



DELMI A Process Engineer

A Process Driven Approach to Process and Resource Planning



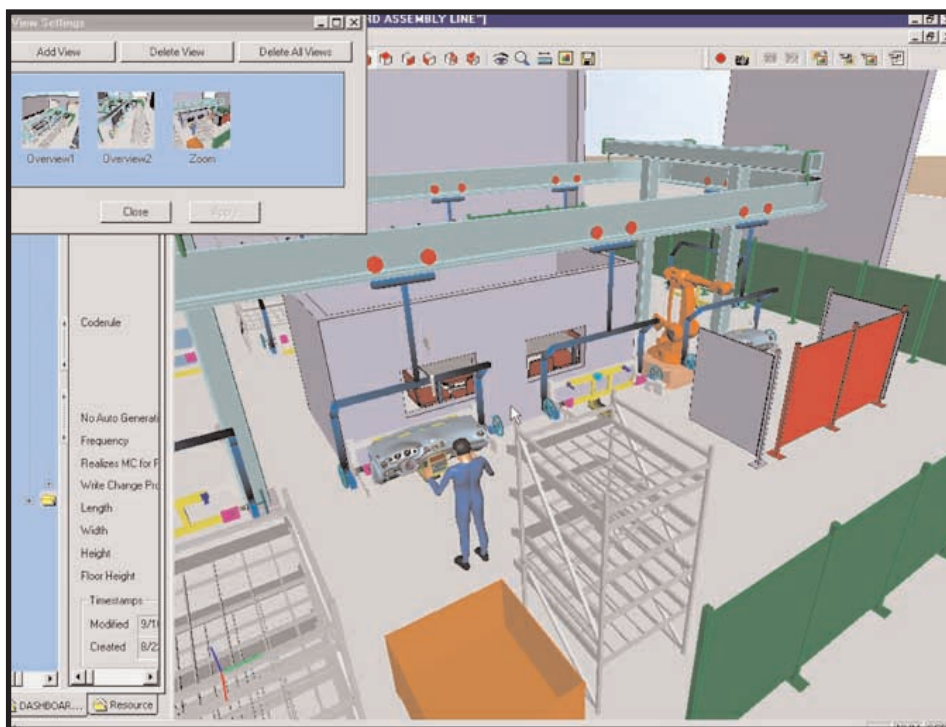
DELMIA Process Engineer

Today's enterprises must continually increase their productivity in order to compete effectively. This requires shorter delivery times, reduced operating costs, optimal utilization of capacities and optimized material and information flow.

cases, cost pressures and overburdened work planning departments lead to poorly designed workplaces. This, in turn, results in poor work performance and low job satisfaction. More than ever before, industrial enterprises need planning tools with which manual and partially automated workplaces can be designed quickly, cost-effectively, reliably and ergonomically.

DELMIA Process Engineer provides, through methodically structured planning, early recognition of process risks, re-use of proven processes, traceable changes and decisions, and access to scattered process knowledge. Process Engineer is utilized from the conceptual product design phase, through the pre-planning and detail planning stages up to the production phase as alternative design and manufacturing scenarios mature. The comprehensive treatment of the relationships between product, process and manu-

facturing resource data, including the plant layout, helps to avoid planning mistakes and obtain a precise overview, early in the process, of the required investment costs, production space and manpower.



At the same time, total automation, defined previously as the ultimate goal, is being superseded by hybrid, partially automated and therefore flexible production systems. Against the background of competition and workplace safety, more attention must be paid to the people at the workplace - a company's most important capital. In many

