

# HOW VISUALIZATION TRANSFORMS PROCESS PLANNING

## VIRTUAL BUILD White Paper



### SUMMARY

Fast-changing markets and technologies are forcing manufacturers of all sizes to move more quickly. Product life cycles are getting shorter and new product introduction must be accelerated to beat the competition. Manufacturing planners have to take products through the process at a faster pace—and make sure that the plan works the first time.

Traditional alphanumeric spreadsheet planning makes this difficult to achieve. It often results in miscommunication, shop floor delays, and costly engineering changes. However, technology is available that enables planners to leverage CAD models and convert spreadsheet process plans into 3D process models that can be shared across the enterprise. In this visual environment, engineers can easily identify and correct potential production problems early in the process, reducing or even eliminating the need for physical prototyping. Line workers can become more productive by referring to graphical work instructions. For these reasons, visual process planning has demonstrated the ability to increase productivity, reduce overall cost, improve product quality and accelerate time-to-market.

## WHY PROCESS PLANNING IS MOVING TO THE NEXT LEVEL

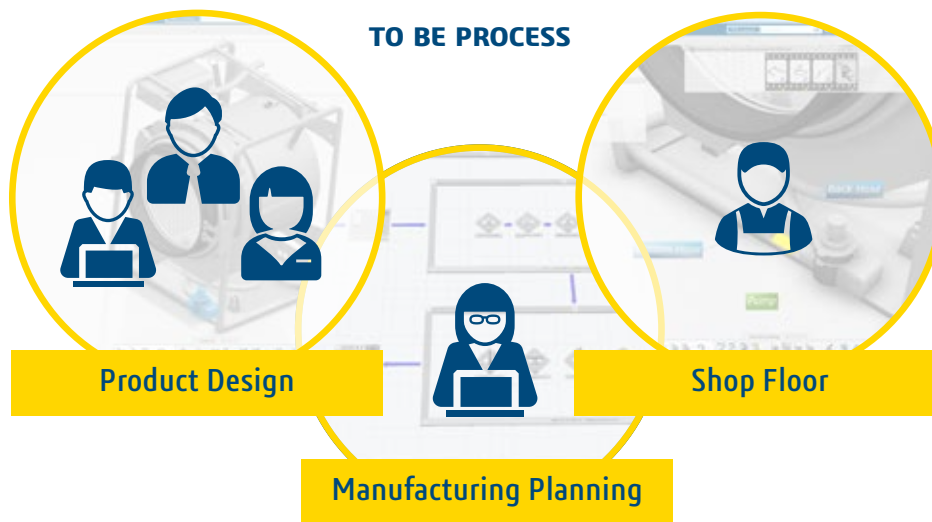
Two clear global trends affect manufacturing companies today: an accelerated rate of change—in markets, technologies, and corporate structures—and higher levels of product complexity. With these forces in the background, manufacturing planners are being pressed to shorten product cycles with plans that work on the shop floor without first-time glitches. At the same time, success in the market demands more new models and variants, and aggressive competition requires more new features that make products more complex.

Many planners are dealing with these pressures using time-honored spreadsheet documentation. The limitations of this approach are becoming obvious, because manufacturing engineers can't see what they're building. They become expert at using alphanumeric data, but the process is susceptible to errors because it lacks any opportunity to visualize what's happening. These problems eventually culminate on the shop floor, where poor manufacturing plans can cause production slowdowns or shutdowns while engineering changes are made and work instructions are edited and republished.



### AS IS PROCESS

### TO BE PROCESS



### VIRTUAL BUILD

- Visualize the assembly sequence
- Validate build specifications to conform to product design
- Derive easy-to-understand work instructions for the shop floor

## THE CHALLENGES OF ALPHANUMERIC PROCESS PLANNING

The spreadsheet-based approach limits documentation to numbers and text—not an ideal way to describe parts or the tasks required to assemble them into a product. We can summarize its shortcomings this way:

- High-cost changes in manufacturing: design problems may not be discernible until they reach the shop, where engineering changes are costly, time-consuming and bad for productivity and launch schedules.
- Communication difficulties: in any product cycle, alphanumeric documentation and hard-copy text iterations of work instructions make communication between design, planning, manufacturing engineering and the shop floor a challenge.
- Change management issues: communicating modifications under pressure of time can lead to misunderstandings.
- High-cost physical prototypes: physical mockups provide a real-world view, but their costs in time and resources can be very high — especially when design changes call for modifications to a prototype.

These problems are compounded by what happens on the shop floor:

- Workers with varying experience and language skills may find it hard to understand work instruction text and perform tasks efficiently. The result: production delays and possible rework.
- It can be a challenge to keep work instructions current. Changes may not make it to the shop floor. Hard-copy instructions can be lost or misplaced. Workers using outdated versions may turn out substandard products that have to be discarded or reworked.



