp. PENCE Poznaň 1994, pp. 255-260

[C3] Ďurovský, F. - Pčola, S.: A Control System with Transputer for Electrical Drives. Proc. of the microCAD'94 Conf., Miskolc 1994, section F, pp. 1-8 also presented at Seminar Transputer 94, Bratislava, pp. 25-30 (in Slovak)

[C4] Zboray, L.: State Control Design for a Synchronous Motor with Salient Poles. Proc. of the Int. Conf. EDPE'94, High Tatras 1994, vol.1, pp. 62-65

[C5] Tomko, J. - Daubner, K. - Šándor, R.: Design of a Vibration Mill Drive Control. Proc. of the Int. Conf. EDPE'94, High Tatras 1994, vol.2, pp. 414-417

[C6] Fetyko, J. - Čverčko, J. - Fedák, V.: Looper Angle and Tension Control for Hot Strip Finishing Mill. Proc. of the Int. Conf. EDPE'94, High Tatras 1994, vol. 2, pp. 497-501

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[C8] Uhrín, R. - Profumo, F.: Performance Comparison of Output Power Estimators used in AC/DC/AC Converters. Proc. of the 20th Int.Conf. IECON'94, Bologna 1994, vol. I., pp. 344-348

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[C10] Uhrín, R. - Profumo F.: Performance Comparison of Different Current Regulators for Resonant DC Link Inverter Systems. Proc. of the Int. Conf. PEMC'94, Warsaw 1994, vol. 2, pp. 1066-1070

[C11] Višnyi, P. - Pokorný, I.: Digitally Controlled AC Drive with a Resonant Frequency Converter. Proc. of the Int. Conf. PEMC'94, Warsaw 1994, vol. 2, pp. 1275-1277

[C12] Kováč D.: Simulation Models of Power Elements in PSPice Program. Proc. of the Int. Conf. PEMC'94, Warsaw 1994, vol. 2, pp. 1275-1277

[C13] Kováč, D. - Kováčová, I.; New Inverter Vector Control without Software. Proc. of the Int. Conf. EDPE'94, High Tatras 1994, vol.1, pp. 112-113

[C14] Uhrín, R. - Profumo F.: Reactive Elements Design Procedure for Quasi Direct AC/DC/AC Converter. Proc. of the Int. Conf. EDPE'94, High Tatras 1994, vol.2, pp. 328-332

[C15] Kováč D. - Kováčová I.: Switching of MOSFET and its Simulation Model. Proc. of the XII Symposium on Electromagnetic Phenomena in Nonlinear Circuits. Poznan 1994, p. 201-206

[C16] Hredzák, B. - Kovalčin, S. - Gair, S.: Pulse Width Modulation Control of Transistor Inverter. Proc. of the Int. Conf. EDPE'94, High Tatras 1994, vol.2, pp. 35-39

[C17] Kovalčin, S.: New Method of the Public Lightning Control Using Semiconductor. Proc. of the Int. Conf. EDPE'94, High Tatras 1994, vol.1, pp. 282-283

[C18] Fedor, P.: Use of the Fuzzy Controller in Control of Electrical Drives. Proc. of the Conf. "Control of Processes", Horní Bečva 1994, pp. 79-82 (in Slovak)

[C19] Fedor, P. - Perduková, D.: Optimization of Parameters of Controller Designed using the Second Lyapunow Method. Proc. of the Conf. "Control of Processes", Horni Becva 1994, pp. 83-88 (in Slovak)

[C20] Bober, P. - Fedor, P. - Girman, M. - Harčarufka, R.: Parallel Simulation of Dynamical Systems. Proc. of the 28th Int. Conf. MOSIS'94 (Modeling and Simulation of Systems), Zábřeh na Morave 1994 (in Slovak)

[C21] Košč, P.: Fuzzy Logic Speed Control AC Drives. Proc. of microCAD'94 Conf., Miskolc, 1994

[C22] Le Quang Duc - Ferková, Z.: Modeling of Switched Reluctance Motor. Proc. of the Int. Conf. EDPE'94, High Tatras 1994, vol.2, pp. 284-286

