

Laboratory Fact Sheet

1 Institution

Name:

Technical University of Lodz,
Institute of Electrical Power Engineering
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90-924 Lodz, Poland
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2 Classification

- independent
- accreditation according to IEC 17025
- long-time DG experience (more than 3 years)
- active in standardisation committees

3 Brief historical background

The Technical University of Lodz (TUL) was founded in 1945. Presently, the University is one of the biggest in Poland with approximately 20,000 students. TUL provides undergraduate and postgraduate studies and offers the following higher education qualifications: B.Sc., B.Eng., M.Sc., Ph.D. degree. The University consists of 10 Faculties, which then are divided into departments and institutes. The Institute of Electrical Power Engineering is a part of the Faculty of Electrical, Electronic, Computer and Control Engineering.

The Faculty of Electrical, Electronic, Computer and Control Engineering is one of the oldest departments at the University. It was founded in 1945 and since then its research and teaching activities have been continuously developing..

The Institute was formed in 1970 with five research groups dealing with very wide problems of generation, transmission and distribution of electrical energy. The present structure of the Institute includes 4 research groups:

- Power Plants, Power Systems and Networks
- Industrial Electrical Power Engineering and Electric Lighting
- High Voltage
- Electric Traction

In these areas research has been done as well as education.

4 Mission statement

The University makes the most of tradition and takes advantage of the newest accomplishments of civilisation to participate in development of science, culture and economy and in solving important scientific, technical and social problems. The main objectives of the University functioning are the following:

- educating professional engineers who can demonstrate their knowledge in science, engineering, technology
- conducting research on the highest international level
- educating researchers for the University and other academic and economic centres
- participating in civilisation transformation and enriching national culture, in particular science and technology.

5 Institution in brief

TUL is a state autonomous higher education institution. Its activities are based on the State Act on University Level Schools and the TUL Statute.

The Faculty has been placed in the FEANI Register, which enables obtaining the title of Euroengineer by its graduates. The Department curriculum is compatible with European standards and great care is devoted to developing laboratories and maintaining high teaching level.

The University employs about 1700 academic staff members. Number of staff at the Faculty is over 450 (including 250 scientific personnel) and at the Institute 56 (38 scientific personnel).

Main sources of funding are government and industry.

6 Brief summary of competences

The main research activity of the Institute of Electrical Engineering encompasses:

- Power system modelling and simulation
- Power quality
- Integration of DER's into the power network
- Energy markets
- Optimisation of power plant operation
- Optimisation of lighting networks and devices
- High voltages
- Electric Traction

The Institute is co-organiser of the International Conferences on Electrical Power Quality and Utilisation and European Electricity Market. This activities help in keeping good contacts with specialists from other centres and getting knowledge about their work.

The international collaboration is carried out with the Strathclyde University in Glasgow (Scotland), Montefiore Institute of the University of Liege (Belgium), Institute of Electrodynamics of the National Ukrainian Academy of Science, Pryazovskyi State University of Mariupol (Ukraine).

Institution: Institute of Electrical power Engineering	
Description of competence	
Involvement in standardisation groups/committees	Yes – Polish Committee for Standardisation (PKN)
Certification expertise	Yes
Area of Scientific expertise	<ul style="list-style-type: none"> - Power Quality - Modelling and Simulation - DG integration - Electricity Markets - HV research and testing - Active management of distribution systems - Power system analysis and economics
Involvement in consultancy (e.g. for industry and government)	Yes
DG reference project list	<ul style="list-style-type: none"> - DISPOWER, V PR UE - Grant No 8 T10B 067 18¹ - Grant No 8 T10B 063 20² - Grant No 8 T10B 040 25³ - Grant No 3 T10B 065 28⁴ - Grant No N511 011 31/1864⁵
List of recent publications (say last 3 - 5 years)	Appendix No1 ¹

7 Laboratory facilities

Laboratory facilities in the Institute of Electrical power Engineering:

