16 Mechanical Workshop

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Besides equipment for the research groups at the institute, an increasing number of parts for other departments of the University were produced with the modern tools of the mechanical workshop during the reporting period. The central metal and technical material store maintained by us [5] supplied again more than 30 institutes with materials and technical support. In November 2009 we organized again an information meeting for the central store customers. The large number of attendants shows that our services are highly appreciated. For outside companies construction and modification work was done and we built prototypes and produced limited-lot series. Ss in previous years, the resulting income was used to supplement and extend the central store. Also new tooling and the continuing education of the workshop staff and the apprentices could be financed this way. Various equipment was refurbished including a lathe of the type "Schaublin 125" used in the training workshop. We replenished the equipment of the material store with a laser engraving and cutting system (see Fig. 16.1). The power of the CO_2 laser is 65 Watt, sufficient to cut almost any kind of synthetic material, paper, wood, etc. and to engrave a large variety of materials. We also bought a bending machine for acrylic glass shown in Fig. 16.2.

For our 5-axes milling machine we purchased a new CAM software package. Using hyperMill a range of special cycles such as 5-axes top milling, 5-axes swarf cutting or cutting edge machining is available now which helps to produce parts faster and with higher quality. We also installed a network license of the SolidWorks 3D design software. With this tool the parts can be designed faster. It can be used by everybody of the technical and research staff at the institute.

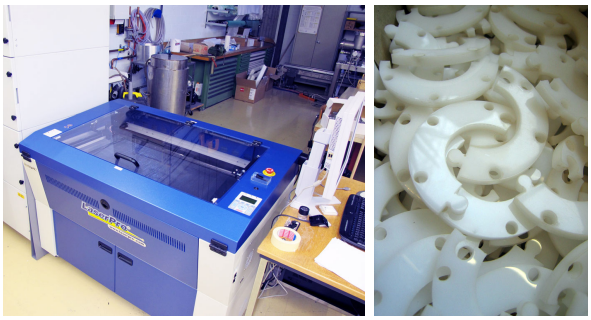

Figure 16.1:
The new laser engraving and cutting system with a working area 965 mm x 610 mm and parts out of POM produced with it.

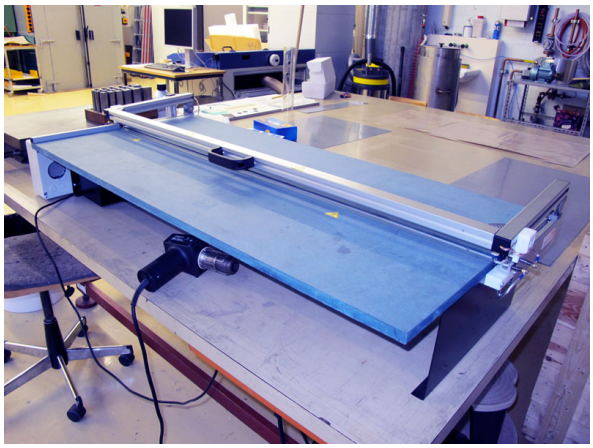

Figure 16.2: Acrylic-glass bending machine.

[5] For a catalogue see http://www.physik.uzh.ch/groups/werkstatt/dienstleistung.html

Below we list some of our projects and activities during the reporting period.

- **Basic mechanical workshop courses**
  We accomplished eight 35-hour basic mechanical workshop courses for bachelor students. During April and August 2009 1-week introductory mechanical workshop courses were provided for the research staff of the institute. These courses may also be attended by members of the other institutes of the University.
- **LHCb silicon tracking detector (Sec. 9)**
  Repair work was carried out and spare parts for the silicon detector modules were produced, to be installed during the next maintenance period.
- **CTA Cherenkov Telescope Array (Sec. 5)**
  We produced additional Winston Cone light concentrators with improved geometries. Modified mounting brackets for the mirror actuators were developed and produced. We made parts and assembled a test setup for these actuators.