[C23] Maxim, V. - Milly, D.: Modeling a Nonlinear Switched Reluctance Motor Using PSPice. Proc. of the Int. Conf. EDPE'94, High Tatras 1994, vol.2, pp. 287-289
[C24] Maxim, V.: Converters for Feeding of Switched Reluctance Motors - Review. Proc. of the Int. Conf. EDPE'94, High Tatras 1994, vol.2, pp. 290-295
[C25] Struckel, P.: Utilizing of CAD Methods by Design of Electrical Machines. Proc. of microCAD'94 Conf., Miskolc 1994
[C26] Dudrík, J.: Examples from Power Electronics - Examples using PSPice Programme. Proc. of TEMPUS Workshop on Microcomputer Controlled Electrical Drive Systems in Industrial Applications. University of Miskolc, 1994, 2 pp.
[C27] Fedák, V.: MATLAB Programme Features for Electrical Drives Design. Proc. of TEMPUS Workshop, Miskolc 1994, 6 pp.
[C28] Fetyko, J.: New Undergraduate Course in Microcomputer Controlled Drive Systems at Technical University of Košice. Proc. of TEMPUS Workshop, Miskolc 1994, 3 pp.
[C29] Fetyko, J.: State-Space Control of DC Drives. Proc. of TEMPUS Workshop, Miskolc 1994, 3 pp.
[C30] Košč, P.: Fuzzy Logic Controlled Electrical Drives. Proc. of TEMPUS Workshop, Miskolc 1994, 3 pp.
[C31] Kovalčin, S.: Adjustable Speed AC Machine Drive Control. Proc. of TEMPUS Workshop, Miskolc 1994, 6 pp.
[C32] Struckel, P.: Introduction to Finite Element Method in Power Engineering. Proc. of TEMPUS Workshop, Miskolc 1994, 8 pp.

6.3 Dissertations

Defended dissertations:

[D1] Ferková, Ž: Contribution to the Reluctance Motor Theory
TU Košice, 1994, 90 pp.
supervisor: Fedor Šimkovic (STU Bratislava)

[D2] Košč, P.: High Performance Electrical Drives Using Fuzzy Logic.
TU Košice, 1994, 98 pp.
supervisor: Viliam Fedák

After passing the dissertation:

[D3] Perduková D.: Control of Technological Processes with Multi-Motor Drive.
TU Košice, 1994, 84 pp.
supervisor: Pavol Fedor

6.4 Textbooks

Publications prepared in 1994 within the project TEMPUS JEP 2177 (in English language):

[B1]	Dudrík, J.: Power Electronics - Examples	320 pp.
[B2]	Kovalčin,S.: PWM Voltage Source Inverters for Adjustable Speed Induction Motor Drives	55 pp.
[B3]	Uhrín, R.: Short Course on Resonant Converters	45 pp.
[B4]	Uhrín, R.: Short Course on PSPice: General Review&Applications	50 pp.
[B5]	Košč, P.: Fuzzy Logic Controlled Electrical Drives	60 pp.
[B6]	Fetyko, J.: Feedback Control of DC Drives	40 pp.
[B7]	Struckel, P.: Introduction to Finite Element Method for Electrical Engineers	90 pp.
[B8]	Fedák, V.: Introduction to MATLAB, SIMULINK and Application Toolboxes	75 pp.

6.5 Other Publications

[O1] Timko, J. et al: Evaluating Equipment of Higher Harmonics Source in Supply Net. Report for VSE Kosice, (East Slovak Power Plant).
[O2] Fetyko, J. - Fedák, V. - Čverčko, J.: Control Tension Analysis of Hot Strip Finishing Mill. Report for VSŽ Kosice. TU Kosice 1994, 74 pp.
[O3] Fedor, P. - Kováč, D. - Harčarufka, R. - Bober, P.: Comparison of Properties of the Selected Control Systems. Report for the Company Regula, a.s., TU Košice 1994, 44 pp.
[O4] Kováč, D. - Kováčová, I.: Connection for a Tolerance Control of the Three-Phase Voltage Inverter. Patent Application No PV 0977-94
[O5] Fedor, J. - Fedor, B. - Kerestúri, M. - Kaňuch, J. - Tvrdoň, M.: Design of Indoor Type Disconnector 1 kV, 4000 A with Electrical Motor Drive. Report for SEZ, a.s. Krompachy. TU Košice 1994, 25 pp.
[O6] Uhrín, R.: AC/DC/AC Conversion System with Parallel Resonont DC link. Minimum thesis. TU Košice, 1994.

