Aleksander Mirek, Kontrapunkt, Kraków

Technology meets nature: the Institute's new building will feature a glass atrium affording views of a nearby birch grove

Unlocking Competitive Technology

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Poland's accession to the EU has focused attention on the need for industry and science to work together – something the Institute of Fundamental Technological Research has always prioritized

The Institute's partners include such names as Snecma Moteurs, Pratt & Whitney, US Steel Corporation, WSK PZL Świdnik S.A., and Echo-Son S.A. Their successes have in part been built upon our Institute's fundamental research achievements in a broad range of fields: the experimental and theoretical mechanics of materials, structures, and liquids; computation methods for mechanics; electromagnetic phenomena; acoustic electronics and ultrasound applications in medicine; applied computer and information science; continuum physics; polymer physics; mechatronics and robotics; engineering and energy-efficient construction techniques. More than 50 years since its inception, the Institute can boast of a host of original technologies, measurement and diagnostic instrumentation, and computer software.

Beginnings

To cite the memoirs of Prof. Ignacy Malecki, the Institute's first director and one of its founders, it was at the First Congress of Polish Science (July 1951) that "the notion emerged of setting up a PAN institute in the field of technical sciences, based on the establishments in exist-

ence since 1950." The autonomous units functioning under the Technical Sciences Division - the Center for Continuous Medium Mechanics, the Electronics Center, the Vibration Research Center and the Center for Metals - were then developing cooperative ties. In June 1952 the PAN Presidium appointed a joint Research Council for the first three Centers, and on 9 December of the same year it passed a resolution bringing all four Centers together to create the Institute of Fundamental Technological Research.

The conditions were then ripe for the Institute's development. Teams led by Professors Olszak, Groszkowski, Malecki, and Krupkowski enjoyed considerable respect both in Poland and abroad for their research achievements and contributions to the advancement of industry in the wake of WWII. The world was then witnessing a surge in the importance of engineering centers, research laboratories, and special-focus institutes of a new sort (such as the international nuclear research facility CERN). The prolific development then observed in new fields of science led the Institute to gain the favor of the Polish authorities, making it possible to maintain personal contacts with researchers on the other side of the Iron Curtain.

Changing Structure

While the Institute now includes 10 research departments, its organizational structure has repeatedly been altered in the past. Soon after it was set up, new departments and laboratories came to be added. On the other hand, many subunits have likewise been spun off, often forming the core of newly-created PAN research establishments. For example, the Electrical Engineering Department became part of the newly-formed PAN Institute of Automatic Control in 1958, and the Isotope Research Department became part of the Institute of Nuclear Research in 1964. In 1963, the Analogy Department served as the basis for the PAN Applied Cybernetics Institute. Three years later, the Departments of Electronics and Magnetic Materials left the Institute to form together the Institute of Electron Technology. Such events took place quite often.

Poland's EU accession has bolstered the significance of the Institute's subunits, in terms of their impact on international science. This is illustrated by the Network of Excellence for "Knowledge-Based Multicomponent Materials for Durable and Safe Performance" (KMM-NoE), jointly coordinated by our Institute, drawing together 36 of the best research units and industrial leaders in Europe to create a pan-European "virtual institute" able to face the challenges of worldwide competition.

Priorities

Research is presently concentrated on 3 priority objectives: modern materials and structures; modeling and diagnostics for medical applications; and IT methods - analysis and optimization. The first encompasses the thermodynamics of shape memory alloys, hydrodynamics in electric-field generation of nanofibers, analyzing the behavior of materials under extreme conditions, and modeling nanoscale stresses in semiconductors. The second includes such research topics as: modeling and ultrasonic imaging of biological tissues, medically-oriented biotechnologies, and digital image analysis. The third type of research includes intelligent materials, the control and dynamics of transport systems, structural reliability and optimization, environmental engineering and renewable energy.

All the above avenues of research at the Institute (plus many more) draw their significance from their practical or potential economic application. The methods developed help in predicting the properties, technologies, and applications of various materials (e.g. designing energy-efficient methods for shaping hard-to-deform materials, or constructing radio-electronic and ultrasound subcomponents). They also find application in medicine, in the design of biomedical equipment (e.g. in bone diagnosis, tissue characterization, blood flow measurement), and in predicting the reliability,

Many avenues of research at the Institute draw their significance from potential economic application

safety, and ease-of-use of various structural designs (e.g. reducing noise to extend the lifespan of railway lines and rolling stock, or reducing the unpleasant impact of airplane landings by designing adaptive landing gear).

Educating staff

Aside from research itself, the training of research staff has always been one of the Institute's main objectives - the Institute's postgraduate program was one of the first in the country. Young researchers learned initially from the Institute's founders themselves (the first doctorate thesis was defended in 1955), and in successive decades from an equally well-renowned staff of professors (the first professorships were awarded as early as in 1954). A total of 120 professors have worked at the Institute through the years, 25 of them became the members of the Polish Academy of Sciences. Many of them began their research careers at the Institute itself, while finding time to successfully pursue diverse interests like alpinism, sailing, theater, and piano.

A New Home

Until 1958 the Institute was housed at the Staszic Palace in Warsaw, a prestigious site but not ample enough for the Institute's numerous and far-flung units. In 1957 a part of the unfinished National Bank of Poland building on Świętokrzyska Street was allotted to the Institute, one year later officially becoming its headquarters for the next five decades. In 2008 the Institute will proudly mark a new milestone in its history when it moves to its own building on Pawińskiego Street. ■