  To measure the transparency and light collection efficiency of the new light concentrators we developed and built a goniometer (Fig. 16.3).
- **Surface Physics (Sec. 13)**
  The main workload during this reporting period went into the Synergia project. Only with the help of our 5-axes milling machine we could fabricate the very complex flanges (Fig. 16.4). Besides producing parts for several Bachelor- and Master-thesis projects maintenance and repair work was performed.
- **XENON Experiment (Sec. 4)**
  A transport trolley for nitrogen containers was developed and manufactured. Different parts made out of tantalum and Teflon were produced and the existing laboratory equipment was upgraded.
- **Fusion Neutron source**
  For the Neutron source which is being installed at the institute we produced different parts. The neutron generator replaces the old plutonium source.
- **Solid State Physics (Sec. 11)**
  The production of the demonstration experiment of a magnetic levitation train

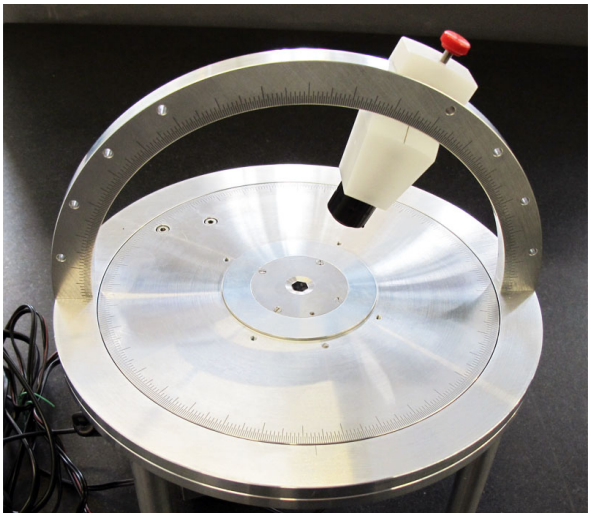

Figure 16.3: Goniometer to evaluate the different optical components.

Figure 16.4: The Synergia apparatus.

Figure 16.5: The institute director watching the model of a magnetic levitation train.

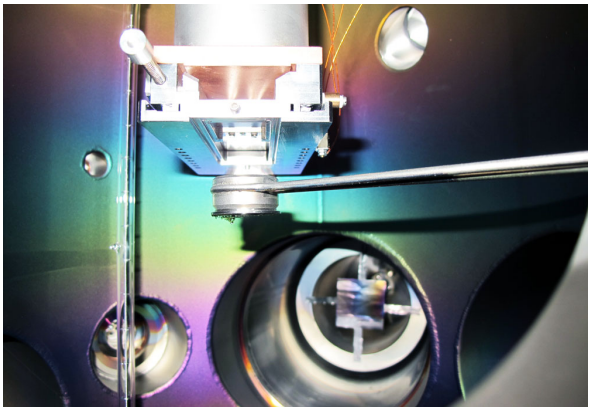

Figure 16.6: Inside view of the vapour deposition apparatus.

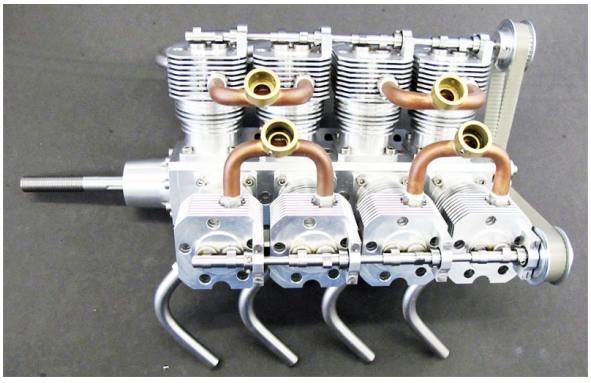

Figure 16.7: The V8 combustion engine.

(Fig. 16.5) using high-temperature superconductor was an interesting, complex but also time consuming task. We also produced motor-driven probe holders, evaporation masks and high-pressure containers made out of high-tensile materials. We had to repair a complete cryomagnetic system and installed experimental test setups.

- **Physics of Biological Systems (Sec. 14)**
  We completed the dedicated vapour deposition device with six coating stations (Fig. 16.6). Also maintenance and repair work was performed.

- **Demonstration and laboratory experiments**
  We designed and built components for a new student experiment which allows the measurement of the gravitational constant. Different instruments and devices were improved and refurbished.

- **Continuing education of the workshop staff**
  The main focus of the continuing education of the workshop staff was put on welding seminars and software courses. In-house introductory tutorials for the new "hyperMill" CAM software were organized.

