THE VALUE OF ENGINEERING PRODUCT INFORMATION *EVERYWARE*.

At an ever increasing pace technology tears down the barriers of information exchange and although CAD visualization technology has been available since the early 1990's a newcomer named 3DVIA Composer is positioned to dramatically change the rules of enterprise wide engineering communication.

For many companies, the information technology revolution has enabled their participation in globalization which can effectively mean the difference between success or failure in today's marketplace. Even if your company has not embraced globalization, you undoubtedly feel its effects in the form of compressed product development cycles and cost pressures. To complicate globalization efforts, electromechanical products in particular have steadily increased in features and complexity, continuously challenging our ability to not only keep pace, but improve against the competition

A number of recent studies have shown that best in class companies are much more likely to have robust communication infrastructures, both internally and externally with suppliers or their extended global organization. A key differentiator of these companies is the recognition that a technology or process that enables the most relevant information to be transferred to, and used by, the intended recipient in the shortest amount of time will have the most positive net impact. The information business processes generate is only valuable if it is consumed, only then can it truly be called *communication*. The goal therefore is not only to identify critical information, but to make it available when, where, and how recipients require it.

For companies involved in product design, 3D models and associated intellectual property are the fundamental *information* components a company ultimately places into the global marketplace in the form of a manufactured product. Management has started to recognize that communication, be it internal or external with the customer, has an associated ROI. Expensive and complex systems such as SAP, SRM and MRP systems are implemented to improve communication yet engineering data is largely neglected. Improving throughput of usable engineering design information, to those who require this data will improve cost, quality, and schedule; the primary components of profitability.

Positioned as a CAD neutral visualization tool and meta-data engine, 3DVIA Composer's "*Product Information Everyware*" slogan, including the spelling of 'everyware', aptly defines the value of its product suite. Traditional visualization applications boast the ability to open tens or even hundreds of file formats, but these are rarely used to their full potential. Instead of compelling users to open their documents in a proprietary and costly 3D authoring application, 3DVIA Composer literally turns this paradigm on its head and brings free use of the CAD models to the Microsoft and web based applications we are already familiar with. The ability to integrate 3D data, markups, and animations with virtually any ActiveX business appli-

cation through their *3DVIA Player Embedded* technology ushers in a new realm of information exchange, where data has a significantly better change of consumption.

