

1.9.13. MOBILE CT-SYSTEM FOR IN-SITU INSPECTION IN THE LHC AT CERN

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At the European Center for Nuclear Research (CERN) the worlds most powerful particle accelerator ring, the Large Hadron collider (LHC), is being put into operation. It has been found useful to have a tool for diagnosis of the state of components in the inter-connection regions of the LHC.

This tool, for non-destructive testing (NDT) must work without opening the inter-connection elements, without breaking the integrity of the vacuum, and without the need to warm up the sector which would be costly and time consuming. In addition the NDT tool has to be transportable in order to position it anywhere around the 27 km long LHC ring.

The approach is an X-ray inspection with the aim of an unambiguous representation of all structural elements in the interconnection regions of the LHC ring. The minimum criterion is to achieve an inspection result which allows for a check of the correct position and integrity of all important components.

3D X-ray computed tomography (3D CT) would be the ideal solution for such an ir But due to the constraints in the LHC tunnel, especially the very limited space behind the LHC ring it is not possible to move an X-ray source and a digital X-ray detector completely around the interconnections. Therefore it was necessary to develop a mobile 3D X-ray system which allows for a maximum scanning versatility within the given constraints and provide 3D results based on scan angles.

Such a mobile X-ray system is presented in this paper as well as results from the inspections of the LHC ring interconnections.

In addition it will be outlined how the approach used in this system could be applied to other applications.