

## RAS Working Group meeting 24.06.2021

**Participants:** A. Apollonio, M. Chioteli, L. Felsberger, B. Fernandez Adiego, R. Johnson, A. La Rosa, I. Lopez, C. Obermair, K. Osman, V. Schramm, J. Uythoven (chair), W. Vigano

The slides are available on Indico:

<https://indico.cern.ch/event/1042458/>

### ***The EP/DT Quality Assurance & Reliability Testing Lab - Speaker: Alessandro La Rosa***

A. La Rosa presented the Quality Assurance & Reliability Testing (QART) Lab. It provides resources for the quality assurance of the CERN detector technology with a focus on reliability testing and visual inspection of systems. After introducing the lab and its equipment, A. La Rosa went through a few example use-cases. These included thermal cycling tests, vibration tests, surface roughness measurements, and operation under magnetic fields, among others.

#### **Questions after the presentation:**

W. Vigano wanted to know the maximum excitation frequency of the shakers. A. La Rosa answered that it is 5.3 KHz.

W. Vigano asked if there is a plan to build a capacity for EMC tests. A. La Rosa said that is not foreseen currently.

R. Johnson asked whether cabling can be run in and out of the climatic chambers which A. La Rosa confirmed.

A. Apollonio asked how long the waiting times for tests are from their request to the start of their execution. A. La Rosa answered that most equipment are usually in use but that slots can be made free so that the waiting times should not exceed two weeks. In addition there are some restrictions due to COVID for the maximum number of personnel in the clean room which are to be respected.

V. Schramm asked how the accelerated tests are designed. A. La Rosa answered that the conditions depend on the application of the tested system and are discussed with the users.

V. Schramm asked whether the climatic chambers have problems with the humidity control during temperature ramps. A. La Rosa answered that for the characteristic ramps for electronic systems (5 degrees per minute) they have never observed problems. Moreover, dry air can be flushed into the chamber to regulate the humidity.

A. La Rosa said that he would be happy to give a tour of the lab. J. Uythoven said that this can be organised through the RASWG and that interested people should get in contact with Lukas, Andrea, or him.

### ***BIS v2 CIBM Reliability Analysis - Speaker: Kamil Osman***

K. Osman presented a progress update on the reliability analysis of the Controls Interlock Beam Manager (CIBM) board of the second version of the Beam Interlock System (BIS v2). He explained the differences between the current BIS and the new BIS v2 before presenting the results of a top-down and a bottom-up reliability analysis.

#### **Questions after the presentation:**

W. Vigano asked how the quality factor of the components was defined. A. Apollonio and V. Schramm explained that the updated 217+ prediction standard does not have a quality factor anymore as the previous 217 standard had. The quality factor is calculated by the manufacturing year of the components.

V. Schramm asked whether the study has already triggered some design changes for the CIBM. A. Apollonio answered that the results have only been shown to the experts a few days before and that discussions are ongoing. J. Uythoven added that the results so far are not worrying and that they will have to be combined with the results of the other systems in the BIS. This may trigger design changes then. A. Apollonio pointed out that it is interesting that only five failure modes contribute to the problematic blind failures. They will be investigated in detail.

W. Vigano and V. Schramm recommended to do the bottom-up failure mode analysis at the level of functional blocks (assuming the functional block failure rate being the sum of the worst-case component failure rates) and to do a detailed analysis at the level of the individual components only if the functional block failure rate is problematic. This might shorten the analysis. A. Apollonio answered that for non-critical parts, such as the monitoring, they have already been doing that. However, for the critical parts they prefer to go in full detail.

M. Chioteli asked whether the FTA was automatically generated from the FMECA in Isograph and whether he compiled the failure modes from the 217+ standard and the BIS expert input. Kamil confirmed both questions.