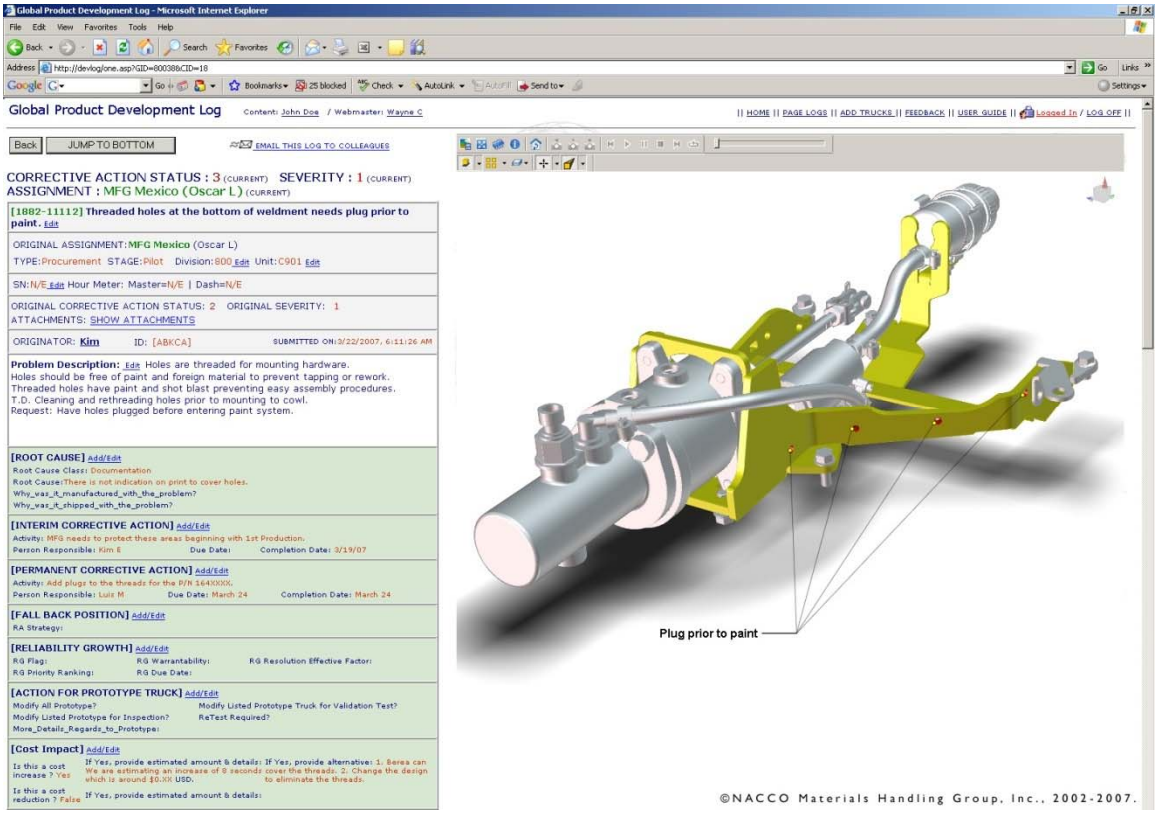

FIGURE 1: WEB INTEGRATION ALLOWS 3D INTERACTION WITHIN A WEB-BASED CONTEXT.

With its own recent foray into the world of 3D, Adobe Systems has also recognized that in order to be truly valuable, CAD needs to freely extend to applications non-CAD users are familiar with such as Acrobat. While 3DVIA Composer can write to the Adobe U3D format, they also offer a free 3DVIA Player plug-in into Adobe that provides significantly better performance and functionality. Where the 3DVIA Composer and Adobe solutions diverge is in the flexibility of the viewing medium. Understandably, Adobe 3D limits its interaction to their own Acrobat suite, whereas the 3DVIA Player easily integrates to Word, Excel, PowerPoint, HTML, email attachments, a standalone executable, or of course PDF with Adobe's U3D or the feature rich 3DVIA Player PDF plug-in.

A compelling feature of the 3DVIA Player MS Office Embedded integration, web or PDF plug-ins and free viewer is they are built on the same core technology as their top of the line authoring product. This enabled my test case of a complete vehicle with nearly 2000 parts consisting of 1.5 Million triangles to be integrated into Excel with no loss of performance. My stock IBM T43 laptop (model 2668-R1U) with 1GB Ram and ATI Mobility X300 graphics achieved a very respectable average of 4 fps (frames per second) with the 3DVIA Composer application sipping a modest 400MB of system RAM. The size of the 3DVIA Composer file was a highly efficient 10MB, and with 3DVIA Composer's decimation and occlusion tools I

was able to further reduce this to an ultra compact 1.7MB without my model looking like post-modern art. Usability is also enhanced by this commonality approach since the basic operation and controls of the plug-in do not significantly differ from that of the free standalone viewer or any of the higher end authoring products.