7. Graduate Theses (Diploma Works) in 1993/94

Power Electronics

1. Andrus, J.: Switched Current Source
   Adviser: Dudrík Consultant: Kinlovič
2. Čverčko, M.: Modeling of an Indirect DC Converter
   Adviser: Dudrík Consultant: Kinlovič
3. Farkaš C.: Design of the Supplying Source for the Asynchronous Motor Drive of a Gyroscope.
   Adviser: Pokorný
4. Gergeľ, S.: Design of the Drive for a Beating Line of a Paper Machine
   Adviser: Kováčová
5. Gondorcin A.: Hazardous States of the Programmable Timer
   Adviser: Oetter
6. Gavalier, M.: Control Circuits for Arc Welding
   Adviser: Dudrík Consultant: Kinlovič
7. Horkavá, M.: Simulator of a Position Sensor for the Switched Reluctance Motor
   Adviser: Oetter
8. Horváth, M.: Digital Voltmeter
   Adviser: Kováčová Consultant: Kováč, FEI TUKE
9. Hičár, L.: Function Generator with Power Output Stage and with PWM
   Adviser: Ondera
10. Hlinka, R.: Design of the Source for Arc Welding
    Adviser: Dudrík Consultant: Kinlovič
11. Marcin, R.: Design of a Laboratory Equipment of Switched Source with IGBT
    Adviser: Ondera
12. Petényi, Z.: Measurement Design and Evaluation of Parameters of an Inductance for Power Semiconductor Converter
    Adviser: Pokorný
13. Pereš, V.: Programmable Function Generator
    Adviser: Kovalčin
14. Pokrivčák, P.: Sinusoidal Current Control of a Three-Phase Frequency Converter with DC Link
    Adviser: Kováčová Consultant: Kováč, FEI TUKE
15. Puškáš, I.: Programmable Supply Source
    Adviser: Kovalčin
16. Sliacky, J.: Design of Power Circuits for a Frequency Converter with a Resonant Link and their Verification by Measurement
    Adviser: Pokorný

17. Šimčák, J.: Indirect Frequency Converter with IGBT
    Adviser: Ondera
18. Vargová, S.: Simulation of a Model of IGBT as a Switch
    Adviser: Kováčová
19. Tomčík, J.: Design of Power Converter for a Switched Reluctance Motor
    Adviser: Oetter

Electrical Drives

20. Bodnár, A.: Design of a Drive for Slab Manipulator
    Adviser: Tomko Consultant: Jančuška, VSZ Kosice
21. Belej, L.: Drive of Working Cylinders in a Continuous Tandem Mill
    Adviser: Fetyko
22. Hlohinec, M.: Design of a Drive of Chains for Wood Cutting
    Adviser: Tomko Consultant: Tomášik, Slavošovce
23. Hužava, J.: Design of a Drive for Paper Cutting
    Adviser: Tomko Consultant: Tomášik, Slavošovce
24. Hruška, J.: State-Space Control of a Synchronous Motor
    Adviser: Zboray
25. Kún, E.: Design of Drive for Feeding Machine of Slabs
    Adviser: Tomko Consultant: Čverčko, VSZ Kosice
26. Lipka, P.: Drives of Cran Travel of a Bridge of Withdrawing Machine
    Adviser: Tomko Consultant: Jančuška, VSZ Kosice
27. Lisik, Š.: State-Space Control of Robot Servosystem
    Adviser: Fetyko
28. Oravec, J.: Drive of Mixing Pump
    Adviser: Tomko Consultant: Tomášik, Slavošovce
29. Pasteľák, R.: Drive of a Worm Conveyer for Transport of Fuel
    Adviser: Tomko Consultant: Prokop, Slavošovce
30. Polanský, P.: Design of Speed Control of Air Pump for Paper Machine
    Adviser: Tomko Consultant: Tomášik, Slavošovce

Electrical Machines and Apparatus

31. Doboš, V.: Electromagnetic Contactor 40 A
    Adviser: Fedor, J.
32. Gajdoš, D.: Design of a Three-Phase Asynchronous Squirrel-Cage Motor
    Adviser: Kostelný Consultant: Kaľavský, VÚES Košice