Facilities	Capabilities
Testing laboratory of lighting and electrical equipment	The laboratory obtained Accreditation Certificate No AB 332 from Polish Centre for Accreditation (PCA) in 2001 according to IEC 17025. 14 procedures used in laboratory meet the ISO standard requirements
Power Quality Laboratory	AC Power Source/Analyser HP6813B (Hewlett Packard), Power Network Analyser TOPAS 1000 (LEM-NORMA), Power Network Analyser MEMOBOX 800 (LEM-NORMA)
Active grid test field	PV, Fuel cells, Micro turbine, Battery storage, APF, DSTACCOM, MV/LV distribution grid model
Simulation laboratory	PSCAD/EMTDC, MatLab, Digsilent (education version), DasyLab, LabView

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³ This has been supported by the Polish State Committee for Scientific Research

⁴ This has been supported by the Polish State Committee for Scientific Research

⁵ This has been supported by the Polish State Committee for Scientific Research

Facilities	Capabilities
HV testing laboratory	Up to 800 kV impulse and 600 kV AC
Grid control laboratory	System Prince (STS, Germany)
Network protection laboratory	New digital network protection

At the Faculty of Electrical, Electronic, Computer and Control Engineering other laboratory facilities are available, such as: EMC lab., Machines lab., Power electronics lab., etc

8 Standardisation activities

The laboratory has potential and capacity for conducting pre-standardisation work.

9 Testing activities

The Institute conducts research, expertise and testing services for utilities, power stations and various industrial plants. These activities encompass wide thematic range following the Institute profile. In particular, research and test work were accomplished for Polish Power Grid Company, Lodz Power Distribution Company, ABB "Elta" Ltd, Belchatow Power Station Company, etc.

List of selected expertises of Power Quality are shown in Appendix No 2ⁱⁱ

List of recent publications

2006

- [1]. Hanzelka Z., Mroz M., Pawelek R., Piatek K.: Quality Parameters of 15 kV Supply Voltage after Connection of Wind Farms – Case Study. IEEE 12th International Conference on Harmonics and Quality of Power, October 1–5 2006, Cascais (Portugal)
- [2]. Gburczyk P., Mienski R., Pawelek R., Wasiak I.: Application of DSTATCOMs for Dips Compensation in LV Grids. International Symposium on Modern Electric Power Systems (MEPS'06), September 6 – 8 2006, Wroclaw (Poland)

2005

- [3]. Mienski R., Pawelek R., Wasiak I., Gburczyk P.: Voltage Dip Compensation in LV Networks Using Distributed Energy Resources. 5th International Scientific and Technical Conference on Efficiency and Power Quality of Electrical Supply of Industrial Enterprises, May 18-20 2005, Mariupol (Ukraine), p. 30-33
- [4]. Mienski R., Pawelek R., Wasiak I., Gburczyk P.: Distributed Generation Sources as a Tools for Power Quality Improvement. 5th International Scientific and Technical Conference on Efficiency and Power Quality of Electrical Supply of Industrial Enterprises, May 18-20 2005, Mariupol (Ukraine), p. 55-60
- [5]. Gburczyk P., Mienski R., Pawelek R., Wasiak I.: Management of Power Quality in Low Voltage Network with Penetration of Distributed Generation. 5th International Scientific and Technical Conference on Efficiency and Power Quality of Electrical Supply of Industrial Enterprises, May 18-20 2005, Mariupol (Ukraine), p. 69-74
- [6]. Mielczarski W., Michalik Mielczarska G.: The Impact of the European Commission Regulation on the Functioning of the Electric Power Systems, 5th International Scientific and Technical Conference on Efficiency and Power Quality of Electrical Supply of Industrial Enterprises, May 18-20 2005, Mariupol (Ukraine), p. 253-256
- [7]. Siewierski T., Wedzik A.: Pricing Ancillary Services Supplied by Power Producers, 5th International Scientific and Technical Conference on Efficiency and Power Quality of Electrical Supply of Industrial Enterprises, May 18-20 2005, Mariupol (Ukraine), p. 269-272
- [8]. Pawelek R., Wasiak I.: On the Assessment of Influence of Industrial Customers on Power Quality at the PCC. 8th International Conference on Electrical Power Quality and Utilisation, September 21-23 2005, Cracow (Poland), p. 253-259
- [9]. Mienski R., Gburczyk P.: Small Wind Turbine Simulator. 8th International Conference on Electrical Power Quality and Utilisation, September 21-23 2005, Cracow (Poland), p. 575-582