Benefits Achieved Using Process Engineer

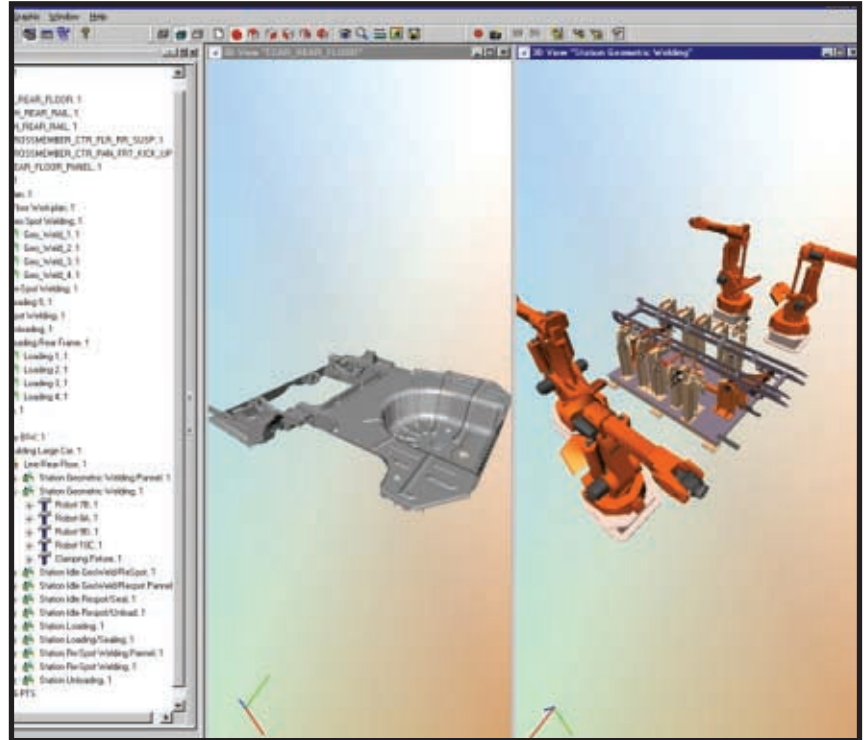
- Optimization of Material Flow
- Reduction of Standard Times
- Modular Product Concept
- Design for Manufacturing
- Fast Product Development
- Short Main Line Concept
- Efficient Logistics
- High Production Flexibility
- Quality Improvement
- Simultaneous Engineering

Results: Savings / Benefits

- Reduction of Workstations
- Decreased Work-In-Progress Inventory
- Shortening of Lead Time
- Reduction of Floor Space
- Reduction of Capital and Operating Costs

The PPR HUB maps the entire planning content of DELMIA Process Engineer and all logical relationships between the process, product and resource data.

The PPR HUB integrates the data used by the process planners, manufacturing engineers, facility planners, industrial engineers and production planners. Any item of information that is of significance within the context of integrated product and process engineering can



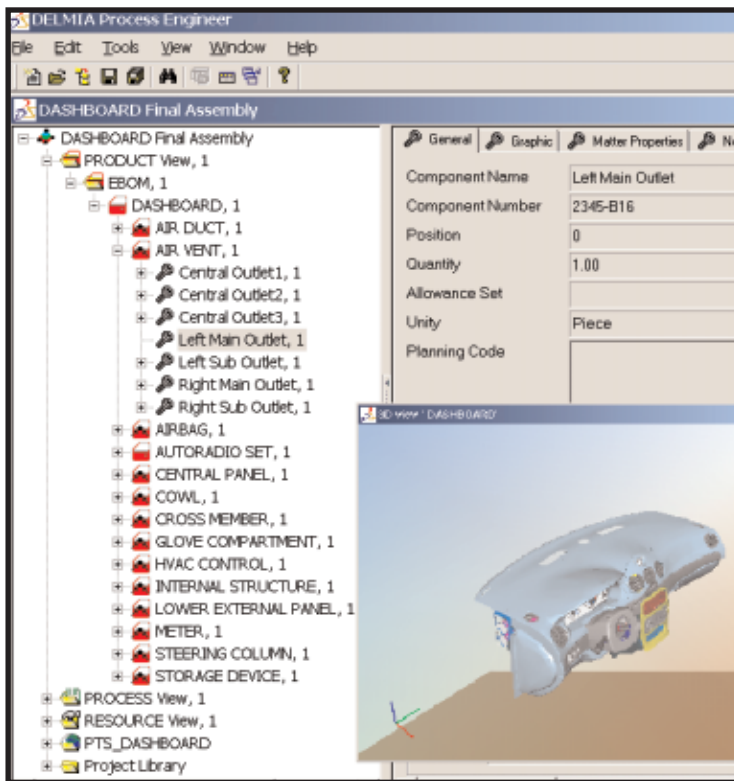
be found in the PPR HUB data model.