33. Jenčík, J.: Electromagnetic Contactor 25 A
    Adviser: Fedor, J.
34. Kovalčin, M.: Switched Reluctance Motor with Axial Air Gap
    Adviser: Kostelný Consultant: Kaňuch
35. Kuchta, M.: Electromagnetic Design of an Asynchronous Motor 2p=2
    Adviser: Kostelný Consultant: Šutaj, VÚES Kosice
36. Kvaka, P.: Three-Pole Disconnector for Indoor Assembling
    Adviser: Fedor, J. Consultant: Fedor B.
37. Lacková, J.: Design of Asynchronous Motor with Forced Ventilation Supplied from Frequency Converter
    Adviser: Kostelný Consultant: Struckel
38. Le Tranh Hai: Three-Pole Disconnector for Indoor Assembly
    Adviser: Fedor, J. Consultant: Fedor B.
39. Nadzam, M.: Debugging of a Library of Parts of Asynchronous Motor for AutoCAD
    Adviser: Kostelný Consultant: Struckel
40. Riegelský, J.: Three-Phase Oil Transformer 1600 KVA, 35 kV
    Adviser: Kostelný
41. Štofírová, L.: Preparation of Technology for Production of the Asynchronous Motor with Outside Rotor P=1.75 kW for Manufacturing in VÚES
    Adviser: Kostelný Consultant: Ladič, VÚES Kosice
42. Ténai, F.: Influence of Magnetic Material for Properties of a Switched Reluctance Motor
    Adviser: Kostelný Consultant: Ferková

Automation of Electrical Equipment

43. Bajus, S.: Speed Control of a Drive with Asynchronous Motor
    Adviser: Fedor, P.
44. Barlok, M.: Model of Fuzzy Controller for a DC Drive
    Adviser: Fedor, P.
45. Buksár, L.: Simulator of Logic Control for Electrical Equipment
    Adviser: Girman
46. Cuker, L.: Control of Line for Perlit Production
    Adviser: Girman
47. Dzurčanin, S.: Identification of the Torque of an Asynchronous Motor Based on Measurable Variables
    Adviser: Fedor, P.
48. Firment, P.: Model of a Potential Transformer
    Adviser: Fedor, P.

49. Guman, P.: Fuzzy Control of Middle Part of Continuous Production Line
    Adviser: Fedor, P.
50. Grega, M.: Visualization of Variables of the Technological Object
    Adviser: Girman
51. Hyben, V.: Monitoring System Controlled by One-Chip Microcomputer
    Adviser: Haluška
52. Lapár, P.: Automation of the Design in Electrical Engineering
    Adviser: Girman
53. Lipa, P.: Software for Logic Processor based on Transputer
    Adviser: Girman Consultant: Bober
54. Maguth, E.: Microcomputer Control System for Thermocontrol
    Adviser: Haluška
55. Maštenik, L.: State Diagrams Utilization for Control of Electrical Equipment
    Adviser: Girman Consultant: Perduková
56. Mózešová, A.: Possibilities of Utilization of PLD for Control of Electrical Equipment
    Adviser: Girman
57. Novák, M.: Development Environment for Control of a Traffic System
    Adviser: Girman
58. Olenočin, S.: Control of a Machine for the Sheet Placing Machine
    Adviser: Girman
59. Polák, M.: Control of Drives for Washing Line
    Adviser: Girman
60. Skonc, J.: Control System for MvE
    Adviser: Girman
61. Timková, M.: Modul of RWM for Control System PC RADOM
    Adviser: Haluška
62. Uchnár, L.: Control of a DC Drive by Microcomputer I80196
    Adviser: Fedor, P.

Note: If not written, the adviser of the graduate work is also on the post of the consultant.

8. Field of Research Interests of Staff Members

Teachers

Jaroslav Timko, Professor, Ph.D.
Control of AC drives fed by power electronic frequency converters using AC asynchronous machines and linear asynchronous machine.

Ladislav Zboray, Professor, Ph.D.
Nonlinear state control methods and their application to the control design of drive systems.

Jaroslav Dudrík, Associate Professor, Ph.D.
Analysis, design, and control of static power converters, high-frequency resonant- and soft switching in DC/DC converters.

Viliam Fedák, Associate Professor, Ph.D.
Application of the MIMO and state-space control theories for the control of multi-motor drives, observers, systems identification and modeling.

Jozef Fedor, Associate Professor, Ph.D.
Switching electrical circuits and switching apparatus, applications of power semiconductor devices and circuits for switching techniques.

Pavol Fedor, Associate Professor, Ph.D.
Software for control systems (mainly real-time SW) and new control methods of electrical drives, parallel and distributed programming and application software for transputer systems.

Ján Fetyko, Associate Professor, Ph.D.
Dynamic approach to motion generationof motion trajectories for manipulation robots and the non-adaptive and adaptive control of electrical servosystems for driving of industrial robots.

Michal Girman, Associate Professor, Ph.D.
Software for automation and control systems, parallel and distributed programming-multitasking on PC&LAN and software for transputer systems.

