

(MBE) Model Based Enterprise and 3D PDF - The Future?

Document Reference: EPI/WP/20140609/1
Revision: 01
Date of Issue: 09/06/2014

Prepared by: Peter Sanderson
Marketing Executive

Approved by: Andrew Vernon
Managing Director

Model Based Enterprise and 3D PDF – the Future?

Model Based Enterprise (MBE) is a rapidly growing best practice and has been touted as the future of efficient product engineering, manufacturing and supply. But what is it?

Model Based Engineering and Model Based Enterprise are often used as synonymous terms, although when the 'E' within MBE refers to engineering this would technically be the practice and when it refers to the Enterprise it would define the uptake of the approach by different organisations. For the purpose of this article we shall simply refer to Model Based Enterprise (MBE) as both the approach and the reality of a fully integrated and collaborative Model Based environment spanning the entire lifecycle of different products.

In the past engineering and manufacturing activities have relied predominantly on hardcopy, and more recently digital, documents, including 2D drawings. These have been used to convey the design data required to drive large manufacturing processes. Within this dataset digital 3D models are now used extensively however they are often associated with 2D drawings, the latter representing the design deliverable. It is this reliance on 2D documents to bridge the gap between design and manufacturing that MBE seeks to eliminate. Model Based Definition (MBD) has emerged as engineering software applications have become more advanced and is the basis for MBE. It is now possible to use 3D Models rather than relying on 2D drawings as the single repository of data to drive every aspect of a product's lifecycle, from design through manufacturing and on into aftersales and support. Associated attribute data is essential to this transition. MBE requires that a complete product definition is present in the annotated model. This includes the Product Manufacturing Information (PMI). The PMI is the critical manufacturing information and geometry that supports production, all quality processes and aftersales support and maintenance.

At 'Model-Based-Enterprise.org' MBE is defined as a 'fully integrated and collaborative environment founded on 3D product definition detailed and shared across an enterprise; to enable rapid, seamless, and affordable deployment of products from concept to disposal'. Quite a good definition don't you think?

There are many compelling reasons to progress from the current reliance on 2D to a full acceptance of MBE. MBE has been proven to significantly reduce manufacturing and engineering costs as well as the time required to take a product from conception to market. By communicating all the engineering and manufacturing information with downstream departments through a fully annotated model, any reliance on 2D drawing based documents is removed. This eliminates the costs associated with their creation and maintenance, as well as providing a complete and uniform source of data for everyone.

Another benefit from using MBE over 2D based drawing or document engineering data is computer interpretability. The benefit of a 3D data model is that it can be processed directly and 'understood' by engineering software applications without the need to interpret information from a document before inputting it into the user interface of different applications. This results in fewer transcription errors and reduces processing time significantly.

Therefore Model Based Enterprise’s success hinges on the interoperability between different software applications, which is delivered through the use of open standards. No one application is normally capable of performing all the engineering tasks involved in a product’s design and manufacture. Users therefore employ a variety of software products suited to different task and objectives. Standards are therefore being adopted nationally and internationally to achieve this vital level of interoperability.

The benefits of 3D PDFs immediately become apparent when considering the standards required for successful deployment of a Model Based Enterprise. 3D PDF is one of three international standard 3D data formats suitable for MBD data; the other two are STEP and JT. MBE is all about leveraging an investment in MBD data across an organisation to realise a greater return on investment. And it is this need for the data to be in a format ubiquitously consumable that sets 3D PDF apart from JT and STEP.

Within 3D PDF there are two 3D data formats supported, U3D and PRC. U3D supports faceted geometric representations, product structure, animations and textures. This makes it suited for visualisations and ideal for use in workplace instructions or manuals. PRC in a similar way to JT and STEP is capable of supporting the tessellated geometry or exact representation of the data as well as PMI so is perfect for the exchange of MBD data for manufacturing.