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- [10].Mienski R., Pawelek R., Wasiak I., Gburczyk P.: Possibilities of Voltage Dip Limitation in LV Networks Using Distributed Energy Resources. 4th International Scientific and Technical Conference on Power Engineering: Control, Quality, Effectiveness of Energy Resources Utilisation, October 5-7 2005, Blagoveshensk (Russia), p. 347-351
- [11].Siewierski T.: Network Constraints Management in the Electricity Market in Poland. 4th International Scientific and Technical Conference on Power Engineering: Control, Quality, Effectiveness of Energy Resources Utilisation, October 5-7 2005, Blagoveshensk (Russia), p. 104-109
- [12].Mielczarski W., Siewierski T., Szypowski M.: Constraints management in local networks. CIGRE Symposium on Power Systems with Dispersed Generation, April 17-20 2005, Athens (Greece),

2004

- [13].Chandarasupsang T., Galloway S., Burt G., McDonald J., Siewierski T.: Bidding Behaviour and Electricity Market Simulation. 8th International Conference on Probabilistic Methods Applied to Power Systems, (PMAPS), October 2004, Iowa (USA)
- [14].Keshav P. Dahal, Siewierski T., Stuart J. Galloway, Graeme M. Burt, Jim R. McDonald, An Evolutionary Generation Scheduling in an Open Electricity Market. 2004 Congress on Evolutionary Computation (CEC2004), June 2004, Portland, Oregon (USA)
- [15].Massucco S., Meini L., Silvestro F., Burt G., Galloway S., McDonald J., Siewierski T.: Electricity Market Strategy Characterisation with Fuzzy Logic: Application to Different Types of GENCOs. 8th International Conference on Probabilistic Methods Applied to Power Systems, (PMAPS), October 2004, Iowa (USA)
- [16].Mielczarski W.: Universal Algorithm for Commitment and Dispatch of Generating Units in the Electricity Markets. Conference MEDPOWER04, November 14-17 2004, Lemassos (Cyprus)
- [17].Mielczarski W., Kasprzyk S.: The recent advances in the Polish electricity market (paper 226). International CIGRE Session, August 29 – September 4 2004, Paris (France)
- [18].Mienski R., Pawelek R., Wasiak I.: Shunt compensation for power quality improvement using a STATCOM controller: modelling and simulation. IEE Proceedings - Generation, Transmission & Distribution, vol. 151, No.2, March 2004
- [19].Mienski R., Pawelek R., Wasiak I., Gburczyk P., Foote C., Burt G., Espie P.: Power Quality Improvement in LV Network Using Distributed Generation. IEEE 11th International Conference on Harmonics and Quality of Power, September 12-15, 2004, Lake Placid (USA)
- [20].Mienski R., Pawelek R., Wasiak I., Gburczyk P., Foote C., Burt G., Espie P.: Voltage Dip Compensation in LV Networks Using Distributed Generation. IEEE 11th International Conference on Harmonics and Quality of Power, September 12-15, 2004, Lake Placid (USA)
- [21].Wasiak I., Mienski R., Pawelek R., Gburczyk P.: Power Quality Control in the Low Voltage Network with Distributed Generation. 2nd Conference on The

European Electricity Market EEM-04. Challenge of the Unification, ,
September 20 – 22, 2004, Lodz (Poland), p.. 173 – 181

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- [22].Bertani A., Bossi C., Delfino B., Lewald N., Massucco S., Metten E., Meyer T., Silvestro F., Wasiak I.: Electrical Energy Distribution Networks: Actual Situation and Perspectives for Distributed Generation. CIRED 17th International Conference on ELECTRICITY DISTRIBUTION, Bcelona 2003, Session 5, p.1-6
- [23].Espie P., Foote C. E., Burt G.M., McDonald J. R., Wasiak I., Mieński R.: Improving Electrical Power Quality Using Distributed Generation. Part 1 – Assessing DG Impact & Capability. 7th International Conference on Electrical Power Quality and Utilizations, September 17-19, 2003, Krakow, p. 593-600
- [24].Wasiak I., Mienski R., Pawelek R., Gburczyk P., Espie P., Burt G.M.: Improving Electrical Power Quality Using Distributed Generation. Part 2 – Case Studies. 7th International Conference on Electrical Power Quality and Utilization, September 17-19, 2003, Kraków, s. 601-608
- [25].Mosinski F., Piotrowski T.: New Statistical Methods for Evaluation of DGA Data. IEEE Transactions on Dielectric and Electrical Insulation 2003 Vol. 10 No. 2 s. 260-265
- [26].Fedorowicz T., Mielczarski W.: Incentives to Improve Quality of Supply. 7th International Conference on Electrical Power Quality and Utilization, September 17-19, 2003, Krakow, s. 81-86

