Geometric measurement for the LHC magnets

As the required tolerances on the geometry [1] of the LHC cold masses and on the positioning of some of its components are very tight, the final steps of the assembly are assisted by 3D optical measurements. From 2001, a Visual Basic™ program written at CERN (i.e.: Magnet Geometric Measurement – MGM) with direct access to the command library of the Leica Geosystems™ software, called Axyz, executes every sub-routine of the measurement process [2]. To be able to continue using the geometric measurement program for the LHC lifetime, the upgrade of the software components was decided.

Using PC-DMIS commands

PC-DMIS automation is language independent and provides a list of methods, properties and events for each PC-DMIS automation object. Performing an action like measuring a point usually involves inserting a command to the script and executing it.

Speeding up development and maintenance

The choice was made to develop MGM using LabVIEW™, because it was the most suited to fulfill the requirements of flexibility, adaptability, quality, integration into industrial control software and light maintenance. Now that LabVIEW™ has been chosen, access to the ActiveX component are just as easy as with Visual Basic™. However, the calculations, displays and data storage are already built-in functions, those only needs to be arranged together. To ease the development, a LabVIEW™ to PC-DMIS library of drivers has been created including the main functions required for the MGM. This means that for each alignment module, the developer will not have to go through the entire PC-DMIS library again.

CONCLUSIONS

The existing MGM Visual Basic™ application has given successful results during the magnet construction for the LHC. Now the new system look promising and the development time has been shortened a lot using LabVIEW™ and the homemade dedicated palette to PC-DMIS. The next step could be to develop a second palette for LabVIEW™ to emScon to avoid using the heavy environment for small automations.