The PPR HUB can be tailored to fit company-specific requirements and documents the planning history of the project. The 3-tier architecture of the PPR HUB enables it to be scaled to meet the requirements of enterprise-wide deployment. It supports multiple concurrent users and user management. The PPR HUB gives the users instant access to the latest, correct data, eliminating the risk of redundant work or the use of obsolete data.

For more information on the PPR Hub, see page 12.

DELMIA Process Engineer Meets Your Requirements for Process Planning

- Provides a structured methodology that systematically leads to an optimal solution by considering all process-related costs and analyzing alternatives early in the planning stage.



- Presents a clear view of the overall system performance versus target values during all planning phases.
- Reduces risks by the re-use of proven processes.
- Supports multiple users, shortening planning time.

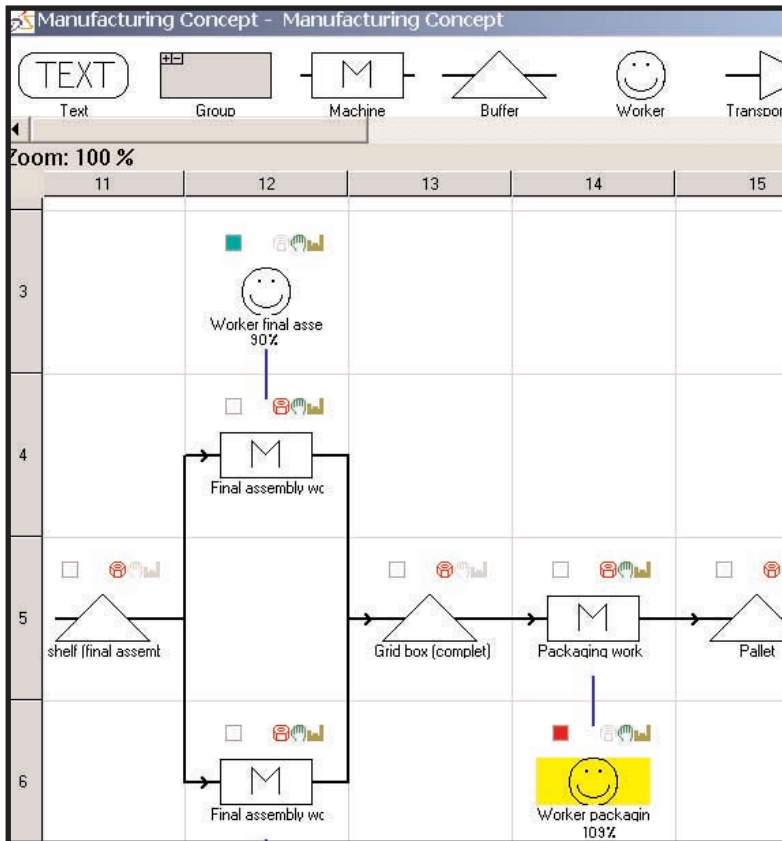
- Organizes each project based on the unique structure of the product, processes, resources and plant involved with easily configurable project structure.
- Customizes the user interface and reporting formats to meet your individual requirements.
- Promotes an identical planning environment for all projects.
- Provides built-in documentation of the planning history.
- Reflects any data change immediately for all users.
- Allows native integration with CATIA and ENOVIA and interfaces with other CAD and PDM systems.

PPR Navigator DELMIA Solution Portfolio for Processes

Process Engineer and the PPR HUB can be easily configured and interfaced with a company's existing IT environment and legacy manufacturing support systems.

Project Structure

The product, process and resource data can be structured in the PPR NAVIGATOR according to company-specific requirements. This guarantees a high degree of transparency and consistency and quick data access during the entire planning cycle. The relationships among the product, process and resource entities are established using the drag and drop technique. Premises of the project, for example the Shift Models and the Ramp Up of the production, are defined in the PPR NAVIGATOR and are re-used in calculations for capacity, occupation and costs.



customize the project to particular requirements and needs. With the help of new attributes, any data fields may be added to a plantype and can then be filled in with information by the users during the planning process.

DELMIA Process Engineer allows the use of scripts to add additional functionality requested by the customer. These scripts can be written by the customers themselves or provided by DELMIA. The scripts can be easily written in Visual Basic, Java or C++.