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- [27].Mienski R., Pawelek R., Wasiak I.: Shunt Compensation for Power Quality Improvement Using a STATCOM Controller – Modelling and Simulation. International Symposium on Modern Electric Power Systems, September 11-13, 2002, Wroclaw, s. 483-489
- [28].Mienski R., Pawelek R. Wasiak I.: Control Algorithm for 12-pulse SVC. 10th International Conference on Harmonics and Power Quality of Power, Rio de Janeiro (Brazil), 6-9.10.2002.
- [29].Mienski R., Pawelek R. Wasiak I.: Application of STATCOM Controllers for Power Quality Improvement – Modelling and Simulation. 10th International Conference on Harmonics and Quality of Power, September 6-9,.2002, Rio de Janeiro (Brazil)
- [30].Kanicki A., Mienski R., Pawelek R., Radlowski M., Wisniewski J.: Analysis of Power Supply Conditions for Magnetic Resonant Instrument. International Symposium on Modern Electric Power Systems, September 11-13, 2002, Wroclaw, s. 567-571
- [31].Mienski R., Pawelek R. Wasiak I.: Simulation Method for Designing Compensation Equipment Applied for Power Quality Improvement. 10th International Conference on Harmonics and Power Quality of Power, September 6-9, 2002, Rio de Janeiro (Brazil),
- [32].Mielczarski W.: A sea change for Polish power reform? Power Economics, February 2002 s. 16-17
- [33].Mielczarski W.: The electricity market in Poland – recent advances. Power Economics, February 2002 s. 15-18

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- [35].Kotlarek T., Kanicki A.: Load flow optimization by using evolutionary algorithm. Proceedings of the 7th Internationale Conference on Probabilistic Methods Applied to Power Systems, Naples, Italy 2002, p. 299-302
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- [37].Kasprzyk S., Mielczarski W., Michalik-Mielczarska G.: Challenges for Statistical Analysis in Balancing Electricity Markets the Polish Market Example. Proceedings of the 7th Internationale Conference on Probabilistic Methods Applied to Power Systems, Naples, Italy 2002, str. 923-928

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- [39].Mienski R., Pawelek R., Wasiak I.: Compatibility between equipment and supply with regards voltage dips and short interruptions. Part I: Determination of the supplying network characteristic. Electrical Power Quality and Utilizations 2001, vol. 7, nr 2, s. 57-61
- [40].Mienski R., Pawelek R., Pawlik M., Wasiak I.: Supply Reliability Improvement by Means of Unconventional Energy Sources. 6th International Conference on Electrical Power Quality and Utilization, September 19-21, 2001, Cracow, s. 513-518
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- [42].Mienski R., Pawelek R., Wasiak I.: Application of SVC for Load Balancing. 6th International Conference on Electrical Power Quality and Utilisation, September 19-21, 2001, Cracow, s. 291-296
- [43].Mienski R., Pawelek R., Wasiak I.: Modelling and simulation of SVC performance for load balancing by means of the EMTP. 6th International Conference on Power and Energy Systems, July 3-6, 2001, Rhodes (Greece), s. 94-98
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- [48]. Mienski R., Pawelek R., Wasiak I.: A Simulation Method for Evaluation of Short-Circuit Influence on Quality of the Supply Voltage. 9th International Symposium on Short-Circuit Currents in Power Systems, October 11-13, 2000, Cracow
- [49]. Mienski R., Pawelek R., Wasiak I.: A Simulation Method for Estimating Supply Voltage Dips in Electrical Power Networks. 9th International Conference on Harmonics and Quality of Power, September, 1-4, 2000, Orlando, Florida (USA)
- [50]. Mienski R., Pawelek R., Wasiak I.: Computer Based Measuring System for Evaluation of Power Quality Characteristics. 4th International Conference on Efficiency and Power Quality of Electrical Supply of Industrial Enterprises" (PQ2000), 24-26.1
- [51]. Mienski R., Pawelek R., Wasiak I.: Computer Based Measuring System for Examination of Disturbances in a Supply Voltage. IV International Conference. „ Efficiency and Power Quality of Electrical Supply of Industrial Enterprises". Mariupol, Ukraine, 25-26 May 2000.