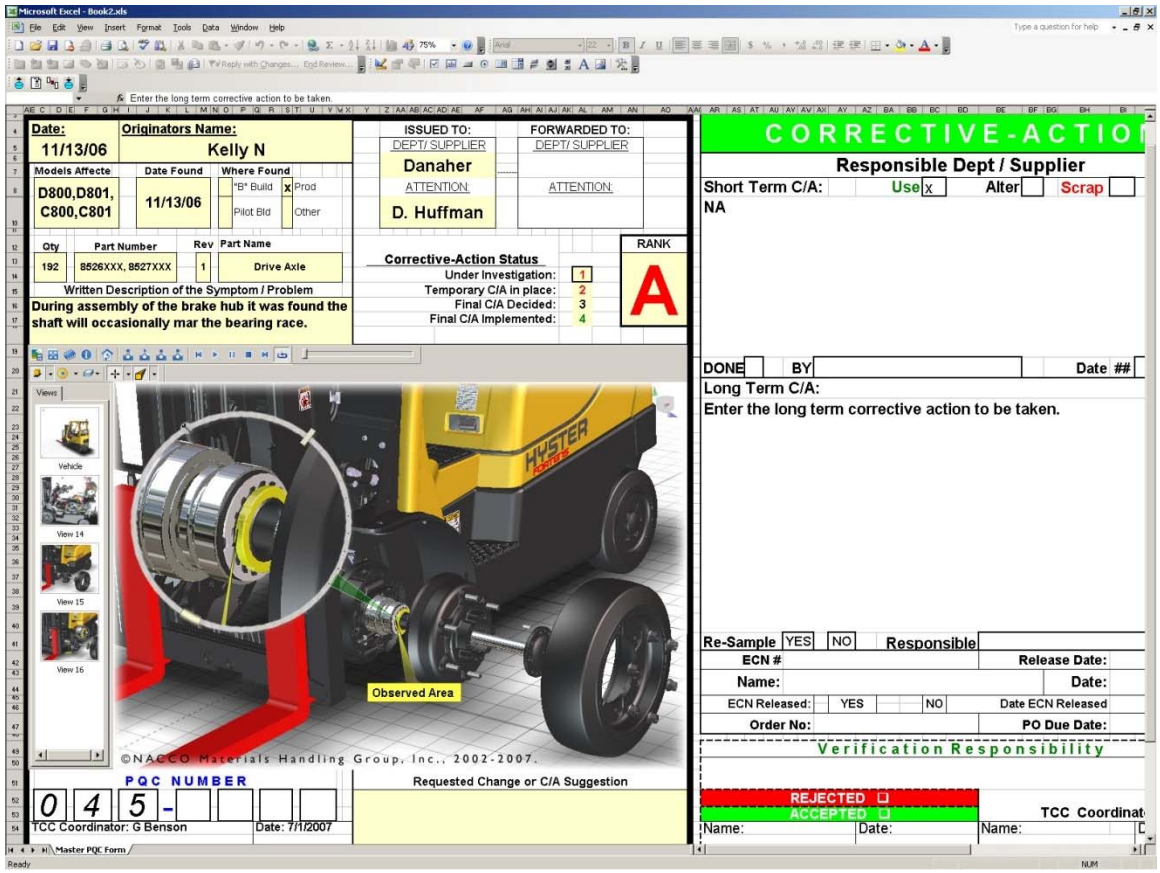

FIGURE 2: BENCHMARK MODEL IN MICROSOFT EXCEL MORE CLEARLY COMMUNICATES INFORMATION.

Although most truly free viewers are not exactly worth writing home about, 3DVIA Player provides functionality rivaling some commercially sold products. I was able to open 3DVIA Composer files, navigate the assembly tree, mark up, dimension, section, play animations, change rendering modes, and even update stored views, called views in 3DVIA Composer. The most notable feature of the free viewing with the 3DVIA Player is the diverse breadth of mediums: Word, Excel, PowerPoint, HTML, email attachments, and even a standalone executable, called a package, that requires no software installation or special user rights. These formats enable 3D data to be efficiently communicated in the method most comfortable to the intended audience.