The manufacturing concept contains requirements for production and assembly, representing an initial model of the future production.

The comprehensive, customer-specific configuration capability of DELMIA Process Engineer makes it possible to customize the project properties.

- Adaptation of User Interface and Terminology
- Derivation of Individual Object Types
- Easy Customization of the Appearance of the Dialogs
- Modification of attributes, Groups and Pages in the Property Window

The PlantTypeSet is the template for the structure and hierarchies in the PPR NAVIAGATOR tree. This makes it possible to

DELMIA PPR NAVIGATOR

Accessing Planning Information

- Navigation Through the PPR HUB to All Product, Process and Resource Data
- Viewing of Product Hierarchy, Process Graphs and Process Trees, Resources (Tools, Machines, Stations, Lines, Plants)
- Reporting Outputs to MS Office, HTML or Reporting Templates
- Libraries for Re-Use of Best Practice Solutions
- Project Structuring
- Versioning
- History
- Advanced Search Functionality

Inquiries concerning work design (US)		
Head area	Materials and tooling	
Working room & body posture	Are effective material handling aids provided to transport/carry loads of all types?	<input type="radio"/> not relevant <input type="radio"/> correct <input type="radio"/> incorrect
Materials and tooling	Are parts positioned within the optimal reach range?	<input type="radio"/> not relevant <input type="radio"/> correct <input type="radio"/> incorrect
Controls	Are parts positioned to facilitate optimum grasps (part bins, tool holders, soft pads, etc.)?	<input type="radio"/> not relevant <input type="radio"/> correct <input type="radio"/> incorrect
Material handling	Is the weight of the tool proper for the task?	<input type="radio"/> not relevant <input type="radio"/> correct <input type="radio"/> incorrect
Information processing	Does the tool handle allow for proper positioning of the hand during use?	<input type="radio"/> not relevant <input type="radio"/> correct <input type="radio"/> incorrect
Value analysis	Does the shape of the handle conform to the hand?	<input type="radio"/> not relevant <input type="radio"/> correct <input type="radio"/> incorrect
Motion economy	Does the workstation provide enough area for proper use of the tool?	<input type="radio"/> not relevant <input type="radio"/> correct <input type="radio"/> incorrect
Work organization	Is fixed tool storage provided within the normal reach of the	<input type="radio"/> not relevant <input type="radio"/> correct <input type="radio"/> incorrect
Muscle strain		
Climate		
Sound and mechanic vibration		

Process Engineer Begins with the EBOM and Ends with Achieving Your Production Targets

DELMIA Process Engineer builds upon existing CAD data and PDM systems through powerful, flexible and configurable interfaces. The integrations to PDM systems are established by the high-performance DELMIA PPR LOADER (Part of DS PPR GATEWAY) so bills of materials and product structures are imported and synchronized directly. It allows special structures and attributes of various PDM systems to be interpreted and makes them available to the PPR HUB in the desired form. Any 3D CAD model required is imported from the CAD system. DELMIA Process Engineer can examine the planning context from the point of view of any object type, i.e., product, process or resource. All associated data can be accessed. For example, production

processes and equipment used, costs, dimensions, volumes and marginal planning conditions may be directly queried from the product structure. Special organizational views set up for the desired type of plan at the enterprise or project level are also available, for example, the "Brake Systems" view in the product structure.

Product Evaluation

DELMIA PRODUCT EVALUATION allows you to see product variants. It supports use of variant codes and mathematically logical expressions to be able to deal with complex product structures.

The result is the possibility to filter the process, product and resource view on the different variants of a product. Alternative components, such as diesel or gasoline engine versions, can be assigned just like variants that are composed of predefined module combinations, e.g., an accumulator pack restricted for use with the 220-volt version. The filtering codes can either be loaded using the DELMIA PPR LOADER or entered manually.

The codes can also be put together as "calculation models" that describe a product variant or a product model that precisely fulfills the list of special features. The model also serves as a filter for the three standard views: product, process and resource.

DELMIA PRODUCT EVALUATION allows the user to view 3D CAD models of the product. The 3D CAD models can be entered manually or imported from the PDM system.

