A NEW TRANSPORT FLASK FOR PSI BEAM LINE COMPONENTS AND THE UCN COLLIMATOR

J. Züllig, A. Strinning, A. Geissler

In order to reduce the dose rate to personnel during the dismounting of components of the PSI proton beam line, the old "K und P" (collimator and profile monitor) transport flask has been rebuilt. The dismantling of the Pirex beam line and the handling of the UCN Collimator are two major tasks scheduled for the new "K und P" transport flask.

NEW FEATURES

Because of the continuous increase of the proton beam intensity, more efficient and safer handling devices must be provided. With the upgrade of the old "K und P" transport flask, which was a rather simple handling device, a flexible and suitable transport flask usable for eight different components of the proton beam line is now available.

The new "K und P" transport flask (Fig. 2 and 4) is the combination of a new hoisting gear part at the top and the old steel shielding part at the bottom.

The new features are:

- A control system to automate operating sequences (PLC)
- An electrical hoisting gear with 2 parallel chains to prevent the rotation of the gripper (maximum load of 2500 Kg)
- A pneumatically controlled hook (gripper), see Figure 1
- A positioning system for the gripper
- A load measuring system with overload diagnosis and loose-chain detection
- A horizontal and vertical system to fix the load during transportation of the "K und P" transport flask on a carriage

In the past, the "K und P" transport flask was hanging on the crane while accelerator components were pulled in and out from the hot cell of the ATEC area. For additional safety, lateral supports (see Fig. 4) were added so that the flask has now a more stable stand.

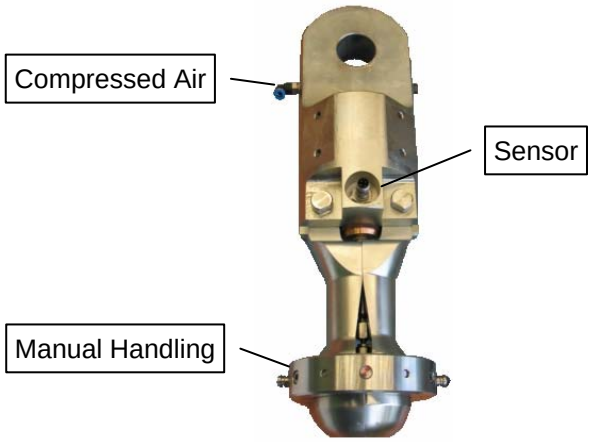

Fig. 1: Gripper

Originally the gripper has been developed at PSI for the carriage of radioactive waste containers. This gripper is now also used in the transport flask, it has pneumatic actuation and is equipped with sensors indicating the open or closed state (Fig. 1).

A traction test has been carried out at the Swiss Federal Laboratories for Materials Testing and Research (EMPA). The examination showed that the gripper had more than sufficient strength to load the heaviest component planned to be handled with the "K und P" transport flask.

Moreover, with the PLC control system, the status of the lifting device is continuously monitored to prevent any false manipulation, as for instance lowering the gripper while the sliding door is closed.

In case of power failure it is foreseen that all safety-relevant gears can be operated manually.

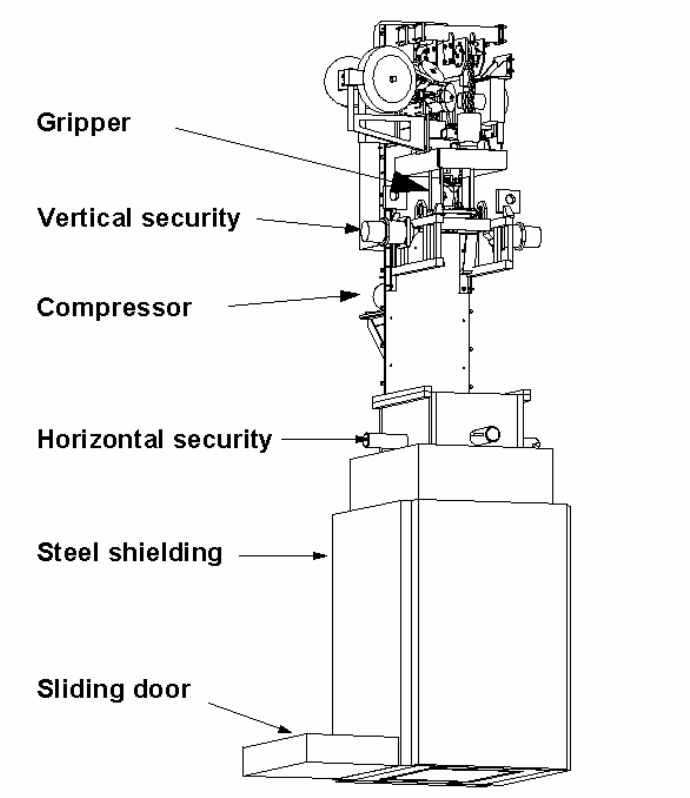

Fig. 2: 3-D view of the "K und P" transport flask top and steel shielding bottom.

HANDLING THE COMPONENTS

Before removal of devices from the beam line with the “K und P” transport flask a suitable holding frame has to be mounted on top of the component (see Figure 3). In order to lift the component the gripper connects to this holding frame.

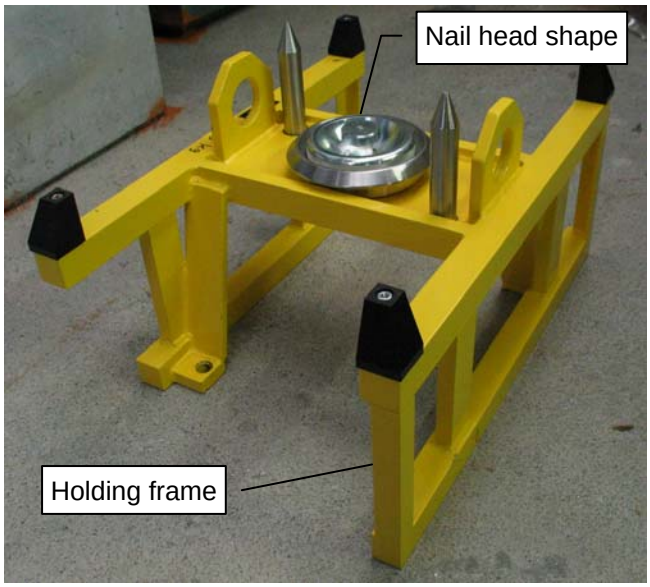

Fig. 3: Holding frame with nail head shape to connect with the gripper.

The “K und P” transport flask can handle components from the Pirex II area as well as from the proton beam line behind target M. It is also planned to use the flask for installation and dismounting of the future UCN collimator.

In the Pirex II area the following components can be handled:

- Degrader DCD1
- BeamDump BC1/FC1
- Profilmonitor MCS/MCP 11/12
- Profilmonitor MCS/MCP 13/14

In the proton beam line behind target M the following components can be handled:

- Profilmonitor MHP 23/24
- Collimator KHM1 and KHM2

Fig. 4: Front view of “K und P” transport flask.

OUTLOOK

At the moment, some small mechanical and electrical adaptations need to be made in order to complete the construction. Thereafter, all functions of the “K und P” transport flask will be tested.

Future extensions in the utilisation of the “K und P” transport flask can be planned. New holding frames can be built for other components in order to fit with the “K und P” transport flask.

REFERENCE

Fig. 3 is a cut-out from design
“TRANSPORTFLASCHE ZUSAMMENST”
10002.72.215A , P. Suter