

Resource Modeling & Simulation



DELMIA  
**QUEST**<sup>®</sup>



.....  
*The Systems  
Integration, Process  
Flow Design  
and Visualization  
Solution*



# QUEST®

The Systems  
Integration, Process  
Flow Design  
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Solution

DELMIA QUEST® is a complete 3D digital factory environment for process flow simulation and analysis, accuracy, and profitability. QUEST's flexible, object-based, discrete event simulation environment combined with powerful visualization and robust import/export capabilities makes it the engineering and management solution of choice for process flow simulation and analysis.

## The QUEST Advantage

QUEST offers powerful modeling tools to build a complete digital factory for manufacturers to analyze production performance and documents the results for decision makers to view and assess the most optimal solution.

- **Observe, Interact, and Analysis of "What If" Scenarios**
- **Import CAD and other data such as scheduling and routing**
- **Complete integration with other DELMIA process planning and simulation solutions.**
- **Identify Bottlenecks**
- **Optimize Labor and Production Schedules**

## The Next Level of Integration

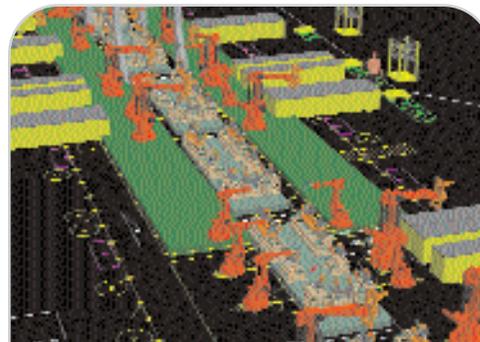
DELMIA QUEST provides a single collaborative environment for industrial engineers, manufacturing engineers, and management to develop and prove out best manufacturing flow practices throughout the production design process.

Improve designs, reduce risk and cost, and maximize efficiency digitally, before spending money on the actual facility, to get it right the first time. By using QUEST to experiment with parameters such as facility layout, resource allocation, kaizen practices, and alternate scheduling scenarios, integrated product teams can quantify the impact of their decisions on production throughput and cost.

## Powerful Solutions for Every Discipline

QUEST is a powerful simulation development and analysis tool for validating and visualizing the impact of process flow decisions made for meeting production requirements. Reduce risk by

validating affordability measures, and minimizing problems and unplanned costs associated with facility startup. QUEST provides a complete solution, providing the tools necessary for both efficient process flow analysis and effective presentation of results to customers, managers, and other engineering disciplines.

