3D Measurement Data Management

with I++ DMS

prostep ivip/VDA Recommendation

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Abbreviations and acronyms

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<tr>
<th>Abbreviation</th>
<th>Meaning</th>
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<tr>
<td>ANSI</td>
<td>American National Standards Institute</td>
</tr>
<tr>
<td>CMM</td>
<td>Coordinate measuring machine</td>
</tr>
<tr>
<td>FDC</td>
<td>Functional dimension catalogue</td>
</tr>
<tr>
<td>I++</td>
<td>Inspection PlusPlus</td>
</tr>
<tr>
<td>I++ DME</td>
<td>Inspection PlusPlus Dimensional Measurement Equipment</td>
</tr>
<tr>
<td>I++ DMS</td>
<td>Inspection PlusPlus Data Management Services</td>
</tr>
<tr>
<td>ID</td>
<td>Identifier</td>
</tr>
<tr>
<td>IP</td>
<td>Inspection plan</td>
</tr>
<tr>
<td>IPE</td>
<td>Inspection plan element</td>
</tr>
<tr>
<td>ISO</td>
<td>International Organization for Standardization</td>
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<tr>
<td>MBD</td>
<td>Model-based definition</td>
</tr>
<tr>
<td>MDM</td>
<td>Measurement data management</td>
</tr>
<tr>
<td>NIST</td>
<td>National Institute of Standards and Technology</td>
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<tr>
<td>OEM</td>
<td>Original equipment manufacturer</td>
</tr>
<tr>
<td>PDM</td>
<td>Product data management</td>
</tr>
<tr>
<td>PLM</td>
<td>Product lifecycle management</td>
</tr>
<tr>
<td>PMI</td>
<td>Product and manufacturing information</td>
</tr>
<tr>
<td>PS</td>
<td>Product structure</td>
</tr>
<tr>
<td>QA</td>
<td>Quality assurance</td>
</tr>
<tr>
<td>QC</td>
<td>Quality criteria</td>
</tr>
<tr>
<td>QIF</td>
<td>Quality Information Framework</td>
</tr>
<tr>
<td>QMS</td>
<td>Quality management system</td>
</tr>
<tr>
<td>SOA</td>
<td>Service-oriented architecture</td>
</tr>
<tr>
<td>UML</td>
<td>Unified Modeling Language</td>
</tr>
<tr>
<td>VDA</td>
<td>Verband der Automobilindustrie (German Association of the Automotive Industry)</td>
</tr>
<tr>
<td>WSDL</td>
<td>Web Services Description Language</td>
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<tr>
<td>XML</td>
<td>Extensible Markup Language</td>
</tr>
<tr>
<td>XSD</td>
<td>XML Schema Definition</td>
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1 Preamble

A variety of measurement methods and equipment are used in the manufacturing industry today to ensure a specified level of product quality. These differ in functional properties such as the way in which data is collected (contact or non-contact), the way in which measurement data is processed and in the level of integration with manufacturing equipment. In addition to typical properties such as precision and speed, their performance also differs in terms of the degree to which they can be integrated in cross-domain PLM processes. The multitude of devices and processes found in the manufacturing industry always presents a sizable challenge for the harmonization of processes and methods. The desire for a standardized interface for the flexible design of the measurement process, with its numerous participants and objects, is therefore a logical consequence. An object model is required that includes not just information on the product model but also the equipment and tools, as well as the relevant test and tolerance data (part of which is referred to as the product and manufacturing information), and its relation to the 3D geometry.

Given that the quality process is increasingly drawing-free, the digital representation of product data – referred to as the digital master and digital twin – has a key function in this context, too.

Cross-domain data management also gives rise to an additional need for powerful measurement data management. Here, factors such as data-related recording, digital master/twin, control of the measurement process as well as IT systems and interfaces play a role. Companies are hoping that this will bring about an increase in the level of process automation, improvements to the change process, further stabilization in the process, consistent quality statements, enhanced performance in individual process steps, and the early identification of process risks before they become a problem. This challenge was addressed collaboratively and in a timely fashion through the Inspection PlusPlus (I++) initiative.

![Figure 1: Measurement process covered by I++ DMS and I++ DME](image)

I++ DMS is an interface definition that emerged from the automotive sector’s Inspection PlusPlus initiative and which has been further developed by representatives of the automotive and aerospace industries in the 3D Measurement Data Management Workflow Forum (3D MDM WF) and Implementor Forum (3D MDM IF) project groups. The interface definition describes an interface for exchanging information between software applications in the field of dimensional quality assurance. The description covers design, planning, programming, analysis and execution in the quality process.

I++ DMS takes a service-based approach and is primarily comprised of a UML information model and an XML schema that describes the model. This specification and its use in quality management systems are described in this document.