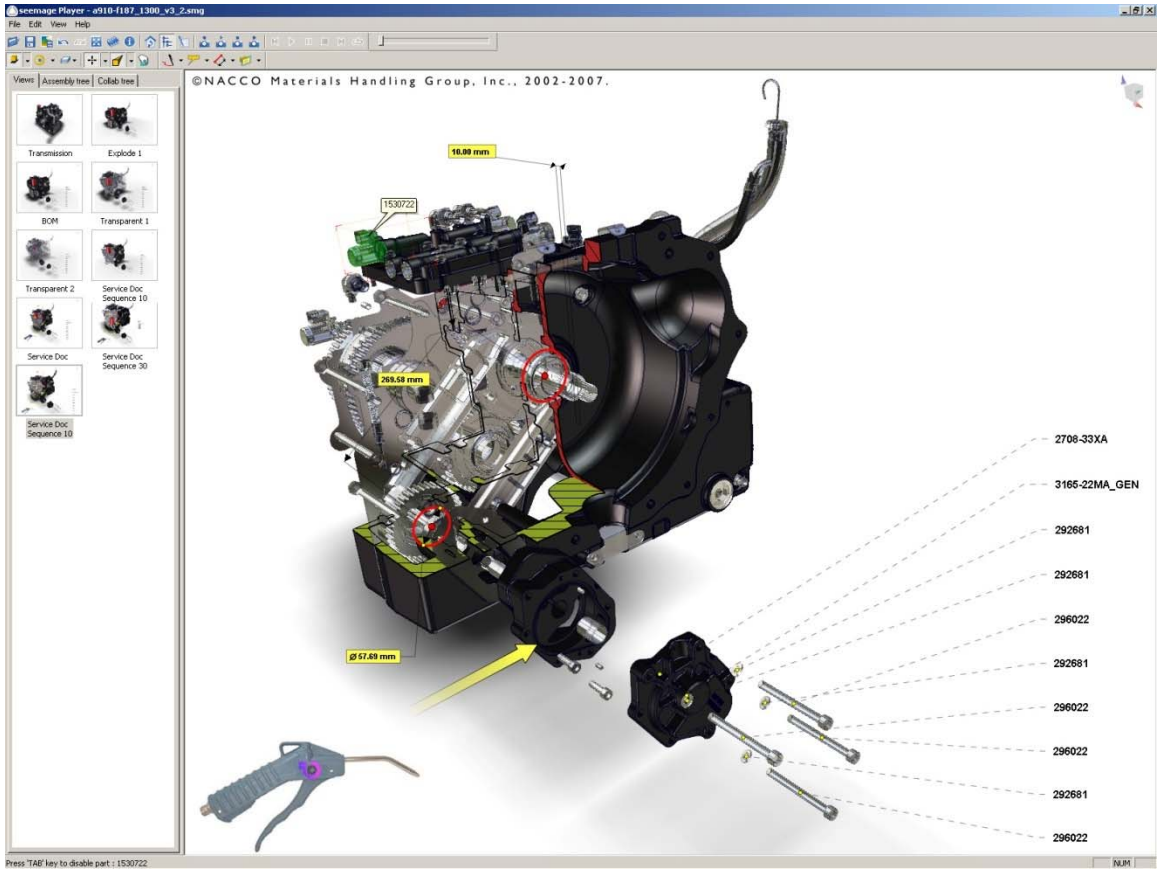

FIGURE 3: FREE 3DVIA PLAYER PERMITS KEY INTERACTION WITH 3D CONTENT.

The 3DVIA Composer product line can be divided into its free viewing tools to distribute the information, and authoring products used to create the content. While the true communication power lies in the free viewing abilities, the capabilities of the authoring tools are critical since they mold the raw data into meaningful information that will be communicated to the extended enterprise. 3DVIA Composer provides a well thought out suite of authoring tools that admirably balance intuitiveness with a rich feature set.

3DVIA Composer is the flagship product from 3DVIA. It is aimed squarely at those requiring the greatest creative control over content generation and access to nearly every conceivable element property. The software contains the essentials for 3D visualization and interaction, including measurements, sectioning, markups, moving components, bill of materials, ballooning, and even lighting and texture mapping. From marketing images to manufacturing instruction sheets, there were few tasks I could not accomplish entirely within this set of features. There are also alignment tools and kinematics, primarily aimed at engineering or manufacturing applications. It is also possible to update geometry and animations, which when combined with a very flexible XML based file format, unleash the *meta-data engine* concept. Unlike other keyframe based visualization software, nearly every property (including the meta-data itself) can change over time or be driven by events. Furthermore the animation retains a high level of interactivity with the ability to integrate linkages either internally to 3DVIA Composer or to external data.

In a matter of minutes I was able to generate interactive assembly instructions that not only replaced dozens of pages of technical documentation, but required no textual instructions that would require translation for overseas facilities. Then within literally seconds I was able to take a vendor's CAD model and update my content to reflect their most recent changes. Additional licensed modules such as automatic path extraction of parts or assemblies are also available.

In addition to all of these tremendous features, 3DVIA Composer allows for technical publication creation and high resolution image export. A notable strength of 3DVIA Composer was the ability to update and reuse older technical publication data. New parts or assemblies can dynamically take on the characteristics of their predecessor allowing for quick updating of changed documents. Bills of materials, ballooning, measurements, and explode lines are also all associative to the models to which they are attached, allowing for quick changes.

