14 Mechanical Workshop

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Thanks to the availability of sophisticated numerically controlled machines the mechanical workshop is well equipped to manufacture all kind of complicated and technically demanding components. For this reason the number of orders from other departments of the university is increasing steadily. The income from construction and modification work for outside companies is used for new tooling and for advanced training courses of the apprentices and the staff members. We also design and build prototypes and make limited-lot productions.

More than 30 institutes made again use of the metal and technical material store maintained by the workshop [7]. The store not only supplies materials but quite often also consults its customers.

During the reporting period some smaller investments were made. For the welding shop we purchased a dedicated welding machine used exclusively for the metal active gas (MAG) and the metal inert gas (MIG) welding of aluminum. On the modern milling machine DMU 50ev we installed a haze filter system. A 26 years old universal manually controlled milling machine was completely refurbished. In the metal and technical material store we adapted the storage frames for the sheet material to the larger actual norm dimensions and the storage for the remainder parts was rearranged.

In summer 2007 and winter 2008 we organized and accomplished the basic courses for the bachelor students in physics. In a first stage the candidates learn how to use all kinds of measuring tools and how to read and produce technical drawings. They also accomplish simple work on drilling and milling machines as well as on the lathe. The course finishes 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. Because of the large number of participants we had to arrange four courses of 35 hours each.

Below we list some of our main projects and activities during 2007.

CMS pixel detector

In 2007 the main part of the workshop workload was related to this project. We produced the detector support structure for the prototype system consisting of a complete half shell and the two half shell pairs needed for the final system. To guarantee the required precision a lot of auxiliary tooling had to be produced for the construction of these parts. Here we profited strongly from the modern computer controlled milling machine with 5 axes (DMU 50eV) acquired in 2005. Very complex parts could be produced with high precision. At the end of October 2007 the final system was sent to PSI, where the installation of the silicon sensors started.

Besides the detector support structure we also manufactured the supply tube half shells for the barrel pixel detector of the CMS experiment. The experience made with the prototype half shell pair resulted in some changes for the final two half shell pairs. Additional

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

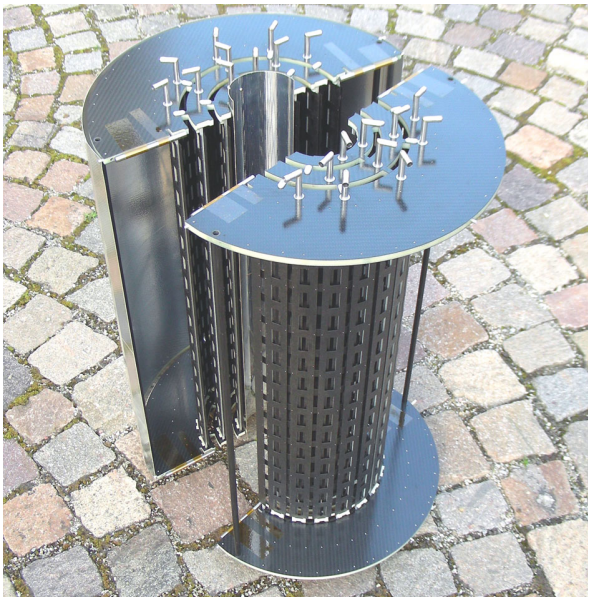
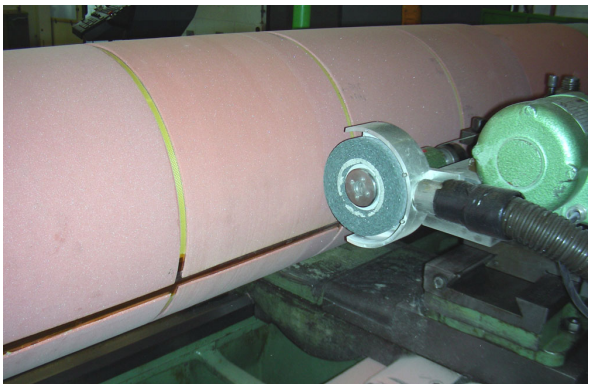


Figure 14.1: CMS Barrel Pixel Support Structure.