Irena Kováčová, Associate Professor, Ph.D.
Power electronics, application of power MOSFETs in the circuits of power electronics.

Michal Kostelný, Associate Professor, Ph.D.
Field of electrical machines, esp. SRM motors.

Juraj Oetter, Associate Professor, Ph.D.
New types of power semiconductor converters and their control, microcomputer controlled transistor converters for SRM.

Jozef Ondera, Associate Professor, Ph.D.
Design and control of power semiconductor converters, esp. of of direct-current converters.

Imrich Pokorný, Associate Professor, Ph.D.
Inverters with and without DC line, design of resonant inverters, back influence on the supply net and the content of higher harmonics in output voltage and current.

Jaroslav Tomko, Associate Professor, Ph.D.
Modern methods of electrical drives control, particularly the state space control, adaptive systems with time delay and electrical drives for technological lines.

Eva Dobošová, Assistant Professor
Analysis and control of electric power systems, control of asynchronous machines.

František Ďurovský, Assistant Professor, Ph.D.
Control of electric drives especially the state space control, design of observers, design and debugging of control programs for electrical drives.

Bartolomej Fedor, Assistant Professor, Ph.D.
Switching electrical circuits and switching apparatus, application of power semiconductor devices and circuits for switching techniques.

Stanislav Fedor, Assistant Professor
Computer control, SMT and hybrid technology, design of measuring instruments for testing and diagnostic of energetic devices.

Želmíra Ferková, Assistant Professor, Ph.D.
Field of electric machines with orientation on research of switched reluctance motor.

Juraj Haluška, Assistant Professor, Ph.D.
Digital control systems, first of all multi-processor systems and reliability of control systems.

Marcela Halušková, Assistant Professor, Ph.D.
Variable structure systems, sliding mode operations, control of linear and nonlinear systems having the applications in field of electrical drives.

Ján Kaňuch, Assistant Professor
Design of disk step motor and disk reluctance motor, application of CAD methods in design of electrical machines and devices.

Jaroslav Kinlovič, Assistant Professor
Field of power electronics, frequency and DC/DC converters.

Stanislav Kovalčin, Assistant Professor, Ph.D.
Field of power electronics, control of power semiconductor converters using microcomputer techniques and its application in the industrial plants.

Vladislav Maxim, Assistant Professor
Field of power electronics, frequency PWM converters with sinusoidal input current.

Dionýz Milly, Assistant Professor, Ph.D.
Field of frequency converters with sinusoidal input and output currents and control circuits for static power converters.

Juraj Németh, Assistant Professor
Models of frequency controlled AC machines, especially with field vector oriented control and with control of the efficiency and power factor.

Daniela Perduková, Assistant Professor
Design method and new control structure for multi-motor drive, model reference adaptive control systems synthesized using the Lyapunow second method.

Pavol Struckel, Assistant Professor
Rotating AC electrical machines, especially magnetic field effects and noise of induction machines, CAD of electrical machines.

Jaroslava Žilková, Assistant Professor
Theory and practical application of process control.

Research Workers

Rastislav Harčarufka
Software for automation and real-time systems with parallel or distributed architecture, based on conventional processors and/or transputers.

Peter Košč
Fuzzy logic control and neural networks applications in electrical drives.

Róbert Šándor
Field of electrical drives, control electronics and automation technique.

Peter Višnyi
Digital speed and position control of electric machines, extremely high dynamic performance and precise electrical drives of small power.

9. Current Postgraduates in 1994/95

First Year

1. ***Ján Skonc,*** full-time Ph.D. student
   theme: Microcomputer Systems in Control of Electrical Drives
   supervisor: Michal Girman

2. ***Stanislav Fedor,*** Assistant Professor
   theme: Fuzzy Controller with Disturbance Identification according to the Lyapunow Method
   supervisor: Pavol Fedor

3. ***Juraj Németh***, Assistant Professor
   theme: State Control of a VSI-Fed Asynchronous Motor
   supervisor: Jaroslav Tomko

4. ***Maroš Ondrej,*** technician
   theme: Control of AC Drives using Method of Variable Structures
   supervisor: Jaroslav Timko

5. ***Pavol Pokrivčák,*** part-time Ph.D. student
   theme: Hard and Soft Switching in Power Converters
   supervisor: Imrich Pokorný

Second Year

6. ***Jaroslav Kinlovič,*** Assistant Professor
   theme: Indirect DC to DC Converter
   supervisor: Jaroslav Dudrík

