

15 Mechanical Workshop

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With the modern tools of the mechanical workshop we produce, besides equipment for the research groups at the institute, an increasing number of parts for other departments of the University. For outside companies construction and modification work was done and we built prototypes and produced limited-lot series. 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.

The central metal and technical material store maintained by us⁷ supplies more than 30 institutes with materials and technical support. In November 2008 we organized for the second time an information meeting with the central store customers. The large number of attendants shows that our services are highly appreciated.

With a small investment we replenished the equipment of the welding shop with an elec-

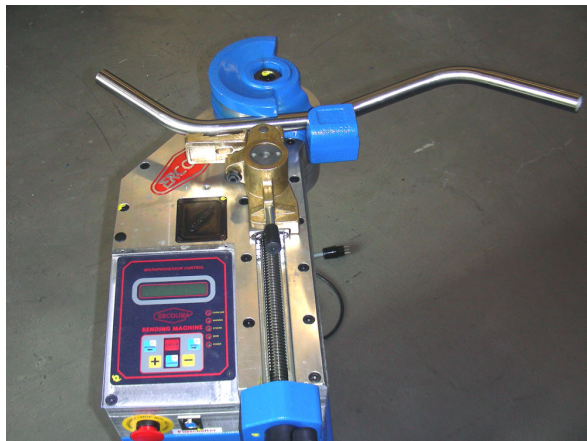


Figure 15.1: The new bending machine.

⁷For a catalogue see <http://www.physik.unizh.ch/groups/werkstatt/dienstleistung.html>

trical rotary draw tube and pipe bending machine. The device is programmable and the bending capacity goes up to 42 mm in diameter. In the training workshop also used for the basic courses we replaced a 35 years old lathe of the type "Schaublin 135" with the later model "Schaublin 125". The second hand machine could be obtained from the hardware marketplace maintained by the University. Dedicated central spanning benches were purchased for use on the modern milling machine with five axes. With these devices an easier and more accurate handling can be achieved.

Below we list some of our main projects and activities during 2008.

- Basic mechanical workshop courses

For the bachelor students we organize two basic courses. During the first stage the candidates learn how to use all kinds of measuring tools and accomplish simple work on drilling and milling machines as well as on the lathe. They learn how to read and produce technical drawings and the course ends with an introduction in the technique of hard soldering. In the second stage more demanding machining techniques are trained. Different materials are handled and an introduction into various welding processes is given. We had to arrange again four courses of 35 hours each because of the large number of students. The students appreciate the courses very much. In March 2009 an in-house introductory workshop course was arranged for the interested research staff. This one-week course will be repeated periodically.

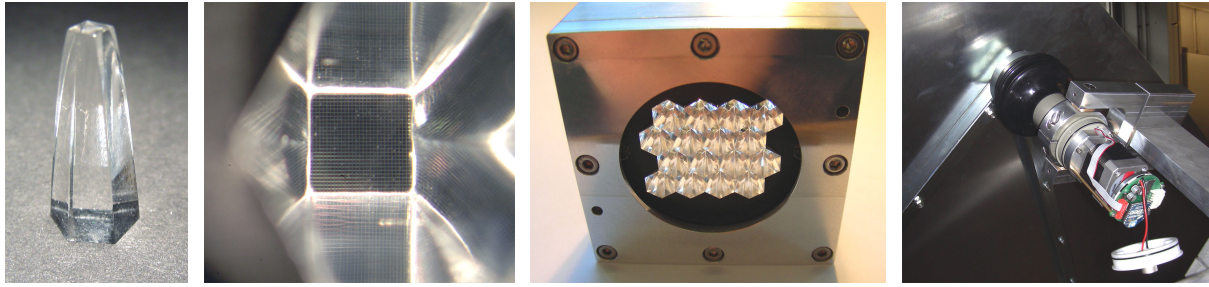


Figure 15.2: From left to right: two views of a prototype Winston Cone light concentrator, an array of 16 such cones and a picture of one actuator mounted on the mirror dummy prototype.

- **XENON Experiment (Sec. 4)**

A photomultiplier test setup was built and different parts made out of Teflon were produced for the XENON experiment built up at the Gran Sasso laboratory in Italy.

- **CTA Cherenkov Telescope Array**

Winston Cone light concentrators were produced using acrylic glass, which is transparent for ultraviolet light. We built a prototype test system with dummy mirror and the necessary actuators for the precise positioning of the mirrors (see Fig. 15.2).

- **LHCb silicon tracking detector (Sec. 8)**

We renewed the cooling system of the electronic crates for the silicon tracker.

