



MEASUREMENT & INSPECTION

Dimensional measurement of components is routinely used throughout the Aerospace Industry to verify the conformance of the manufactured product to the specification. To ensure measurements are reliable, it is important to ensure the measurement capability is suitable for the feature being measured. Failure to implement and maintain effective measurement processes can lead to quality problems. It is therefore important for all aerospace manufacturers to operate effective measurement processes. There are a number of standards available that address Measurement & Inspection (M&I) issues, such as ASME Y14.5, ISO 17025, and ISO 10012. However, consistency of interpretation and application of these standards can be difficult, and existing customer or other party audits do not address the full scope to the level of detail required.

Consequently, the aerospace supply chain still experiences a number of issues related to measurement and inspection. The M&I Task group was established in 2012 to help address these industry concerns. Today, M&I conducts approximately 190 audits per year, and over 230 suppliers hold accreditation to M&I.

INDUSTRY SUPPORT

Participating Stakeholders:

- Airbus*
- Airbus Defense*
- Airbus Helicopters
- Safran*
- GE*
- Rolls Royce*
- Lockheed Martin
- Pratt & Whitney
- Honeywell
- Boeing
- Spirit Aerosystems
- Heroux Devtek
- (* mandates)

BUSINESS BENEFITS

- Reduced costs associated with product malfunction, returns, complaints and equipment failure
- Reduced reputational damage and impact on credibility and trust in the industry
- Customer attrition due to inability to satisfy requirements
- Improved on-time delivery
- Improved control of supply chain
- Mitigated in-service risk of product failure
- Reduced scrap and rework
- Improved product quality

TECHNICAL BENEFITS

Reduction in nonconforming product by ensuring a more in-depth review of . . .

- The equipment calibration processes and requirements
- Operator qualification and training
- The process of hardware inspection including part set-up and fixturing
- Part programming and software use
- Coordinate system establishment
- Equipment maintenance in supporting fixture and asset care to prevent use of dirty/damaged/unfit for purpose equipment
- Equipment operational environment
- Equipment capability to measure tolerance required (measurement system analysis)
- Part programming / software verification

AUDIT CRITERIA

1. AC7130 – M&I Accreditation
2. AC7130/1 – Coordinate Measuring Machine
3. AC7130/2 – Laser Trackers
4. AC7130/3 – Articulating Arms
5. AC7130/4 – 3D Scanners
6. AC7130/5 – Mass Airflow Measurement of Turbine Engine Parts
7. AC7130/6 – General Inspection Tools

Mandates

Airbus, Airbus Defense and SAFRAN – AC7130/1/2/3
GE Aviation – AC7130/5
Rolls Royce – AC7130/4

COMMON INDUSTRY ISSUES

- Calibration of Equipment – lack of calibration, out of tolerance, lack of flow down of requirements to calibration house, lack of recurring calibration.
- Operator Qualification – no evidence or documentation of training/qualifications, or process of training/qualification.
- No evidence of verification checks during equipment operation.
- No evidence that equipment is capable of required inspection to required tolerance levels.
- No verification or inappropriate software use, or wrong revision.
- Equipment being used in uncontrolled or unmonitored environments.
- Out of tolerance conditions not being addressed.
- No reverification of equipment after measurement of calibration setup.

COMMON NONCONFORMANCES FOUND DURING AN AUDIT

- NCR 1** - The Auditee provided evidence of a calibration certificate for the CMM (S/N #38, 3 Dec 2022), however the calibration results indicated “as-found, out of tolerance”. The Auditee could not provide evidence to indicate appropriate actions taken as result of the out of tolerance condition.
- NCR 2** - The Auditee could not provide evidence of an asset care process for the CMM equipment. The probe tip was contaminated with grease and dust and the guideways were covered with grit.
- NCR 3** - The Auditee could not provide records or any evidence of training, experience or on the job training (OJT) required for the Operators. The Auditee could not provide evidence of Operator approvals.
- NCR 4** - The Auditee could not provide evidence of current calibration for the CMM (PO records or calibration certificate). Calibration status was also not displayed on the CMM.
- NCR 5** - The Auditee could not provide evidence of flow-down of specific calibration requirements to the calibration source.
- NCR 6** - The Auditee could not provide evidence of a calibration certificate verification review when received from the calibration source.
- NCR 7** - The Auditee could not provide evidence that the Measurement System Software was verified to previous artifact data after two software updates and is in use.
- NCR 8** - The Auditee could not provide evidence of a process to manage the temperature around the CMM. During the audit, the ambient temperature was 6 degrees F above the industry standard.
- NCR 9** - The qualification sphere size indicated in the CMM software does not match the calibration size of the sphere listed on the calibration certificate.

USA / International Headquarters

Telephone: +1 724 772 1616
Email: PRIAmericas@p-r-i.org

Asia Office (China)

Telephone: +86 10 6463 6008
Email: PRIAsia@p-r-i.org



Europe, Middle East and Africa

Telephone: +44 (0) 870 350 5011
Email: PRIEMEA@p-r-i.org

Asia Office (Japan)

Telephone: +81 80-6911-1154
Email: PRIAsia@p-r-i.org

GET INVOLVED

NadcapInfo@p-r-i.org