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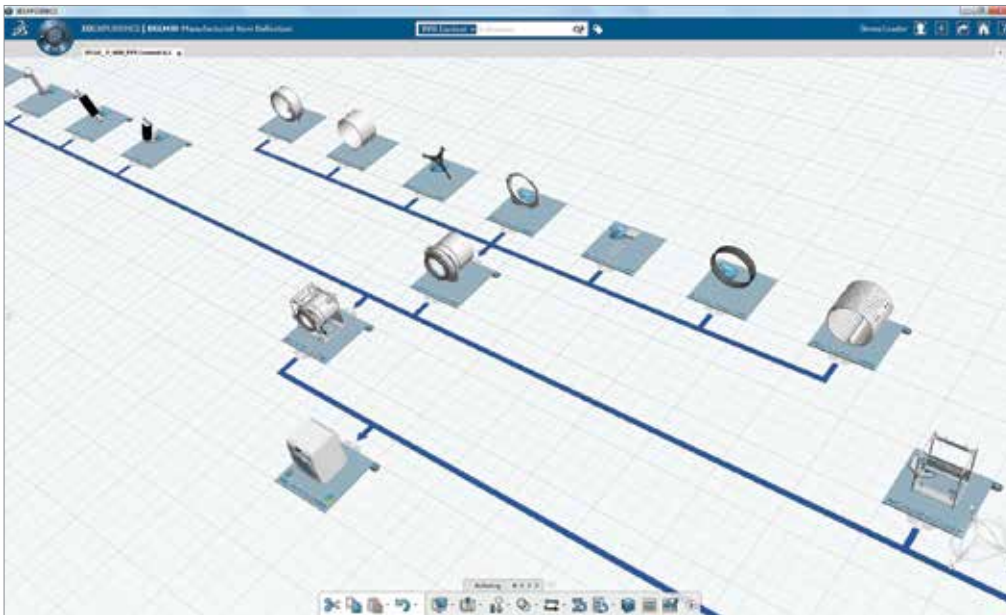
3D assembly process visualization improves the quality and efficiency of manufacturing plans.

## HOW VISUALIZING THE ASSEMBLY SEQUENCE CAN TRANSFORM THE PROCESS

The assembly sequence buildup, created in graphic format or converted from alphanumeric spreadsheet data, provides a 3D visualization of how a product will be manufactured. It immediately delivers game-changing benefits:

- Disciplines and departments can collaborate in real time during process development, sharing 3D views of in-process parts and assemblies.
- Manufacturing engineers can clearly see how assemblies come together, rotating models and visually validating build specifications. They can start to provide feedback to designers even before the design is frozen, when changes are still inexpensive and easy to manage.
- Physical prototyping becomes unnecessary and obsolete. This costly, time-consuming step goes away.
- Process-plan visuals are leveraged to give shop floor workers annotated graphical work instructions. They quickly comprehend the task and become proficient. Production delays are avoided. Time-to-market improves.

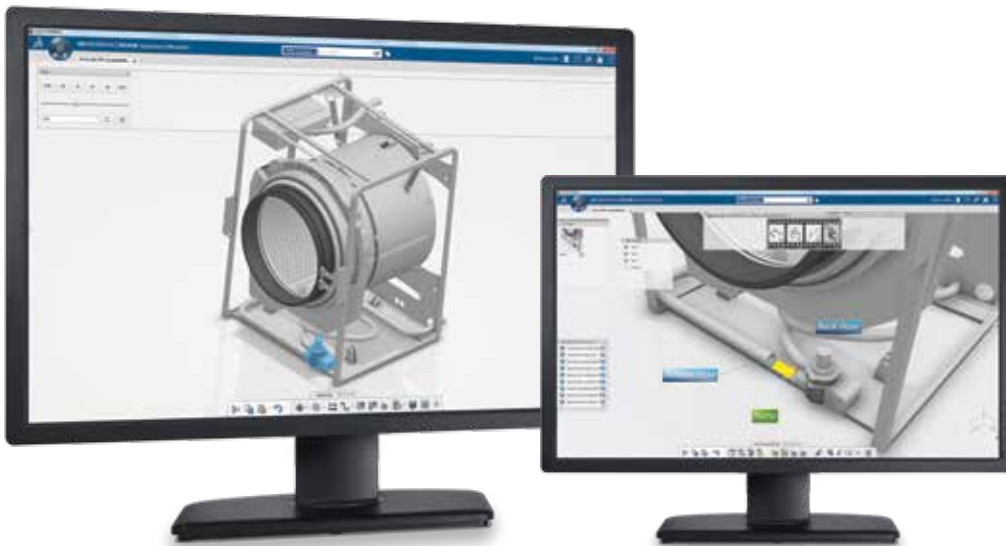
The DELMIA Virtual Build solution, built on Dassault Systèmes' **3DEXPERIENCE**® platform, was developed expressly to give manufacturing companies an easily implemented approach to the benefits of visual process planning. The **3DEXPERIENCE** platform unifies the user experience for all participants. It provides a single source of truth and a powerful process experience while helping to reduce the need for costly IT operations such as database replication. An intuitive, compass-like interface provides easy-to-use navigation, search and collaboration.