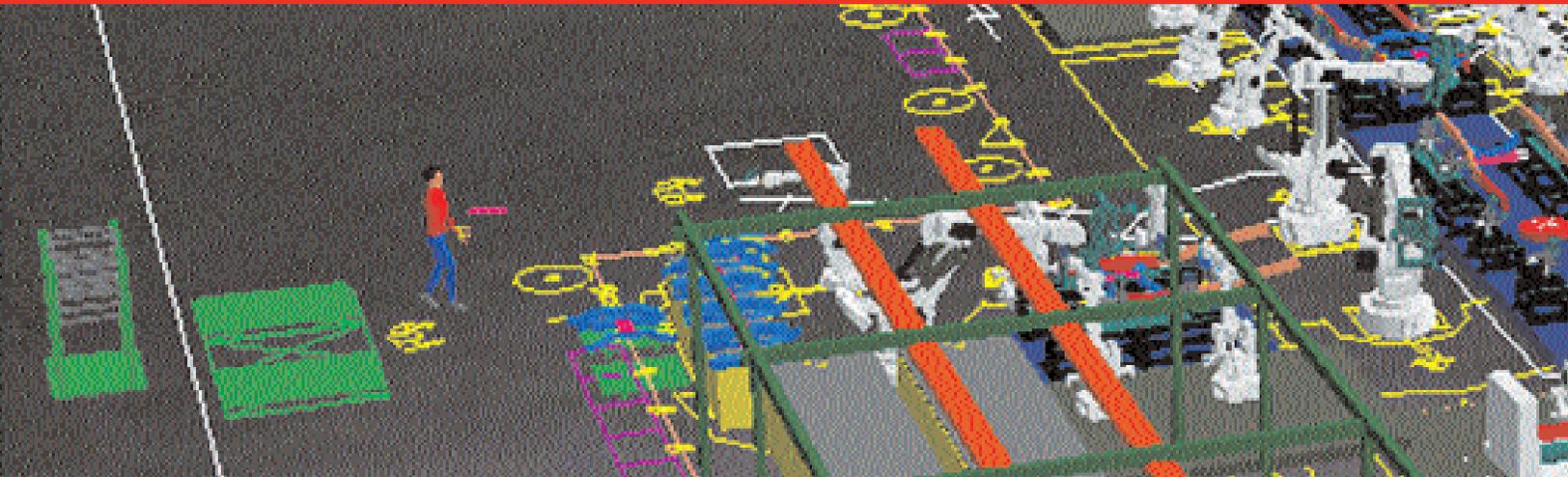


*A Single Environment building and running the model, allowing instant visualization of any model change, thus eliminating lengthy edit/compile/run/analyze cycles.*

## From Concept to Implementation

QUEST allows you to quickly build a simulation model to the level of detail required, adding more detail as necessary to improve accuracy throughout the design process. Conceptualize your processes by populating the model with intelligent objects and pre-built submodels from your

libraries. Once your proposal is accepted, carry the same model into the design process by integrating it with existing design tools such as 2D/3D CAD, Microsoft spreadsheet and planning software, and other types of simulation applications such as ergonomic workplace assessment. Use the QUEST model to document the lessons learned through the systems integration process, quantifying the impact of design decisions.



As your facility springs to life in the digital world, the system's behavior is emulated with real processing times, speeds, staffing levels, schedules, failure rates, and timing. This interactive digital environment allows accelerated "what if" analysis to be explored, for evaluating production scenarios, product mixes, and other alternatives. Results are efficiently communicated back to the product/process team for incorporating the best solutions.

Finally, as the facility is built, use QUEST to author an Express model of your proprietary processes and integrate the simulation using QUEST Express™ with your MES, ERP, MRP, PLC, or scheduling systems for assisting in production floor analysis and systems monitoring. In each stage, analyzing and presenting QUEST results to decision makers is simple and effective.

### *Reuse Existing Data*

Leverage the results produced from your engineering counterparts to dramatically reduce your data collection and model building time. Simply read in process data from standard databases, and use the CAD geometry from product designers to facilitate recognition. Use a distributed modeling approach by communicating real-time via sockets protocol between QUEST and any application, such as another QUEST model, other DELMIA products,

and production monitoring systems.

DELMIA's integrated solution allows you to automatically link to related simulation analysis, thus reducing the time to build and modify the model. Read DELMIA recordings from other DELMIA products into QUEST, to speed up model building and help generate a better understanding of the processes being simulated.

Link and jump to other DELMIA products, maintaining a close association to the actual location of data origination. This capability also provides faster feedback and modification requirements to other engineers.

### *Object-based Model-building Means Reusability*

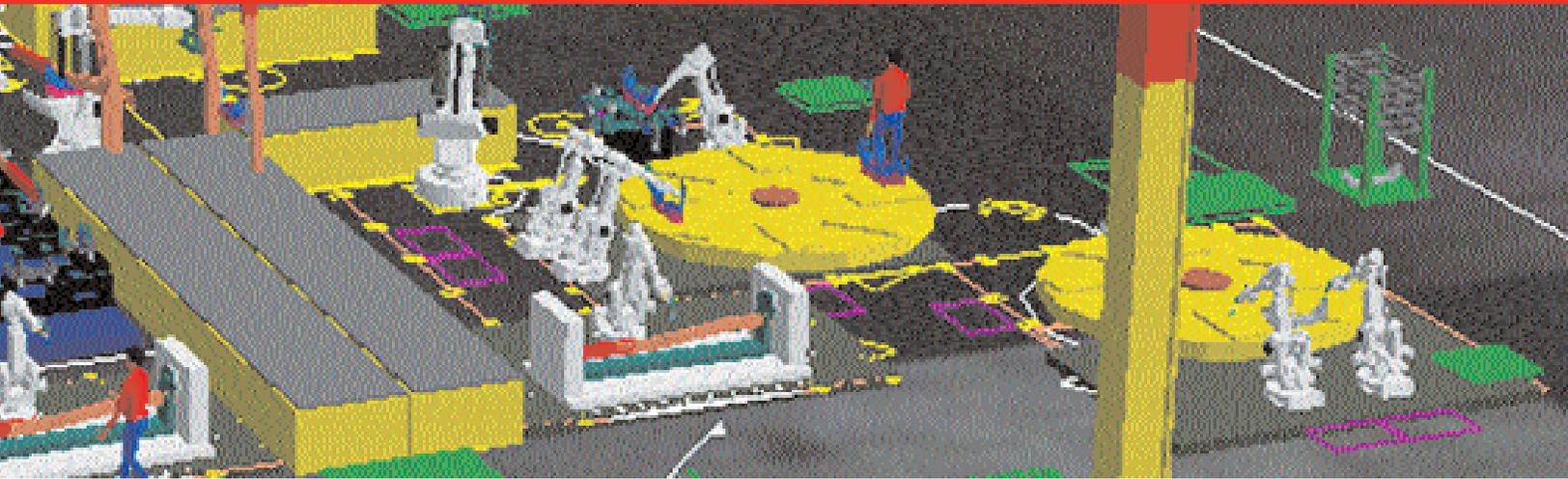
QUEST includes a rich resource library of geometric objects that library... enables users to quickly and accurately model a production facility, such as buffers, machines, material handling systems, and docks. Save and reuse objects on multiple levels — elements, classes, groups, submodels, or just logic and geometry. Combine this custom library with the default libraries available in QUEST to efficiently simulate your new facility.