7. ***Robert Šándor,*** Research worker
   theme: AC Drive of Vibration Mill
   supervisor: Jaroslav Tomko

Third Year

8. ***Kolcun Vladimír,*** full-time Ph.D. student
   theme: Switched Reluctance Motor with Axial Air Gap - Construction and Measurement
   supervisor: Michal Kostelný

9. ***Do Quoc Vu,*** full-time Ph.D. student
   theme: Fuzzy Control of Synchronous Motor Drive
   supervisor: Pavol Fedor

10. ***Jaroslav Žilková,*** Assistant Professor
    theme: Control of AC Drive by Neural Networks
    supervisor: Jaroslav Timko

Fourth Year

11. ***Tvrdoň Miroslav,*** full-time Ph.D. student
    theme: Switched Reluctance Motor with Axial Air Gap $2p_1/2p_2=6/4$
    supervisor: Michal Kostelný

12. ***Uhrín Rastislav,*** full-time Ph.D. student
    theme: Resonant Converters
    supervisor: Imrich Pokorný

Other Postgraduates (finishing their study and preparing the thesis)

1. ***Čverčko Ján,*** external form (research worker, VSŽ Kosice)
   theme: Adaptive Control of Strip Elongation in the Finishing Cold Strip Mills
   supervisor: Ján Fetyko

2. ***Daubner Karol,*** external form
   theme: Drive Control with Elastic Coupling
   supervisor: Jaroslav Tomko

3. ***Dobošová Eva,*** Assistant Professor
   theme: Phase Control of AC Machines of Small Power Ratings
   supervisor: Jaroslav Vladář

4. ***Kaňuch Ján,*** Assistant Professor
   theme: Disc Step Motor with Axial Air - Gap
   supervisor: Michal Kostelný

5. ***Maxim Vladislav,*** Assistant Professor
   theme: Steady - State and Transient Analysis of Converter for Switched Reluctance Motor
   supervisor: Juraj Oetter

6. ***Struckel Pavol,*** Assistant Professor
   theme: Electromagnetic Noise Source Components of Magnetic Field in Air - Gap of Asynchronous Induction with Rotor Eccentricity
   supervisor: Ladislav Hruškovič, STU Bratislava

10. Teaching and Research Laboratories

At the Department there are 19 laboratories. They are used both for research and teaching. The most important are:

- two laboratories for teaching of general electrical engineering subjects
- three specialized laboratories for power electronics
- three computer laboratories for CAD design and simulation in electrical drives, power electronics and electrical machines (AUTOCAD, MATLAB, PSPice, and other programs)
- two specialized laboratories for electrical drives and servosystems
- three specialized laboratories for electrical machines
- one specialized laboratory for electrical apparaturs and devices

11. Other Activities

11.1 Seminars and Conferences

Seminars

The Department of Electrical Drives organizes a series of scientific seminars for the departmental staff. On the seminars there are presented the results achieved in research activity of the department and the results of works of Ph.D. students. The seminars are organized according to needs and their aim is to inform the staff about the state of scientific work in the department as well as the new knowledge in the specialization.

EDPE'94 International Conference

The Department has organized international conferences on Electrical Drives and Power Electronics (EDPE) with a long-year tradition. The last conference, the 11th in the order since its establishment in 1973, was held on October 18-20, 1994 in the hotel ACADEMIA, Stará Lesná, the High Tatras.

Some statistics: 102 papers were presented in 2 plenary, 3 poster and 7 oral sessions. 160 participants from 16 countries took part there, among them 20

members from the Department. The conference proceedings in two volumes with registration code ISBN 80-967131-2-4 contain 506 pages.

The conference was supported by following firms and companies:

SIEMENS A.G., Erlangen (Germany), NORMA GOERZ INSTRUMENTS, Wien (Austria), EPE Association, Brussels (Belgium), DANFOSS, s.r.o., Praha (Czech Republic), East Slovak Power Plant (VSE), Košice (Slovakia), TATRAMAT, a.s., Matejovce (Slovakia), PROCH, s.r.o., Svit (Slovakia), COMTRADE, s.r.o., Košice (Slovakia), ELFA, s.r.o., Košice (Slovakia).

The 1994 Conference was organized under the chairmanship of Assoc.Prof. Viliam Fedák. The department was entrusted by members of the 1994 Conference Steering Committee to organize the next EDPE'96 Conference (in September 1996).