## THE HIGH-PRODUCTIVITY ENVIRONMENT OF DELMIA VIRTUAL BUILD

When planners see assembly sequences displayed graphically in the **3DEXPERIENCE** environment, its benefits are instantly clear. The plan can be validated visually. Manufacturing engineers can look at virtual models, verify assembly procedures, and know whether products can be built as-designed. The manufacturer enjoys all of these competitive advantages:

- Faster product and process development: cycle times shrink because the graphics clarify communications between design, process planning, manufacturing engineering and the shop floor.
- Improved planning quality: viewing and sharing sequence steps in 3D enables manufacturing engineers to identify and correct issues before they can trigger costly engineering changes and long delays.
- Precise understanding of time and effort per operation: viewing assembly sequences in a 3D graphic format gives engineers a better way to estimate how long tasks will take and the effort they require.
- Early validation of service processes: the **3DEXPERIENCE** platform provides an effective environment for determining the efficiency and effectiveness of service process design.



## ELIMINATING THE COST OF PHYSICAL PROTOTYPING

DELMIA Virtual Build replaces high-cost physical mockups with the virtual prototyping that is a normal function of every virtualized process plan. Besides delivering a substantial saving in prototyping costs, it eliminates wait times that prolong the product cycle. Engineering changes take place rapidly in the virtual space instead of in the physical prototype. And the virtual models are very flexible; they can be easily duplicated and modified to serve multiple use cases.

## ACCELERATING PRODUCTION WITH GRAPHICAL WORK INSTRUCTIONS

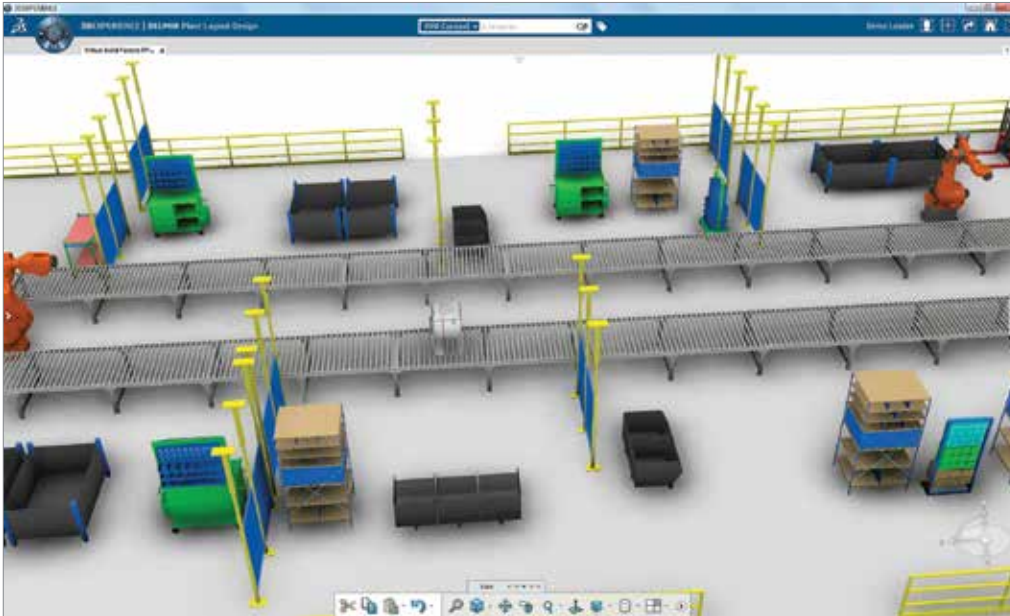
DELMIA Virtual Build enables manufacturing to derive work instructions from the product buildup in the process plan. Delivery to the shop floor is flexible, and can range from a 3D interactive display to an electronic document with embedded images to old-fashioned paper printouts with the same high-resolution imagery. The instructions are easily updated; they can simply be re-generated if the product design or process plan are modified.

## VALIDATING PRODUCT BUILDUP

DELMIA Virtual Build works directly from design models coming from virtually any CAD system. It gives manufacturing engineers prompt validation of the product buildup at all assembly sequence steps, and easily handles complex models with high variability. Doing the same job with just CAD tools would require time-consuming data preparation for each step in the assembly sequence, and lack the flexibility needed for smooth, rapid progress through the process.

## TRANSFORMING THE PROCESS WITH VISUAL POWER

DELMIA's Virtual Build solution makes all the difference. It elevates the process plan to a level of intuitive visualization that makes its intentions clearer and stronger. It saves the costs of prototyping and potential errors on the shop floor. It lets stakeholders in design, planning and manufacturing collaborate more knowledgeably, and it delivers easily understood, always-current visual instructions to the shop floor. The benefits are clear: a faster, smoother, higher-quality process, shorter product cycles, reduced costs and a more productive shop floor.



For more information visit:  
<http://www.3ds.com/products-services/delmia/>

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