- **Surface Physics (Sec. 12)**

We built several devices for Bachelor- and Master-thesis experiments carried out in this research group (see Fig. 15.3). Different evaporators were built and we manufactured parts used for evaporation deposition made out of molybdenum and stainless steel. New probe holders were provided as well. Maintenance and repair work was performed during the reporting period.

- **Solid State Physics (Sec. 10)**

For this research group we produced sample holders and complete probe manipulators. Again different coil shells made out of different materials were manufactured. We started the development and

construction of a new demonstration experiment with a running train supported by cooled high-temperature superconductors floating in a magnetic field. The setup will also be shown during public events.

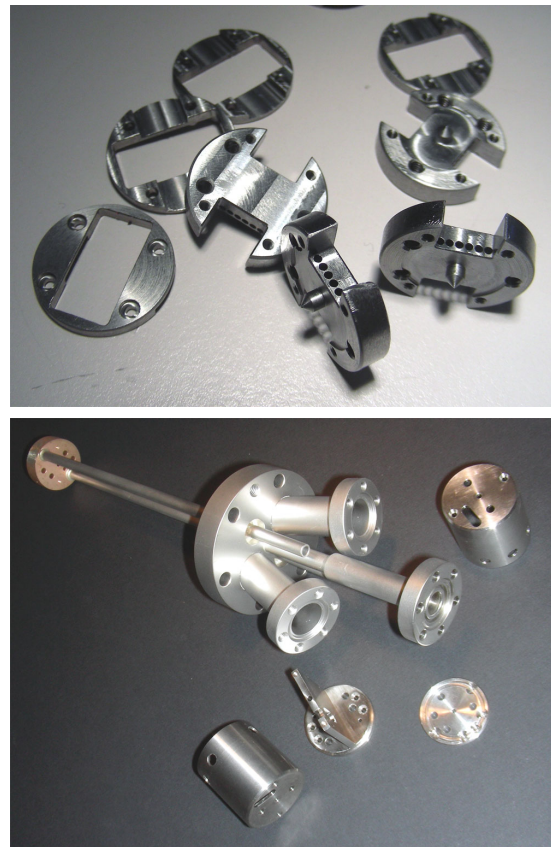


Figure 15.3: Parts of a sample holder made out of molybdenum and stainless steel. The lower picture shows a custom-made evaporator.

- **Physics of Biological Systems (Sec. 13)**

We started the production of a dedicated vapour deposition device with six coating stations (Fig. 15.4). Maintenance and repair work was performed as well.

- **Continuing education of the workshop staff**

In August 2008 an internal course in modern metrology techniques was organized. During four days we learned and trained the operation of the measuring machine installed in the workshop. Seminars and innovation days in relation with modern processing methods and materials were attended including the international trade fair "PRODEX" which shows the latest machine tools and accessories. CAM software courses were attended and assessments in welding were made.

- **Education of the apprentices**

Between the April 28 and May 9 we organized trial apprenticeship for candidates interested in getting a grade as polytechnician. Besides the mandatory Swiss-mechanic courses the apprentices attended again advanced courses in computer controlled machine (CNC) programming, pneumatics and electronics. In February and March 2009 the apprentices started their preparation for their intermediate and final exams. For the project work which the apprentices have to perform in the fourth year of their education different parts for a V8 combustion engine were manufactured on the drilling and milling machines in our workshop (Fig. 15.5).

- **Miscellaneous**

In April 2008 on the occasion of the 175th anniversary of the University of Zürich the apprentices designed and installed an exhibition stand (Fig.15.6). They informed about their work and demonstrated different devices built in the workshop. We visited a bio-fuel production plant in May 2008.

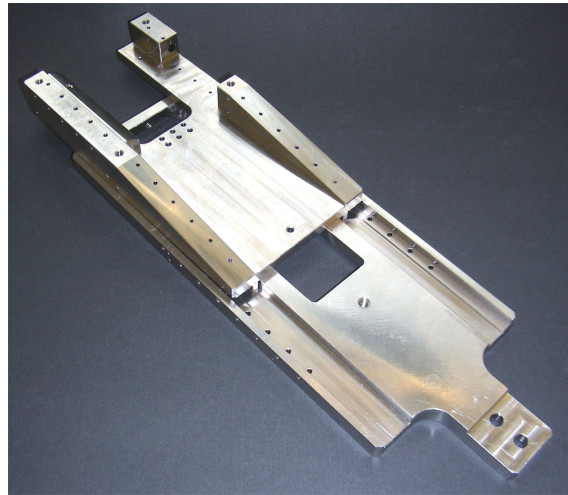


Figure 15.4: Component for the dedicated vapour deposition device with six coating stations.



Figure 15.5: Cylinder heads and the crankcase for the V8 combustion engine.



Figure 15.6: Exhibition stand with running demonstrations. In the foreground a steam engine built in the workshop can be seen.