### *Intelligent Material Handling System Templates*

QUEST incorporates real production variables, such as physical lengths, speeds, accelerations/decelerations, and plant layout to analyze the effects on material handling equipment and labor. For example, QUEST simulations enable parts of different sizes to accurately accumulate on conveyors, and automatically generated or user-defined labor paths to determine the overall time spent by operators walking between work stations in a job shop. Use available templates to accurately simulate material movement systems such as labor, forklift trucks, conveyors, power and free systems, automated guided vehicles (AGVs), cranes, kinematic devices, and automated storage and retrieval systems (AS/RS).

### *Analyze Throughput, Manpower Requirements, Inventory Levels, Routing Behavior Effects*

Use the interactive, true 3D animation and statistical results to allocate resources appropriately, allowing you to justify or reduce costs associated with Work In Process (WIP) inventory, labor scheduling, equipment failure, and capacity planning. Display analytical results in customizable numerical tables, bar graphs, pie charts, histograms, and time series graphs. Export the data to an external analysis



tool such as a spreadsheet or other charting package. Compare multiple runs graphically and through confidence intervals. These analytical tools assist you in identifying and quantifying the impact of bottlenecks on your facility, and measuring value-added vs. non value-added activities for lean activities.

### *An Open Architecture Approach to Modeling*

QUEST models directly emulate real-world system behaviors through distributed logic, used to associate with each resource, such as routing logic, buffering policies, built-in push and pull production attributes, and composite processes with requirement/selection rules. Easily select the most commonly needed behavior logic from comprehensive logic menus that are parameter-driven for even greater flexibility.

For unique problems, QUEST's robust and flexible simulation language provides distributed processing with access to all system variables. This high-level, structured language allows users to define

custom behaviors and gain unlimited control over the simulation. Users can simply modify any default logic since all logic menu selections are written in this powerful language, providing an efficient alternative to the tedious task of creating a "workaround" for near-correct logic. Instead, develop your own library of custom logic, accessible through the menu interface.



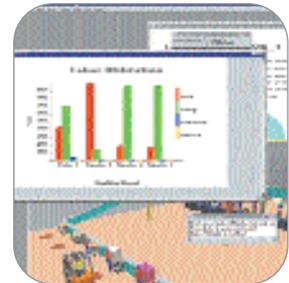
*Simulate the Flow* of material, transactions, or discrete event processes allowing users to visualize accurate 3-D representations of the manufacturing process and associated behaviors over time.

Effectively reduce risk by increasing the level of understanding that the decision makers possess regarding the impact of problems and proposed solutions. With real-time control of the model viewing world, the user can view any potential problem area.

### *Communicate Quickly to Complete the Task*

The 4D simulation accelerates human recognition and understanding, allowing the model builder to efficiently complete the simulation task — easily explaining impacts to those not intimate with the model, such as managers, customers, and other engineering disciplines.

## *Communicate Quickly to Reduce Risk*



*Share results with charts, Model graphics and animation in common file formats, such as TIFF, JPEG, MPEG, AVI, and VRML 1.0*

DELMIA

# QUEST<sup>®</sup> ADVANCED

Quest Advanced extends the power of QUEST by providing an intelligent, efficient and automatic Design Of Experiments process. Based on sophisticated algorithms and search techniques, QUEST Advanced provides decision makers the best results — quickly and easily.