Process & Resource Planning Process Graph

In the Process Graph, shown as a precedence graph, the modules and assembly steps of the product are outlined. This first and still very coarse model of future manufacturing is neutral with regard to the solutions available and typically takes into account only value-adding processes those that are defined as indispensable for the product specifications. The processes are interlinked in a simple and intuitive manner as predecessors, successors and parallels and result in a process sequence. The processes can either be structured hierarchically or combined in groups. This enables a top-down planning, where a rough overview is created, to be detailed later. The displaying of the processes as a graphic view makes the process flow easy to understand and communicate.

The Process Graph can comprise process-related information in classifying attributes that are completely configurable. Estimated process times can be entered and later

updated to precise analyses and FMEA-compatible risk analysis can be applied. Assemblies and parts from the product structure can be assigned to the processes by dragging and dropping. Proven procedures can be stored in a process library for retrieval in planning.

Manufacturing Concept

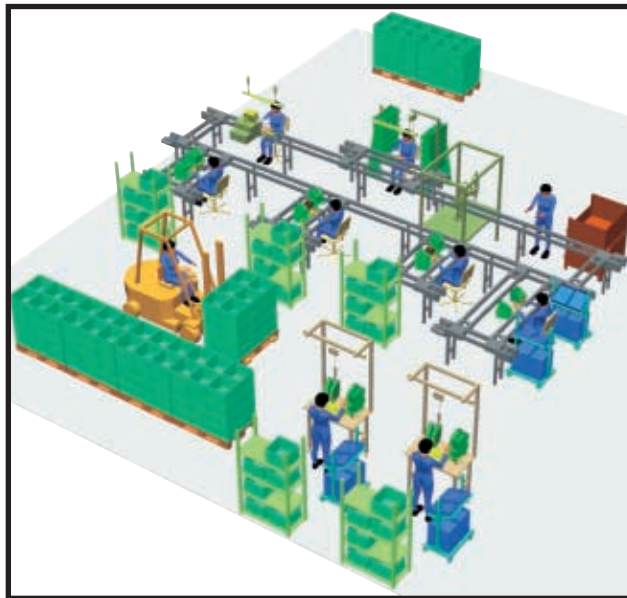
The Process Graph is re-used as a backbone [template?] to create the next step in the process planning: the Manufacturing Concept. The objective of the Manufacturing Concept is to get a graphical overview of the manufacturing system that includes processes, product and resources.

The Manufacturing Concept is a schematic layout that results from mapping the resources to the process activities. It includes activities that do not add value - the total of all processes and resources that are required for production. In addition to machines and workplaces, tools, transport equipment, buffers and



test positions can be described in detail. The links between the objects are inherited from the process graph and new links can be added. The manufacturing concept includes human resource planning.

In the DELMIA PROCESS & RESOURCE PLANNING the planning premises such as shift models, wage groups and data for Production Over Time are used in the Manufacturing Concept to evaluate the resources. In this way, a rough estimate of



the cost and efficiency of the Manufacturing Concepts can be done. DELMIA PROCESS & RESOURCE PLANNING supports multiple Manufacturing Concepts so the user can do several alternative concepts and use the built-in functionality to compare the concepts to find the most efficient and cost-saving alternatives.

By working with the capacity planning in

DELMIA PROCESS & RESOURCE PLANNING, the user gets a graphical view of the processes and resources, either as an overview or as a detailed view, allowing efficient and accurate planning.

Layout Planning

The module DELMIA LAYOUT PLANNING supports simultaneous engineering of production facilities. The schematic layout from the Manufacturing Concept is turned into a 3D layout and assists in basic and detail planning of manual and semi-automated workplaces and entire work systems (resource planning). Creating the layout in 3D provides more accuracy than layouts created in 2D. As well, 3D layouts are easier to understand and can also serve as a basis of discussion. It is possible to conduct both general and detailed planning during each stage of the planning phase. Bill of Resources of layout components is created automatically as components are added to the layout and investment roll-ups are calculated.

To allow the user to quickly create cost-effective designs and optimization of layouts, both for stations, lines and complete work systems, DELMIA LAYOUT PLANNING comes with a library of commonly used manufacturing equipment. You can also easily create your own system elements or use CAD data such as cgr-files, jt-files and vrml1-files in the layout. The system elements are stored in a library allowing their re-use in multiple layouts and projects. In addition to the graphic, you can

also store detailed written information about the system elements in the database, such as name, manufacturer and purchase price.