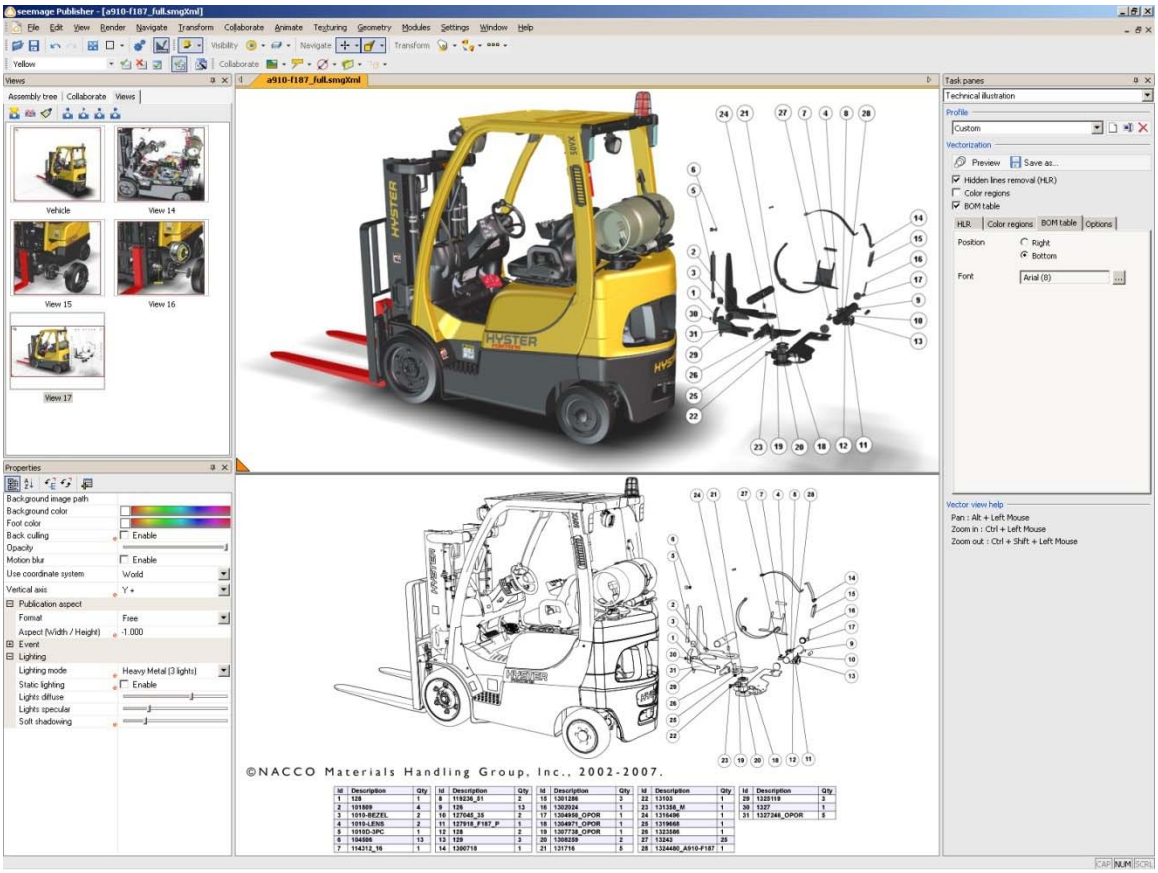

FIGURE 4: TECHNICAL PUBLICATION WITH ASSOCIATIVE BALLOONING.