*Adding Analytical  
Capabilities to  
QUEST*

## *Search for the Best Solution*

Discrete event simulation tools have proven invaluable for finding optimal solutions. Their shortcoming, however, has been the trial-and-error aspect to achieving the best results.

Simulation's critical function, determining the merit of different decision alternatives, becomes less effective when a proper analysis requires an operations research degree to design. DELMIA's QUEST<sup>®</sup> Advanced takes a vastly different approach: it uses intelligent search techniques to automate the process of finding the best solution.

With traditional simulation packages, the answers to such questions require a painstaking examination of multiple scenarios, where each scenario further requires the implementation of an appropriate simulation to determine the consequences for costs, profits and risks. Missing in traditional simulation packages is the ability to disclose which decision scenarios are the ones that should be investigated. Also missing is the ability to identify good scenarios automatically by a search process designed to find the best set of decisions. With traditional simulation packages, searching for these answers also typically requires a great deal of the user's time and a high level of expertise in advanced analysis techniques.

By contrast, QUEST Advanced is designed to increase the user's productivity by providing an easy way to conduct analyses without requiring extensive operations research training. QUEST

Advanced enables the decision maker to specify a variety of relationships in order to achieve the best solution, such as:

- *Ranges of key parameters*
- *Budget limitations*
- *Machine capacities*
- *Minimum and maximum lot sizes*
- *Limits on hours worked*
- *Links between components or subsystems*

Once the parameters have been chosen, QUEST Advanced automatically determines which decision scenarios are the ones that should be investigated and graphs them, providing visual representation. The results then can be used to reevaluate the master QUEST model to ensure the highest quality outcomes for profits, costs, risks, and other criteria selected by the decision maker.

## *Take out the Guesswork*

QUEST Advanced offers revolutionary methods to find optimal or near-optimal solutions while only evaluating a small fraction of possible alternatives. The decision maker does not have to rely on educated guesses to make recommendations. Valuable time does not have to be wasted attempting trial and error solutions. And further, the user does not have to be a programmer or mathematician to determine quality results.

## *Get The Optimal Results*



*Use the intelligent search algorithms in QUEST Advanced for an efficient, automated Design of Experiments process.*



## QUEST & the Manufacturing Hub

DELMIA's entire solution portfolio work on top a unique data model called the Manufacturing Hub, which allow manufacturers to store, manage and reuse all product, process, and resource information required throughout the product lifecycle.

The Manufacturing Hub is part of a collaborative, PPR data system that supports Dassault Systemes' Product Lifecycle Management solution. This PPR data system ensures the seamless integration between CATIA, ENOVIA, SMARTEAM and DELMIA. CATIA provides the product design solution; DELMIA provides the manufacturing engineering solution; and ENOVIA & SMARTEAM provide the lifecycle applications and decision support tools.

With DELMIA digital manufacturing solutions, companies have the power to capture, manage and share their best practices and ensure everyone has access to the right information, at the right time.

## The DELMIA Digital Manufacturing Solution

DELMIA's portfolio of digital manufacturing solutions are categorized in three distinct domain suites, based on how they impact the flow of the manufacturing process. Each domain employs a set of tools that steps through the entire manufacturing process from concept to implementation.

### Process Planning

Provides a comprehensive process and resource planning support environment. The resulting process diagrams can provide a clear overview of the sequences and links between processes and resources early in product design conception.

- *Layout Planning*
- *Time Measurement*
- *Process & Resource Planning*
- *Product Evaluation*
- *Cost Analysis*
- *Line Balancing*

### Process Detailing & Validation

Employs the structure and diagrams of the Process Planning solutions into the application specific disciplines of manufacturing. Verify process methodologies with actual product geometry and define processes to a greater level of detail within a 3D environment.

- *Manufacturing and Maintenance*
- *Assembly Sequences*
- *Factory/Cell Layouts*
- *Machining Operations*
- *Workforce Performance and Interactivity*
- *Shop Floor Instructions*

### Resource Modeling & Simulation

Provides a comprehensive process and resource planning support environment. The resulting process diagrams can provide a clear overview of the sequences and links between processes and resources early in product design conception.

- *Factory Flow Simulations*
- *Robotic Workcell Setup and OLP*
- *NC Machining*
- *Virtual Reality Scenarios*
- *Ergonomic Analysis*
- *Inspection*