The areas of use are

- Layout of Production Facilities
- Design of the Material Flow
- Layout of Workplaces
- Selection, Dimensioning and Arrangement of Operating Materials
- Evaluation of the Workplace Layout According to Ergonomic Criteria
- Archiving and Documentation of the Planning Results

The most important planning results are

- Bills of Resources with All Required Work System Elements
- 2D and 3D Workplace Views and Drawings
- Workplace Dimensions
- Facility Layouts

The DELMIA LAYOUT PLANNING supports the quick, cost-effective design and optimization of ergonomically safe manual and partially automated work systems.

Ergonomic Analysis

Anthropometrical elements help the planner to quickly and accurately layout and evaluate a workstation. DELMIA LAYOUT PLANNING has human models of different nationalities, gender and anthropomorphic data. Work positions can be created and saved.

Ergonomic analysis allows the user to

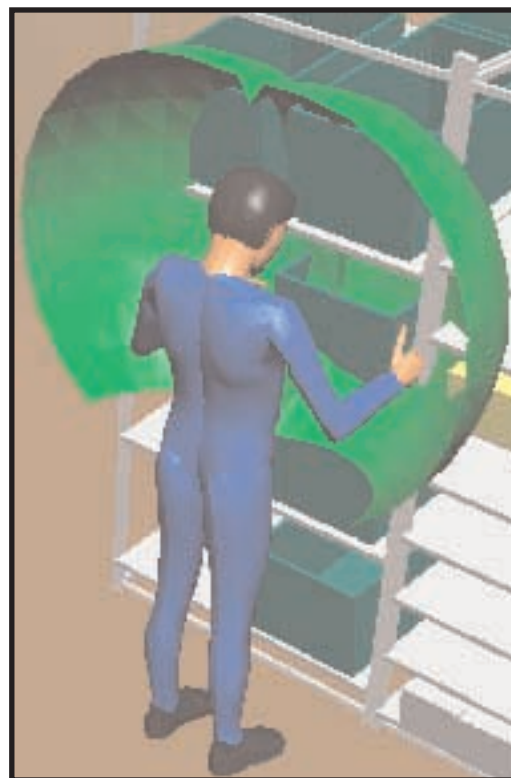
- Determine that Objects can be Reached
- Provide Vision Field Analysis

- Calculate Maximum Forces and Torques
- Perform NIOSH Lifting Analysis
- Obtain a Comprehensive Workplace Design Checklist

Time Measurement

Design and Evaluation of Lean and Flexible Work Systems with DELMIA TIME MEASUREMENT

Sound time measurement based on internationally recognized methods (MTM, WF) contributes significantly to the efficiency of a company. The use of detailed methods and design know-how in the planning process promotes effective and economic planning and execution of manual and partially automated production sequences.



Major Advantages of DELMIA TIME MEASUREMENT

- Quick and efficient generation of time analyses using all common analytical procedures (MTM and WF)
- Registration and management of estimated and recorded time values
- Creation of user-defined data cards
- Creation of user-defined formulas for determining process times
- Design of user-defined print forms
- Checking of rules for correctness and completeness (MTM-1, UAS, MEK, MTM standard data, WF)
- High application speed through creation of time macros (library elements) and use of analysis templates
- Data compression capability over any number of data levels
- Structured data filing in work processes/workstations
- Flexible search mechanisms using key words and search patterns
- Time analysis directly associated with workstation layout
- Automatic updating of time values
- Extensive user configuration options

Available Standard Time Methods

- MTM
 - o MTM-1
 - o MTM-2
 - o Standard data
 - o UAS
 - o MEK
 - o SAM
 - o Office Tasks
 - o Visual Inspection

- Standard time method extensions are also supported in the individual analysis systems.
- Work Factor
 - o Block Method
 - o Quick Method
- General Time Element or Time Analysis

Modules of any quality obtained from any source (estimated times, process times, planning time elements) are acquired and managed in this category.

