# OVERVIEW:

The Scientific Equipment Division consists of the Design Group and the Mechanical Workshop. The activity of the Division includes the following:

- designs of devices and equipment for experiments in physics; their mechanical construction and assembly. In particular, these are vacuum chambers and installations for HV and UHV;
- maintenance and upgrading of the existing installations and equipment in our Institute;
- participation of our engineers and technicians in design works, equipment assembly and maintenance for experiments in foreign laboratories.

The Design Group is equipped with PC-computers and AutoCAD graphic software (release 2000 and Mechanical Desktop 4.0) and an A0 plotter, which allow us to make drawings and 2- and 3-dimensional mechanical documentation to the world standards.

The Mechanical Workshop offers a wide range of machining and treatment methods with satisfactory tolerances and surface quality. They include:

- turning – cylindrical elements of a length up to 2000 mm and a diameter up to 400 mm, and also disc-type elements of a diameter up to 600 mm and a length not exceeding 300 mm,
- milling – elements of length up to 1000 mm and gear wheels of diameter up to 300 mm,
- grinding – flat surfaces of dimensions up to 300 mm x 1000 mm and cylindrical elements of a diameter up to 200 mm and a length up to 800 mm,
- drilling – holes of a diameter up to 50 mm,
- welding – electrical and gas welding, including TIG vacuum-tight welding,
- soft and hard soldering,
- mechanical works including precision engineering,
- plastics treatment – machining and polishing using diamond milling, modelling, lamination of various shapes and materials, including plexiglas, scintillators and light-guides,
- painting – paint spraying with possibility of using furnace-fired drier of internal dimensions of 800 mm x 800 mm x 800 mm.

Our workshop is equipped with the CNC milling machine which can be used for machining of work-pieces up to 500 kg. The machine allows the following tool movements in particular axes: X – 1000 mm, Y – 500 mm, Z – 500 mm; it is controlled by HEIDENHAIN 407 Control System, and ensures the accuracy and reproducibility of machining of 0.01 mm in each of the axis.

In 2001 the Department of Mechanical Construction designed, manufactured and assembled an equipment for the following foreign laboratories:

- Deutches Elektronen Synchrotron, Hamburg, FRG,
- European Organization for Nuclear Research CERN, Geneva, Switzerland,
- Forschungszentrum Karlsruhe, FRG,
- Institute of Physics, Polish Academy of Science, Warsow, Poland,
- Jagiellonian University, Kraków, Poland.

Besides the large designs and systems described below, some interesting works were made for the departments of our Institute and other institutions:

1. Design and manufacturing of the new photon calorimeter of Luminosity Monitor for ZEUS Experiment at DESY,
2. Manufacturing of the shutter and supporting structures for AUGER Project in Argentina,
3. Manufacturing and assembly of 105 sets of mirror positioning devices for AUGER Project in Argentina,
4. Design of ion source for cyclotron AIC-144 at our Institute,
5. Design and manufacturing of a vacuum chamber and parts of vacuum lines for dual beam ion implantator at our Institute,
6. Design and manufacturing of experimental chamber for Proton Microprobe at our Institute.

Jerzy Halik

# REPORTS ON ACTIVITY:

In this report the most important installations and devices designed and manufactured at the Scientific Equipment Division are shown.

## Preliminary Design of HF Trucks for ATLAS Experiment on LHC at CERN

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The forward support system (HF) consists of 4 supporting structures (Trucks) which are used during assembly and disassembly of ATLAS components and as supports of forward shieldings (JF) during normal operation of the detector.

There are two moving trucks equipped with air pads on their bases with a capacity of 1000 tons (static or moving) and two fixed trucks with a capacity of 1600 tons.

The HF Trucks are foreseen for the following purposes:

- to move truck in lateral direction during long openings of detector;
- to assemble and disassemble of barrel calorimeter (1600 tons once assembled);
- to keep the load of shielding during normal operation conditions of detector (about 1000 tons);
- to enable assembly and disassembly of the shielding and other components of detector;
- to have an access platforms for assembly and disassembly of detector components.

During this phase of design the preliminary static calculations of the truck have been made according to the EUROCODE 3 and drawings of preliminary design have been prepared.

The preliminary design has been discussed and accepted by the customers at CERN.

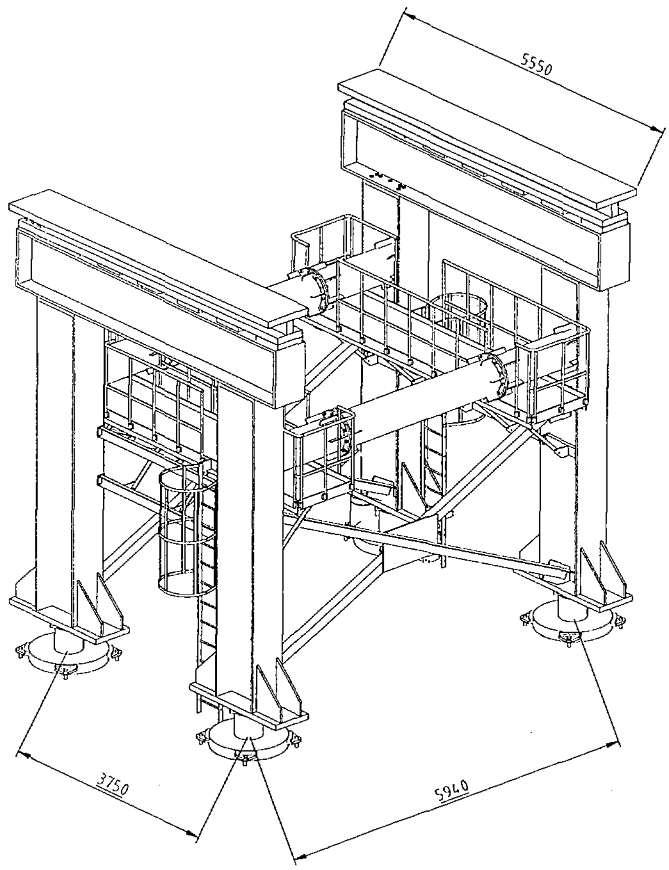


Fig. 1: HF Truck with access platforms.