Participation in other Conferences and Meetings

1. International Conference microCAD'94, University of Miskolc, 1994. Participants: Ďurovský, Košč. Task: presentation of papers.

2. The 20th International Conference IECON'94, Bologna, 1994. Participants: Haluška, Halušková, Timko. Task: presentation of the paper.

3. The 12th Symposium EPNC, Poznaň, 1994. Participants: Ďurovský, Zboray. Task: presentation of papers.

4. International TEMPUS Workshop on "New Course on Microcomputer Controlled Electrical Drives in Industrial Automation", University of Miskolc, July 4-6, 1994.
   Participants from the department: Dudrík, Fedák, Fedor J., Fetyko, Kovalčin, Struckel.
   Task: presentation and dissemination of results attained within JEP, the final evaluation of the project, further cooperation with partners within the JEN and COPERNICUS projects.

11.2 International Cooperation

Projects

1. The Department of Electrical Drives colaborated within the **TEMPUS** Joint European Project No 2177 in years 1991 - 1994 with Napier University of Edinburgh (the JEP coordinating institution), University of Miskolc, Universidad Politecnica de Valencia, and Politecnico di Torino. Assoc.Prof. Viliam Fedák has been the national coordinator of the project. Within the project, the curriculum of Bc. course was developed utilizing experiences of the project partners, 9 teaching materials were written in English, new equipment was purchased for laboratories (in 1994: PSPice program, 6 computers PC 486 Olivetti and laser printer), and in 1993/94 academic year, 6 teachers and 3 students were on long-term mobilities in partners institutions. During mobilities teachers updated their knowledge, got lot of valuable experiences, and collected materials.

2. To continue the cooperation with TEMPUS partners in 1995-96, a project proposal within the framework of **JEN** (Joint European Network) was prepared in the end of 1994. The most important goals are: to disseminate the JEP results by organization of short courses for industrial partners in the target group and strengthen the industry-university cooperation. In the target group there are 5 institutions and enterprises from Slovakia. The consortium consists of former JEP EC partners.

3. The proposal No ERB3512PL941325 of research project within the **COPERNICUS** 1994 program (Community Action for Cooperation in Science & Technology with Central and Eastern European Countries): Design and Realization of New Types Motors for High Performances Purpose, was submitted. Collaborating institutions: VUES Brno - branch Košice, TU Košice, STU of Bratislava, TU of Brno, GREEN ENSEM Nancy, Universidad Politecnica de Valencia. The goal of the project is to design and preparation for manufacturing of a three-phase multidisc high speed reluctance machines for application in robotics.

Membership in International Organizations and Societies

EPE (European Power Electronics and Electrical Drives Association) - V. Fedák
IEE (Institution of Electrical Engineers) - V. Fedák

11.3 Visits to Foreign Institutions

Staff

- Dudrík, J. .: Politecnico di Torino, Italy, 15 weeks, January-May
  PSPice simulations, preparation of teaching material
  granted by TEMPUS JEP 2177-93/3
- Fetyko J.: Napier University of Edinburgh, UK, 12.5 weeks, January-March
  preparation of teaching material, supervision over master thesis
  granted by TEMPUS JEP 2177-93/3
- Fedák,V.: Politecnico di Torino, Italy, 13 weeks, April-June
  lectures presentation, preparation of teach.materials, simulations
  granted by TEMPUS JEP 2177-93/3
- Kovalčin, S.: Napier University of Edinburgh, UK, 6.5 weeks, May-June
  collection materials to habil.thesis, preparation teach.material
  granted by TEMPUS JEP 2177-93/3
- Struckel, P.: Univ. Politecnica de Valencia, Spain, 4 weeks, June
  Finite Elements Method study, preparation of teach. material
  granted by TEMPUS JEP 2177-93/3
- Košč, P. Politecnico di Torino, Italy, 4 weeks, April-June
  study of fuzzy logic control, preparation of teaching material
  granted by TEMPUS JEP 2177-93/3
- Kostelný, M. ENSEM, Nancy, France 1 week, April
  preparation of common research project (COPERNICUS)
  granted by TU Košice

Note: several short (1 day) journeys abroad were undertaken in order of:
- coordination of the TEMPUS project (Fedák, Fedor J. - Miskolc)
- future research cooperation (Timko, Haluška, Halušková - Budapest)
- future cooperation between the faculties (Girman - Czenstochowa)

