DEPARTMENT OF THERMAL POWER ENGINEERING

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I. STAFF

Professors
Vojtech Molnár, DSc., Prof.
Professor in: Power Engineering
Research topics: General Power Engineering, Fluid Mechanics and Thermodynamics of Turbomachinery, Computational Fluid Dynamics

Associate professors
František Urban, PhD., Assoc. Prof.
Associate Professor in: Thermal Power Engineering
Research topics: Nuclear Power Plants, Energy production and utilization, Economy

Stanislav Malý, PhD., Assoc. Prof.
Associate Professor in: Thermal Power Engineering
Research topics: Boiler Technology and Heat Exchangers

Senior lecturers: 3
Research workers: 3
PhD. students: 2 (1 internal, 1 external)
Technical staff: 2

II. EQUIPMENT

II.1 Teaching and Research Laboratories

Turbomachinery Laboratory

Equipment:
1 MW gas turbine, 500 kW, 100 kW and 35 kW steam turbines and a 250 kW experimental turbocompressor. The electric drive of the compressor has a continuously controlled speed in the range of 0 to 1520 rev/min. Maximum rotor speed is 14 000 rev/min. A direct-torque measuring device is installed. The design of the compressor allows for a combination of different radial wheels and vanes or vaneless diffusers. The measuring equipment forms accessories for the
compressor, which enables measuring of the compressors characteristics. The compressor serves as an air supply source and the testing model may be mounted on the inlet or outlet of the machine.

Areas of Application:
The laboratory serves for experimental seminars as well as for the research of radial compressor components, e.g. compressor wheels with radial, forward and backward swept blades with vane diffuser, channel diffuser and spiral diffuser.

Aerodynamics Laboratory

Equipment:
An AT-1 wind tunnel for flow experiments of extremely enlarged models with a testing chamber 1000 x 800 mm. An experimental radial compressor for flow research in the rotor, diffuser and reverse channel. Individual micro-probe manufacturing, together with a transverse device, supported by an automatically operated, computer controlled, calibrating tunnel. The calibrating system provides calibration possibilities of up to 150 m/s, and progressively up to 300 m/s. The above mentioned equipment is also used for applied research.

Areas of Application:
Measurement of model turbine blades, buildings, bridges, with dimension up to 1000x800 mm.

Computational Fluid Dynamics Laboratory

Equipment:
Includes a Pentium based multiprocessor server and terminal network. Professional software available for complex flow analysis specialized for turbomachine component modeling, heat transfer modeling and turbulence modeling. Other professional software packages are destined for general flow analysis in complex applications. Additional software used in the laboratory is department developed.

Areas of Application:
General flow analysis in energy systems

II.2 Special Measuring Instruments and Systems (Laboratory Devices, Computers)

- A wind tunnel for low velocity flow experiments of extremely enlarged models Experimental radial compressor for flow measurements in the rotor, diffuser and reversing channel
- Small 5-hole pneumatic probes with traversing equipment
- Completely automatic probes
- Heat exchangers
- Fuel testing apparatus
- Laboratory-scale gas turbine (LSGT) power plant Constant Temperature Anemometry (CTA) system Streamline
- An experimental equipment for measurement of the operation characteristic of pump
- An experimental equipment for low output boiler measurements
### III. TEACHING

#### III.1 Graduate Study

<table>
<thead>
<tr>
<th>Name of subject</th>
<th>semester lectures</th>
<th>hours per week</th>
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<td>Operation of Heat Energy Facilities</td>
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#### III.2 Undergraduate Study

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#### III.3 Postgraduate Study

Study Field Thermal and Hydraulic Power Technology
IV. RESEARCH TARGETS

Basic Research Areas
- Basic research in secondary flow and losses in turbomachine blade rows
- Basic research in burner aerodynamics for steam boilers
- Software development for CFD

Applied Research Areas
- Aerodynamics of Turbomachinery
- Aerodynamics of Combustors
- Emissions reduction
- Power Systems Analysis
- Central Heat Supply Systems

V. RESEARCH PROJECTS

Grant Projects
- Environmental Sustainable Development of Classic Thermal Power Systems

Contractual Activities
- Assessment of the competitive heat prices from the block boiler houses.
- Improvement of the fuel assemblies output determination and distribution in the WWER440 type reactor core.
- Energy conception of the town Šamorín in the thermal energetics.
- Energy conception of the town Holíč in the thermal energetics.

VI. COOPERATION

VI.1 Cooperation in Slovakia
- Nuclear Power Plant, Jaslovské Bohunice
- Nuclear Power Plant, Mochovce
- West Slovakia Power Co., Bratislava
- Slovak Power Machinery Works, Tlmače
- Power Plant, Vojany
- Slovak Power Company, Bratislava
- SPP (Slovak Gas Industry), Bratislava
- ZSNP Žiar nad Hronom

VI.2 International Cooperation
- TU Darmstadt, Germany
- TU Vienna, Austria
- FH Joanneum, Graz, Austria
VI.5 Membership in Domestic Organizations and Societies
- L. Kučák - Slovak Nuclear Society, Bratislava
- L. Kučák - Slovak Association of Mechanical Engineers, Bratislava
- F. Urban - Slovak Nuclear Society, Bratislava
- F. Urban - Slovak Association of Mechanical Engineers, Bratislava
- S. Malý - Member of Energy Sector, Slovak Industry and Business Board, Bratislava
- V. Molnár - Member of “Strojnícky časopis” (Mechanical Engineering Magazine) Editorial Board

VI.6 Membership in International Organizations and Societies
- V. Molnár - International Society for Air Breathing Engines, USA
- V. Molnár - VDI, Germany

VI.8 Visits of Staff Members and Postgraduate Students to Foreign Institutions
- F. Urban – Switzerland (4 days)
- M. Pulmann – Czech Republic (2 days)

VII. THESES

VII.1 PhD. Thesis

VII.2 Graduate Theses (Diploma Works)
(Registrar’s name in the brackets)

[1] Barát, J.: Laboratory-Scale Gas Turbine Project (V. Molnár)
VII.2 Bachelor Theses

(Supervisor’s name in the brackets)

[1] Vozárik, T.: *Cogeneration Unit* (P. Žáková)

VIII. OTHER ACTIVITIES

- V. Molnár - Organization Committee Member of the 6th European Conference on Turbomachinery (Fluid Dynamics and Thermodynamics)
- V. Molnár - Member of the University Consortium Committee
- V. Molnár - Member of the DrSc Defence Committee
- F. Urban - Member of the University Consortium Committee

IX. PUBLICATIONS