- **Education of the apprentices**
  In April and September 2009 we again organized trial apprenticeships for candidates interested in getting a grade as polytechnician. In the period of May and June 2009 the final examination of an apprentice was successfully carried out in the workshop. In 72 hours of work the candidate had to manufacture all the required parts for a demonstration experiment. Besides the mandatory Swissmechanic courses the apprentices attended again advanced courses in computer controlled machine (CNC) programming, pneumatics and electronics. Also seminars introducing the use of different graphical and office software were attended. The project of constructing a V8 combustion

engine already presented in the previous report was finished successfully (Fig. 16.7).

- **Activities for other departments and outside companies**
  For other departments of the University we produced an increasing number of parts and devices. For an exhibition in the Museum of Zoology we built control desks (Fig. 16.8) and a dedicated microscope sample support. For the Institute of Forensic Medicine we constructed an improved probe holder (Fig. 16.9) which speeds up standard blood tests. Micro drives with sensor holders (Fig. 16.10) and custom designed camera packages were manufactured for the Institute of Neuro-informatics. For the Institute of Physiology a respiration demonstration experiment was renewed and special needles were produced used for the biopsy of the muscles of athletes (Fig. 16.11). Also for outside companies construction and modification work was done and we produced prototypes and limited-lot series. As an example we developed and manufactured holders for energy saving LED lamps for a company which sells illuminating systems.

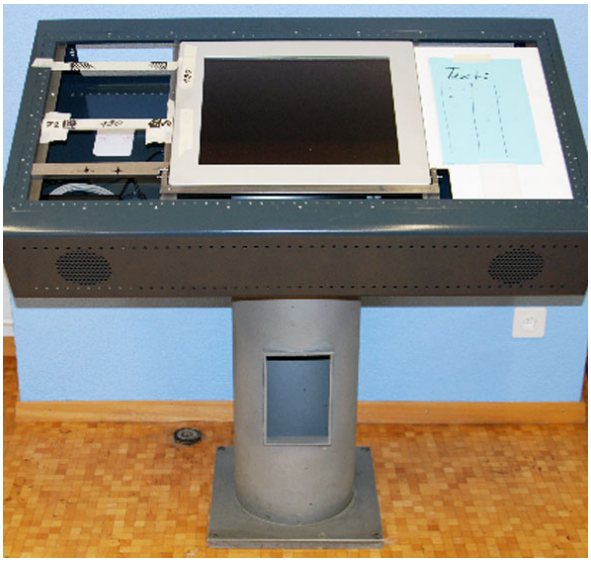

Figure 16.8: Control desk.

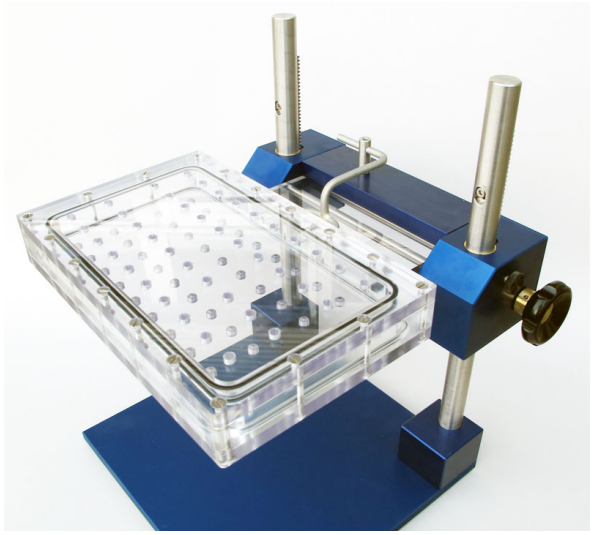

Figure 16.9:
Probe holder for the institute of forensic medicine

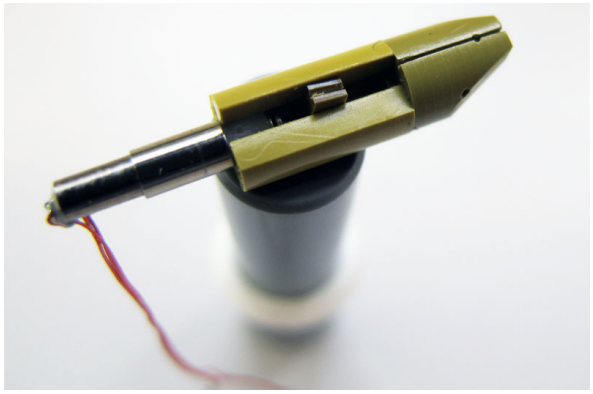

Figure 16.10:
Micro drive for the institute of neuro-informatics.

Figure 16.11: Biopsy needles.