Another factor placing 3D PDF in a class apart from JT and STEP are its publishing capabilities. It’s unique ability to create rich renditions of all kinds of data. As well as 3D data, audio, video animations and images can all be encapsulated within this ubiquitous standard. A 3D PDF also has the added benefits of being able to use other features provided by the PDF standard, such as signatures, security and digital rights management.

Model Based Enterprise is gathering momentum but must make the leap from its current position to mass adoption. This is illustrated perfectly by the Technology Adoption Lifecycle.

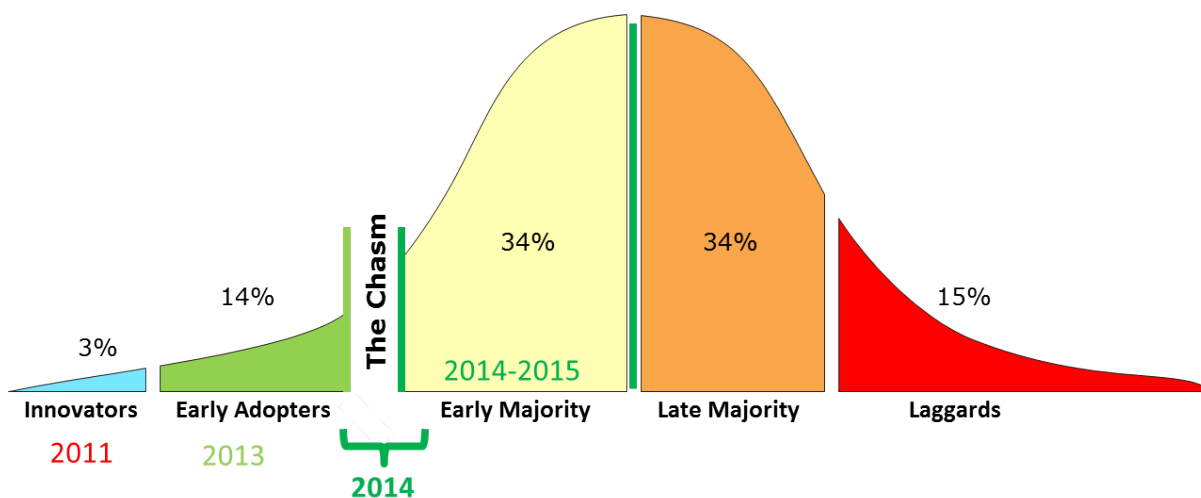


Fig. 1 – The Technology Adoption Lifecycle and Chasm

Fig.1 shows the typical adoption curve associated with the introduction of new technology starting from the technologies conception and use by early innovators through to total assimilation. The chasm represents the gap between the early market dominated by enthusiasts and the next mass market phase, this is the obstacle to overcome. The uptake of a new technology generally slows or plateaus when the majority within an industry are reluctant to invest in new practices. Model Based Enterprise currently sits, teetering on the edge of The Chasm. MBE's compelling advantages over 2D document based engineering, combined with 3D PDF's ubiquity and obvious suitability to MBE could together be the bridge that carries the technology over The Chasm and provides the catalyst to power ahead into the mass market adoption phase.

Adobe introduced 3D PDF technology in 2004 and in 2010 they selected [Tetra4D](#) of Seattle as their exclusive partner, trusted to continue to lead the market as the only authorized provider of native 3D PDF technology solutions. Tetra4D are also one of the founding members of the 3D PDF Consortium.

[Tetra 4D's 3D PDF solutions](#) are currently in use in aerospace engineering, [Boeing have adopted the file format for use on their 787 Dreamliner project](#) where it is being used for final assembly instructions and is now the key standard for worldwide MBD data distribution for ongoing 787 production. The ability to integrate 3D PDF directly with required industry systems is behind its growing success and its potential for MBE.

Epitomy Solutions, based in Sheffield is a Product Information Management (PIM) company. Epitomy are also providers of 3D CAD visualisation tools and are the UKs exclusive provider of Tetra4D 3D PDF products. To find out more about 3D PDF and BIM, and how our solutions can help you, please visit our [website](#) or get in touch.