



The Szwalski Institute of Fluid-Flow Machinery cooperates with water power plants – such as in coping with this defective rotor

Go with the Fluid Flow

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The Szwalski Institute of Fluid-Flow Machinery was established in 1956 to conduct research into the fundamentals of the performance, design, construction and development of machines and devices used for energy conversion in flows, to provide education and to implement new solutions in this area

The main priorities of the Institute include fundamental and applied research in fluid mechanics, fluid thermomechanics, plasma and laser technology, and machine mechanics, training and education of highly qualified research workers in technical sciences, especially in such branches as mechanics, and the construction and operation of machines, as well as making the obtained research results available for practical applications.

The Institute is the largest Polish Academy of Sciences research centre in northern Poland, employing 158 people, including 80 research workers. The core staff of the Institute includes 24 outstanding professors and assistant professors with worldwide recognition, plus 32 young and talented research assistants in whose hands the Institute's future stature will undoubtedly rest. With a cur-

rent average staff age of approximately 40, this structure of employment makes the Institute one of the youngest research centers in Poland.

Research projects

The Institute has consistently ranked high in evaluation lists of research centers prepared by various government institutions. It exercises full academic rights, including the right to confer Ph.D. and D.Sc. (*habilitation*) degrees, as well as the right to initiate the nominating procedure for the title of professor.

The Institute's prestige is attested not only by publications in leading world scientific journals and by its research staff development, but also by the number and scope of research projects it has won in international and domestic competitions, plus its direct cooperation with industry. In this context, the Institute has notched up a noteworthy success with its coordination of a large international project entitled "*Unsteady effects in shock wave caused separation*," carried out in cooperation with foreign partners under UFAST, the Sixth European Framework Programme. Moreover, the Institute is currently participating in numerous other projects, such as: ARTIMA, AITEB 2, TLC, FLIRET, Cost-7 and COST G8.

The research policies of the Polish government and the authorities of the Polish Academy of Sciences, Division IV - Technical Sciences, have in recent years been ever more prominently targeted towards integrating the potential inherent in Poland's higher education institutions, Polish Academy of Sciences institutes, and governmental establishments. The Institute is particularly active and successful in this area, being the initiator of such activities as the scientific-and-industrial consortium called the "RIMAMI" Centre of Advanced Technologies, the "Eko-Energia" Scientific Network, and three large-scale, interdisciplinary Government Projects involving more than ten research teams from all over the country.

In financing research activities and staff development, an important role is played by smaller individual research projects, i.e. grants obtained in annual competitions organized by the Ministry of Science and Higher Education. Each year about 40 grant projects of this type are carried out in the Institute, which is impressive considering the number of research workers.

The company ALSTOM Power Elbląg, also known under its former names ABB-ZAMECH and ZM ZAMECH, has been the strategic partner of the Institute for years. Such cooperation has exerted a huge impact on the selection of research topics to be investigated at the Institute, and has resulted in numerous valuable reports, articles and implementations.

In general, we can name a number of spectacular industrial implementations of our research results, such as the modification of a steam turbine stage before the extraction

point, implemented at the Koźienice, Turów, Rybnik, Dolna Odra power plants and others. Every year this modification yields coal consumption savings of 30 thousand tons. Next, an improvement in multi-stage jet ejectors sucking the air in steam turbosets brought documented gains in the form of 2-3% savings in turboset output power. Moreover, our research teams have achieved great acclaim in cooperation with the low-capacity water power industry. These teams have developed and implemented a series of design solutions concerning water turbines; they also contribute to the integration of the scientific and technical community by organizing popular periodical conferences attended by representatives of foreign industry.

A look into future

Further prestige is lent to the Institute by the commissions it wins from foreign concerns. Good examples here are to be found in the long-term contract with Air Liquide (France), concerning the destruction of ecologically harmful gases, and in a similar contract with Electricite de France.

Every year the Institute performs about 40 direct industry-commissioned contracts, which means an average of one contract for every second research worker - one of the highest rates among Polish Academy of Sciences technical institutes.

If we consider the main, strategic areas of research defined in the list of priorities of the Polish Framework Programme and confront them with the Institute's research potential, increasing attention can be expected to be paid to problems connected with new ecological energy resources, including renewable energy, and problems relating to co-generation based, dispersed power engineering. Of special potential here is research connected with steam-driven micro power stations, low-emission combustion techniques, and fuel cells. Being the coordinator of the all-Polish scientific network EKO-ENERGIA and the coordinator of the "RIMAMI" Centre of Advanced Technologies, the Institute can play a significant role in these areas. ■



Building of the Institute