Appendix No2

List of selected expertises

- [1]. Pawelek R., Mienski R.: Examination of power supply in the mains of Indesit Company Poland Ltd. Report No. I-15/0181/543/2006. Lodz, June 2006.
- [2]. Pawelek R., Wasiak I.: Evaluation of impact of 110/15 kV transformer station in Stara Wies on power quality in 110 kV supply network Report No.. I-15/0181/530/2005. Lodz, October 2005
- [3]. Pawelek R., Wisniewski J., Radlowski M.: Evaluation of technical conditions of selected equipment installed in EC-3 thermal electric power station in Lodz. Report No. 8/ORŁ/2005 SEP-Lodz, Lodz, June 2005
- [4]. Pawelek R., Sikora R.: Examination of supply conditions of X-ray machine (angiograph) in Bieganski hospital in Lodz. Report No. 6/ORŁ/2004 SEP-Lodz, Lodz, April 2004
- [5]. Pawelek R., Radlowski M.: Technical documentation for extension of 3 kV container traction station MRP-8/2 type. Report No. I-15/0181/479/2003, Lodz, June 2004
- [6]. Mosinski F., Kanicki A., Pawelek R., Wisniewski J.: General concept of energy supply in Lodz city centre including continuity of supply and elimination of 6 kV voltage level in distribution MV network. Report No. SEP O/Łódź nr 8/ORŁ/2002, SEP-Lodz, Lodz, July 2002
- [7]. Pawelek R., Wisniewski J., Radlowski M.: Evaluation of needs in terms of cable instalation in Belchatow power station. Report No. nr I-15/0181/415/2000, Lodz, March 2001

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- [8]. Mienski R., Pawelek R.: Examination and identification of disturbances of the supply voltage in the industrial plant „AMICA” Wronki S.A. Report No.. I-15/0181/407/2000. Lodz, April 2000
 - [9]. Pawelek R., Wisniewski J., Radlowski M.: Examination of electric shock hazard in 6 kV station due to single- and two-phase short-circuit with ground. Report No. I-15/0181/421/99. Lodz, December 2000
 - [10]. Pawelek R., Wisniewski J., Radlowski M.: Examination of electric shock hazard in 6 kV and 15 kV networks due to two-phase short-circuit with ground. Report No. I-15/0181/373/99. Lodz, November 1999
 - [11]. Mienski R., Pawelek R.: Examination of the supply voltage parameters in the industrial plant „Thomson-Polkolor” Ltd. in Zyrardow. Report No.. I-15/0181/384/99. Lodz, November 1999
 - [12]. Mienski R., Pawelek R.: Examination of the supply voltage parameters in the industrial plant „MIRELLA” in Dobre Kujawskie. Report No. I-15/0181/383/99. Lodz, November 1999
 - [13]. Mienski R., Pawelek R.: Examination of disturbances in the supply system and control cables in the thermal electric power plant EC-4. Report No. I-15/0181/361/99. Lodz, March 1999
 - [14]. Mienski R., Pawelek R.: Examination of disturbances emission produced by WP-120 boiler supply systems in Lodz thermal power station EC-2. Report No. I-15/0181/359/99. Lodz, January 1999
 - [15]. Mienski R., Pawelek R.: Concept for supply network operation in emergency conditions in the sewage treatment in Piotrkow Trybunalski. Report No. nr I-15/0181/352/98. Lodz, December 1998
 - [16]. Mienski R., Pawelek R.: Examination of the supply voltage parameters in the industrial plant „Thomson-Polkolor” Ltd. in Zyrardow. Report No. I-15/0181/347/98. Lodz, September 1998