CAD translation is handled with support for native SolidWorks, CATIA V4 and V5, Pro/ENGINEER, and a host of neutral file formats ACIS, STEP, IGES, and a number of other 3D formats. CAD customers have long known that problems in interoperability plague the industry and many integrated converters have their own limitations, not the least of which is cost, and 3DVIA Composer uses Dassault's Spatial product

(http://www.spatial.com) for its flexibility and cost effectiveness. A CAD license and software are not required to open native CAD models, however there are certain limitations of this type of translator. If the CAD system dynamically generates content such as is done with Pro/ENGINEER's welds or flexible components, the Spatial converter is unable to reconstruct this geometry without the benefit of the CAD modeling kernel. In these cases the native CAD system must be used in conjunction with neutral files to obtain the correct representation on these model types. Many CAD based translators have similar limitations in addition to higher associated costs. Until the large CAD vendors understand that interoperability is a customer must, not a want, obtaining completely accurate geometry easily will remain a challenge. In my case, for less than the cost of one seat of publisher PTC Partner Etrage LLC (www.etrage.com) was able to provide a Pro/E Toolkit based application that handled conversion of dynamically generated content to ensure data integrity on these items and also wiring harnesses, assembly cuts, and even double deep family tables.

A server product exists, called 3DVIA Sync, for automating the conversion process. With a deceptively simple looking interface one can actually create powerful rules for conversion and optimization of data and handle multiple data input and output types. 3DVIA Sync integrates with another 3DVIA innovation, the Rights Manager component of 3DVIA Safe. Purchased as an add-on, 3DVIA Safe also works with 3DVIA Composer to secure or limit functionality of the data when distributed using any of the free viewing methods. More and more companies are recognizing the potential risk involved if their intellectual property is compromised, particularly when globally outsourcing manufacturing. In addition to password protecting of files, 3DVIA Safe can expire documents so they are usable only within a certain period or for a specified number of days. Functionality of the data can also be greatly limited by restricting access to Annotations, Cutting Planes, Bill of Materials, or even the Assembly Tree. To protect the intellectual property from more advanced pirating techniques such as reading graphics card memory buffers, 3DVIA Safe also includes a patent pending technique called Secure 3D for randomly and irreversibly relaxing the geometry. This can be applied globally to the model, or interactively on individual surfaces so only the area of interest is an accurate 3D model, and the surrounding areas or components are altered to where design intent is still captured, but the models are not suitable for reverse engineering purposes.

The XML-based file format of 3DVIA Composer is truly the power source behind the meta-data engine. Not only is it flexible and easy to work with even for novice programmers, but it is extremely powerful with the ability to integrate any associated model meta-data such as cost, materials, revision, or nearly any other associated data type and apply them at either the individual part or assembly level. With well thought out features that rival or exceed the JT format, and an open XML based format, I found myself quickly coming up with methods where complex communication problems could be solved by integrating 3DVIA Composer 3D data into other applications or data systems within our organization.

A robust file concept 3DVIA Composer refers to as 'shattered' also allows assemblies to be sub-divided by their parent/child relationships. To CAD users this file structure concept is nothing new: instead of trying to embed information about an assembly within a single file, an assembly file knows only about its immediate children and subassemblies are dynamically referenced when their information is read. 3DVIA Composer's optional shattered file format supports this same approach, which not only greatly simplifies file translation, but simplifies integration with PLM (Product Lifecycle Management) software. To contrast the

significance of this approach versus a single 'monolithic' file, consider a simple change to a part within your system. Any assembly that uses this part has the part information embedded within the assembly file, and any assembly that those assemblies are used in also has it, and so on. A change of one component necessitates conversion or some other manipulation of every assembly in the system that uses that component in order to maintain accuracy in a monolithic structure. Not only does this significantly increase the amount of processing time, but over the course of a week that adds up to a re-processing of the majority of the assemblies in the system, and in our case would require multiple servers running concurrently to update data. With 3DVIA Composer's shattered file structure, only the part needs to be updated, and any assembly that references this part will immediately read the updated information correctly. Furthermore, 3DVIA Composer allows a parent to search multiple prioritized locations for updated children. A user may have a top level file on their local system, but when loaded, children can be taken from a central fileserver, ensuring up to date information.

Up until recently, while management understood a relationship between profit and customer communication, when asked if communications within their internal organization hold similar value, most would refer you to the section in their budgets labeled "*cost of doing business*". Attitudes are now changing due to a growing body of evidence that finds that all business communication and financial performance are inexorably linked. If your company sees value in improving communication of your 3D assets and associated intellectual property to downstream customers, communicate your product information everyware with 3DVIA Composer.

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