Under- and Postgraduate Students

- Uhrín,R.: Politecnico di Torino, Italy, 9 months, Oct.93-July 94
  Ph.D. student accepted by the Politecnico, in 1993/94 in the 2nd year of study. The stay was granted by TEMPUS JEP 2177-93/3
- Tvrdoň M.: Politecnico di Torino, Italy, 4.5 months, January-March
  collecting materials for dissertation, finite element method solution

granted by TEMPUS JEP 2177-93/3

- Lisik Š: Napier University of Edinburgh, UK, 3 months, January-March
  preparation of the graduate work
  granted by TEMPUS JEP 2177-93/3
- Polák M.: Politecnico di Torino 3.5 months, January-March
  preparation of the graduate work
  granted by TEMPUS JEP 2177-93/3

11.4 Foreign Visitors

Staff

During DPE'94 Conference foreign visitors and guests were accepted by the Department:

Dr. Reza Sotudeh	University of Teesside, Middlesborough,	UK
Prof. László Szentirmai	University of Miskolc	Hungary
Prof. Sinclair Gair	Napier University of Edinburgh	UK
Prof. Pilinski V.V.	Politechnical Institute Kiev	Ukraine
Assoc. Prof. Schvaichenko V.B.	Politechnical Institute Kiev	Ukraine

Number of furhter visitors were met during the EDPE'94 Conference in the High Tatras (for details see Report from the EDPE'94 Conference).

Students:

- Mrs Katia Stefanovski from ENSEM Nancy, France, April - June (3 months) in order to finish her master thesis: Switched Reluctance Double-Sided Disc Motor. Supervisor: Assoc.Prof. Michal Kostelný

11.5 Joint Projects with Industrial Sector

1. Timko, J. et al: Evaluating Equipment of Higher Harmonics Origin in Supply Net.
   Project No 15/93, done for VSE, š.p., Košice (East Slovak Power Plant).
   Grant: 160.000 Sk

2. Tomko, J. et al: Design and Realization of the Pressure and Temperature.
   Project No 9/0415/94 done for Šíravar Michalovce (Brewery).
   Grant: 180.000 Sk

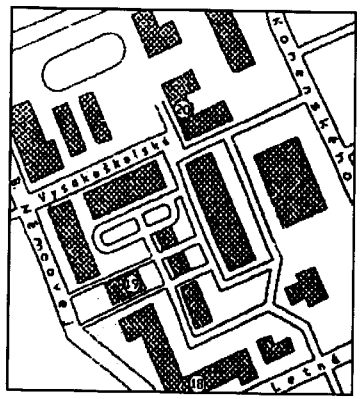
3. Fedor, J. et al: Design of One-Pole Disconnector 1 kV, 4000 A, with Electrical Motor Drive and Forced Switching-off. Project No 13/93, done for SEZ, Krompachy (Electrical Engineering Factory).
   Grant: 125.110 Sk

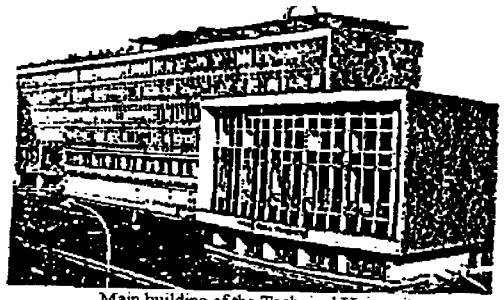
4. Fetyko, J. et al: Control Tension Analysis of Hot Strip Finishing Mill.
   Project No 19/93, done for VSŽ Oceľ, s.r.o., Košice (East Slovak Steelworks).
   Grant: 120.000 Sk

5. Tomko, J. et al: Analysis of Origins of Disturbances in Transformers Supplying Exciting Circuits of Main Drives in the Hot Strip Finishing Mill.
   Project No 17/93, done for VSŽ, Košice (East Slovak Steelworks).
   Grant: 130.000 Sk

Košice - City Plan

1 St. Elizabet's Cathedral
2 State Theatre
3 Railway Station
4 Bus Station
5 Osloboditeľov sq.
6 Maratón sq.
7 Amphiteater
8 Restaurant Družba
9 Restaurant Šport
10. Restaurant U Leonarda
11 Restaurant Asia
12 Restaurant Tip-Top
13 Restaurant Kriváň
14 Hotel Hutník
15 Hotel Slovan
16 Hotel Centrum
17 Hotel Coral
18 Main building of Technical University
19 Lectures Halls
20, 22 Students' Hostels
P Post Office
B Bank





Main building of the Technical University