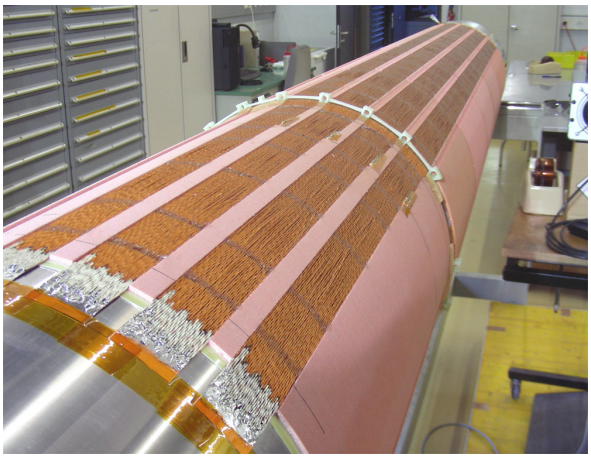


Figure 14.2: CMS Barrel Pixel Supply Tube during the production.

auxiliary tools were produced in the workshop. The production of these parts with a length of about 2.2 m was accomplished on a 3 m long lathe which is especially adapted for such components. Although the experts from the safety department of the university complained about the unconventional use of the machine it was only due to these additional installations and modifications that the very complex milling, drilling and grinding work could actually be accomplished. The last supply tube pair was completed in April 2008. All components are now at PSI where the complete detector system will be assembled.

LHCb silicon tracking detector

The Tracker Turicensis was transported to CERN already at the end of 2006. Some modifications were made to the cooling system and the electronic crates.

Figure 14.3: Installation of the LHCb TT-station at CERN.

Surface Physics

We manufactured a stand for a scanning tunneling microscope (STM) with different extensions and installations. We produced different probe- and vacuum-deposition-holders made out of stainless steel. In addition we performed maintenance and repair work during the whole reporting period.

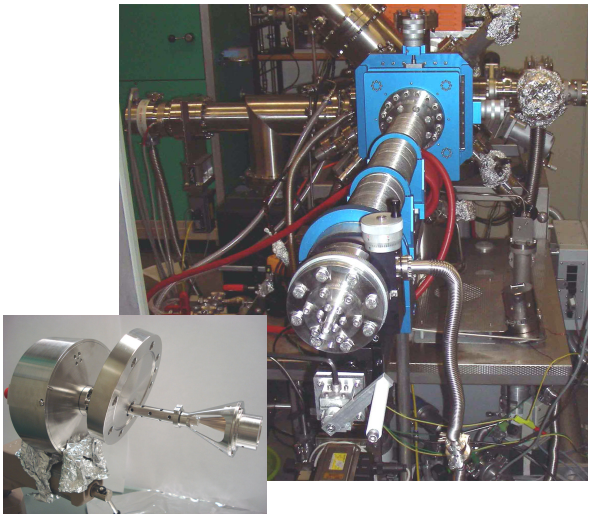


Figure 14.4: Vacuum parts made out of stainless steel and a new probe manipulator.

XENON Experiment

We produced a test setup for photomultipliers and manufactured different parts made out of Teflon for the XENON experiment built up at the Gran Sasso laboratory in Italy.

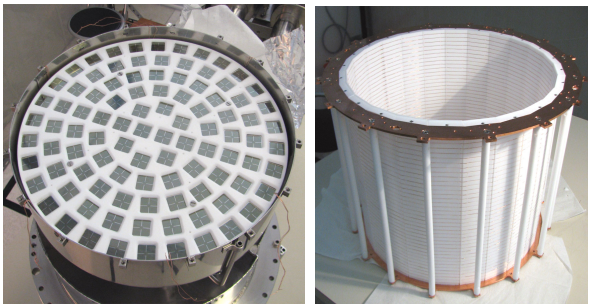


Figure 14.5: Components for the XENON Experiment made out of Teflon.

Solid State Physics

Specimen holders and complete probe manipulators were produced. We manufactured different coil shells and probe packagings made out of different materials.

