

# DEVELOPMENT OF ADVANCED TECHNOLOGIES AND AUTOMATION OF MANUFACTURING PREPARATION

*Founded 1983.*

*Founder: **Aleksandr Nikolaevich MARTYNOV**, Doctor of Engineering Sciences, Professor, Honoured Worker of Science and Engineering of the Russian Federation.*

***E. F. Bezhehukova**, PhD in Engineering, Associate Professor; **A. S. Belashov**, PhD in Engineering, Associate Professor; and **V. O. Sokolov**, Doctor of Engineering Sciences, Professor, have made significant contributions to technological and metrological areas of the group's research.*

*In 2005, the research group was led by **Vladimir Zinoviyevich Zverovshchikov**, Doctor of Engineering Sciences, Professor. At present, the group's head is **Aleksandr Evgenyevich Zverovshchikov**, Doctor of Engineering Sciences, Professor.*

The research group's members: **A. N. Martynov**, Doctor of Engineering Sciences, Professor; **V. Z. Zverovshchikov**, Doctor of Engineering Sciences, Professor; **V. A. Skryabin**, Doctor of Engineering Sciences, Professor; **I. I. Voyachek**, Doctor of Engineering Sciences, Professor; S. A. Nesterov, PhD in Engineering, Associate Professor; **A. N. Mashkov**, PhD in Engineering, Professor; N. A. Mironychev, PhD in Engineering, Associate Professor; E. V. Zotov, PhD in Engineering, Associate Professor; P. A. Gurin, PhD in Engineering, Associate Professor; E. A. Zverovshchikov, PhD in Engineering; A. V. Zverovshchikov, PhD in Engineering, Associate Professor; N. V. Sorokina, PhD in Engineering, Associate Professor; A. Yu. Komarov, PhD in Engineering; A. V. Ponukalin, PhD in Engineering.

The research group works on improving the finishing and strengthening treatment technology of components using free abrasive media weighted by inertial forces.

The research covers a wide range of problems in design and manufacturing, including process and tool modelling; studies of diamond and abrasive machining processes; application of wear-resistant coatings to tool and die surfaces; computer-aided design systems and their integration; product inspection and prototyping.

The research group's main research areas are as follows:

1. Multifunctional centrifugal-planetary processing of components (**A. E. Zverovshchikov**).
2. Surface quality assurance in centrifugal processing using discrete abrasive material (**V. Z. Zverovshchikov**).
3. Theory of abrasive cutting (**V. A. Skryabin**).
4. Quality assurance of rigid joints (**I. I. Voyachek**).



■ Assoc Prof S. A. Nesterov giving a master class on measurement technologies using a coordinate measuring machine for students from School No. 9

5. Finish processing of easily deformable and elongated details made of highly ductile materials using a densified working medium (N. A. Mironychev).

6. Low-temperature flash and burr removal from polymer products using abrasive material (E. A. Zverovshchikov).

7. Finishing and strengthening processing of components (S. A. Nesterov)

8. Spindle processing of components with external compaction of abrasive material (A. V. Zverovshchikov).

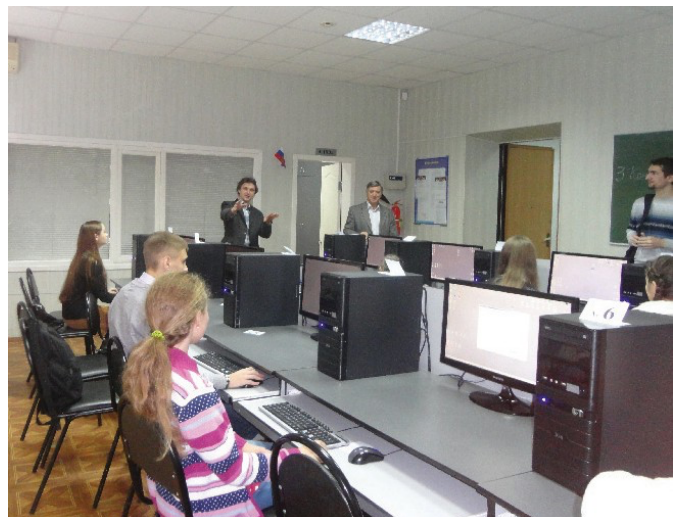
9. Plunge diamond cutting (N. V. Sorokina).

The research group maintains close cooperation with Start Production Association, Penztyazhpromarmatura, Specialised Design Bureau for Turbochargers, Penzadizelmash, the Rostselmash Combine Plant, AUTODESK, and many other industrial enterprises.

The launch of the training programme in Computer Design and Production Technology at the Department of Machine Building Technology has promoted the integration of information technologies into automated manufacturing processes. The department serves as the base for the Delcam-Penza Centre for



■ Prof A. E. Zverovshchikov giving a lesson on assembly processes in mechanical engineering to high school students from School No. 12 and School No. 53 as part of the Polytechnic School PSU Project



■ Regional contest in 3D modelling

Computer Design, headed by **A. N. Mashkov**, PhD in Engineering, Professor.

The department's premises include a computer class supporting the complete workflow of computer-aided design based on software such as MSC NASTRAN, Ansys, Polygon, SolidWorks, Sprut, and ASKON.

Based on the department, the Laboratory for Cutting and Finish Processing Methods has been also established. It is equipped with various processing machines, including a multifunctional centrifugal-planetary machine for three-dimensional machining.

The research group's members have published 8 monographs, over 40 training manuals and textbooks, and more than 800 research papers. Over 120 inventor's certificates and pa-

tents on the group's research area confirm the technical novelty of its projects.

The research group supervises PhD and Doctor of Science programmes in two study fields, namely Machine Building Technology and Technologies and Equipment for Mechanical and Physico-Technical Machining. The group has supervised 8 Doctor of Science dissertations and 47 PhD dissertations.

The group's research outcomes have been implemented in enterprises of Penza, Moscow, Vladikavkaz, Izhevsk, Yoshkar-Ola, and Gomel, Belarus.