



AeroSpace and Defence
Industries Association of Europe

AIA – ASD Interoperability coordination concal 30th of Jan. 2019

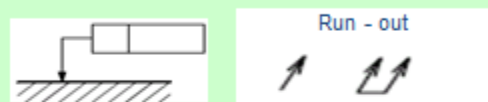
Status of interoperability of GD&T information

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Different standards for specification of GD&T – PMI at the Methods level

- ISO standards: ISO 1101, etc
- ASME standards: ASME Y14, etc
- Main GD&T are common between the 2 standards, but some differences exist

Main GD&T are common between the 2 standards:



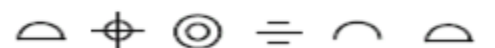
Form tolerance



Orientation tolerance



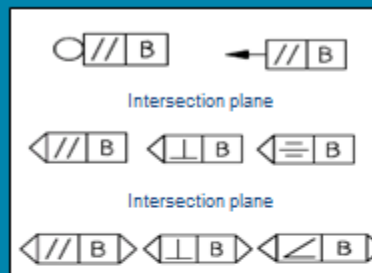
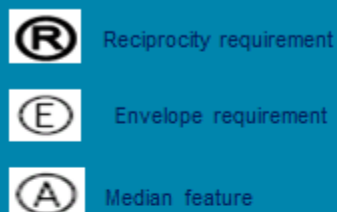
Local tolerance



Requirement, condition,...



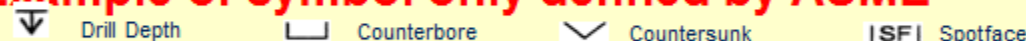
Example of GD&T only defined by ISO



modifier for a linear size



Example of symbol only defined by ASME



Example of GDT&T Not completely equivalent

ISO Unequally Disposed Tolerance Zone

UZ

ASME Unequal Bilateral Tolerance Zone

U

Strong opportunities for coordination of standardization activities to maximize benefits of 3D GD&T information interoperability

- Multiplication / risk of inconsistent ISO standards for interoperability of CAD 3D GD&T:
 - ISO 10303 (AP242, AP238, etc),
 - ANSI QIF, proposed for harvesting in ISO /TC 184 /SC 4
 - ISO 14306 JT (for 3D visualization)
 - ISO 14739 PRC (for 3D visualization with PDF 3D)
- Emerging needs for **different business usages and implementation formats** for interoperability of 3D GD&T:
 - data exchange
 - data long term archiving
 - Data visualization
 - Integration (web services)
 - analytics
 - Increasing use of PLM COTS applications based on databases, requesting real time integration / linked data

Inconsistent ISO information model for GD&T will result in multiplication of inconsistent standards for exchange, LT archiving, 3D visualization, web services, analytics of 3D GD&T : additional cost and delay for the industries

Digital thread relies on integrated Engineering ⇔ Manufacturing processes

: GD&T – PMI information is used across the entire process

The information of the “detailed parts Design definition” has to support the end to end digital thread

(Assembly operations information not described)

Engineering

Manufacturing

Support

GD&T / PMI

GD&T / PMI

GD&T / PMI

GD&T / PMI

GD&T / PMI

**Detailed parts
Design**

Parts
Manufacturing
preparation

Parts
Manufacturing

Part
Quality
control

Part
supports
/ repair

Part
Preliminary
Design

Multi physics
detailed parts
simulation

Detailed parts
Cost analysis

Parts
Manufacturing
simulation

**Example of MB Design – MB Manuf.
integrated processes / part categories:**

- Machining parts
- Composite part
- Tubing part
- Ducting part, etcl
- Forging part
- Additive Manuf. part
- Sheet metal part
- Elec. wiring harness

Most GD&T / PMI are independent of the types of part categories

Need to ensure a consitent data model for PMI / GD&T covering the diffirent part categories



- Need to ensure consistency of standards for 3D PMI – GD&T to support MBD – MBM integration
 - Enhancement of 3D product data standards to take into account of the different categories of parts: composite, sheet metal design, additive manufacturing,
 - Emerging needs for **different interoperability usage**
: exchange, visualization, sharing / linked data, LT archiving, analytics
- ➔ Strong opportunity to ensure the consistency of ISO and ASME standards for interoperability of GD&T – PMI