Work Plans

The creation of work plans is supported in DELMIA TIME MEASUREMENT by a "summary" feature within a standard time method. Such summaries are used to represent individual, integrally complete analytical elements in an overall sequence or work plan.

In addition, this approach serves as a block equalizer (time-determining time element) and can generate the work and text instruction sheet - work instructions for the worker - directly at the workstation.

Moreover, DELMIA TIME MEASUREMENT allows the user to create custom data cards for quick and easy integration of company-specific data.

Analysis with Data Cards

Graphical data cards facilitate quick and efficient creation of work sequence descriptions for manual and partially automated workstations. The desired activity is selected by clicking in the data card with the mouse, then DELMIA TIME MEASUREMENT prompts for the associated time element parameters, such as length of movement. From the data card element chosen, a

complete line with code, standard description, quantity, frequency and time is generated. Naturally, user-defined time elements can be inserted in the sequence of operations described wherever needed.

Analysis Based on a 3D Layout

When existing 3D workstation layouts are used, instead of working exclusively with data cards, DELMIA TIME MEASUREMENT can perform quick and reliable analyses. As virtual workstations, these 3D workstation graphics completely represent the subsequent real workstation situation in production with all essential features.

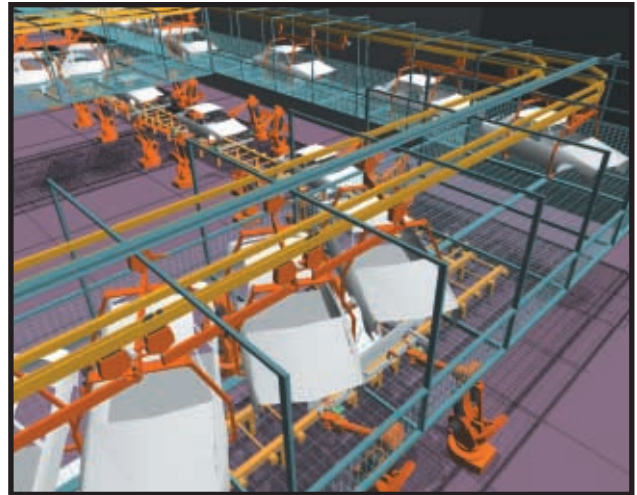
This provides unambiguous documentation of workstation conditions underlying the time analysis, eliminating the need to estimate. The process of analysis based on 3D workstation layouts is simple

- Select the time element code from the data card.
- Define the starting and end points of the action by mouse clicks on the 3D representation.
- Confirm the sequence.

Analysis with Formulas

Complex formula constructs can be created and structured in DELMIA TIME MEASUREMENT. This is implemented by means of structuring elements such as

- Formula Within a Formula
- Subroutines
- "if ... then ... else ..." Control Structures
- "from ... to ... step ..." Loops



Nesting and control structures enable the user to create highly dynamic formulas. It is possible to calculate and plan a great number of variants using only a few formulas. This simplifies data maintenance and increases the quality of the time data.

Benefits

- Quick and Efficient Generation of Time Analyses
- Creation of User-Defined Data Cards
- Creation of User-Defined Formulas for Determining Process Times
- Design of User-Defined Print Forms
- Checking of Rules for Accuracy and Totality (MTM1, UAS, MEK, MTM Standard Data, WF)

DELMIA PROCESS ENGINEER



PPR Hub at a Glance



The PPR Hub is the data backbone of the DELMIA solution portfolio for digital planning and control of production processes.

PPR Hub:

- Maps the entire planning content of DELMIA Process Engineer and all logical relationships
- Manages product structures, product variants and documents
- Guarantees the creation of a companywide distributed database solution with the PPR Hub at its center
- Supports adaptation of database content to company-specific requirements.
- Supports companywide access to all planning data
- Can be integrated in the planning and project workflow of the company
- Supports linking of any software solution via programmable interfaces
- Supports links to legacy manufacturing files and databases

Advantages for You as the User:

- All users of the PPR Hub work with the same up-to-date data
- You always see the data view that is related to your task
- Any data change is immediately reflected for all users
- Costing is always based on the current data status

Interested?

We will be glad to answer your questions in a personal meeting. Please give us a call or send us an e-mail at info@delmia.com.

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