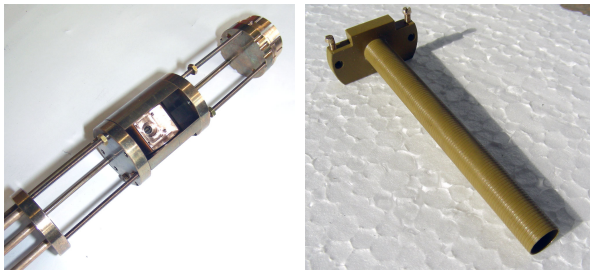


Figure 14.6: Coil shell and specimen holder made out of different materials.

Physics of Biological Systems

Different test setups were built. Some apparatus were upgraded and in addition we performed maintenance and repair work.

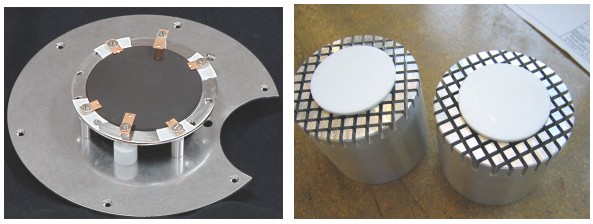


Figure 14.7:
Multichannel plate holder and ceramic disks for the LEEPS Microscope prepared for the milling.

Projects from other institutes and outside companies

In 2007 an increasing number of jobs were carried out on the workshop machinery for other institutes of the university. Besides single parts, complete setups were also built. Furthermore, we accomplished some work for outside companies.

Figure 14.8: Custom built sample holder for the Institute of Physiology.

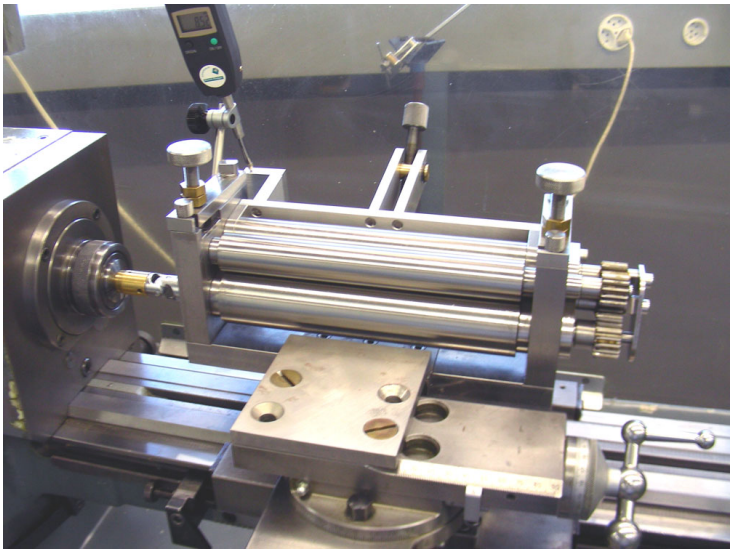


Figure 14.9: Dedicated plate bending machine.

Continuing education of the workshop staff

In April and June 2007 an internal welding course was organized for the workshop staff. For 5 days we learned and practiced the latest welding techniques. Seminars and innovation days in relation with modern processing methods (welding, grinding, milling, etc.) were attended. In August and September training courses for the CAM software used in the workshop were organized for all staff members.

Education of the apprentices

Besides the mandatory Swissmechanic courses the apprentices attended also advanced education in computer controlled machine (CNC) programming, pneumatics and electronics. In May 2007 the apprentices had to pass their intermediate and final exams. The final apprenticeship examination consisted of a project of 75 working hours carried out at the institute's workshop. The candidate had to manufacture a dedicated plate bending machine which was designed and developed in the workshop. With this apparatus we can produce precise tubes with a length of 150 mm and a diameter of 30 mm and greater out of 1.5 mm thick plate material. In the period 11 - 15 June 2007 we organized trial courses for young people interested in an apprenticeship at the workshop.

Miscellaneous

On the 29th and 30th of June 2007 the workshop staff visited CERN in Geneva. We visited both LHCb and CMS for which we manufactured components in our workshop. In October we moved the components of the H1-project which were de-comissioned in 2007 back from Hamburg to Zürich. Since 1991 people from the workshop staff spent several weeks working for the project at DESY. So leaving Hamburg this time some nostalgia came up. In February 2008 the workshop staff enjoyed a day out in the snow.