

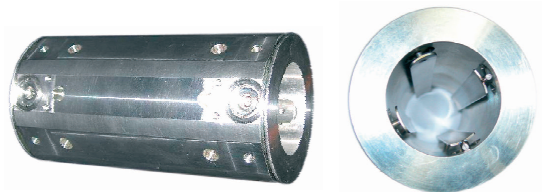
## DIAGNOSTIC COMPONENTS

Several types of **diagnostic components for beamlines, main rings and LINAC** of particles accelerators (colliders and storage rings for synchrotron light) have been produced by CECOM for different research institutes. The collaboration with our Customers for the identification of critical points of each application and of the best production methods improved our knowledge about the stringent requirements of this kind of application, and our know-how concerning manufacturing methods which can guarantee the required precision and performances. The main requirements for the production of these components are mechanical precision (tolerances better than **0.05 mm** for assembled components) and long term mechanical stability: each device must be developed in order to avoid any deformation during its lifetime; at this purpose the structure of the relative vacuum vessel is usually thermally treated for mechanical stabilization. Another important item involved with the construction of diagnostic components is the fiducialization of inner components, which shall be guaranteed with a precision of the order of **0.01 mm**.



In this field of application a relevant example is represented by the **Pick-up** for **CNAO**: the transversal position of the beam passing through each peak up can be detected by means of stainless steel electrodes. These electrodes are electrically insulated with respect to the body of the vacuum chamber by means of ceramic breaks. The device is equipped with a removable survey structure including positioning holes for survey spheres.

Similar in scope, but really different in the production method, are the **"monitor strip line"** components for the LINAC of SPARC (LNF). The inner electrodes are positioned with a tolerance of the order of 0.01 mm. Inner electrodes are fiducialized with respect to the outer references.

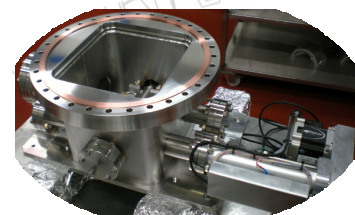


Another kind of diagnostic components for the characterization of the beam are the **RF-deflectors**. These devices are used at SPARC for the determination of the bunch length. Each RF deflector is composed of a series of brazed cells, made up of OFHC copper. The two edge cells are brazed to CF flanges. Each cell is machined with a  **$\pm 0.01$  mm tolerance**, and a roughness of **0.2  $R_a$**  is achieved on the inner surfaces. Each RF-deflector is equipped with an RF-tuning system and with an external cooling circuit.

**BPM bodies** for LHC Beam Position Monitor were manufactured in CECOM. These 900 parts are made up of forged stainless steel AISI316LN. The most critical technical aspects of these components were the high mechanical precision and the 100  $\mu$ m copper plating of inner surfaces.

Further relevant UHV diagnostic devices produced by CECOM are:

- **Beam Position Monitors** for CELLS and ESRF
- **Multiscreen Systems** for ELETTRA
- **Wire Scanner Monitors** for MEDAUSTRON



References: **CERN, INFN, CNAO, CELLS, ELETTRA, ESRF, MEDAUSTRON**