

# Tecnomatix

Transforming the process  
of manufacturing

UGS

[www.ugs.com](http://www.ugs.com)



Tecnomatix™ is a complete digital manufacturing solution that helps companies quickly identify the best strategies for boosting productivity and lowering cost.



# Digital manufacturing

## An essential part of a complete PLM strategy

### Why you need digital manufacturing

A company's biggest cost center – and that of its supply chain – is manufacturing operations. Your product's competitive advantage is squandered when delays and cost overruns result from inefficient, expensive and unpredictable manufacturing processes. The economic success of innovative product designs hinges on the performance of your manufacturing operations.

### How Tecnomatix helps build products better

Tecnomatix is an open digital manufacturing system that increases your company's profitability by improving the way your products are built. Designed for companies who need to get products to market faster and more cost effectively, Tecnomatix:

- Gives your teams faster access to key data when they need it
- Promotes more efficient collaboration, informed decision making and manufacturing knowledge

- Facilitates the sharing of best practices
- Enables rapid response to product lifecycle changes
- Shows you the outcome of plans before you implement them
- Ensures that your processes achieve their expected results

Other manufacturing planning products lack either the application coverage to improve your entire manufacturing cycle or the knowledge management underpinnings to leverage upstream lifecycle information. Tecnomatix is unique because it brings together a comprehensive suite of industry-leading applications with a proven knowledge management foundation spanning the entire product lifecycle.

### Why Tecnomatix is vital to your profitability

Manufacturers have long understood the value of automating product development and production. CAD/PDM and

ERP/MES solutions have become critical assets for developing innovative, market-leading products. These solutions define what products a company builds and control when and where it builds them. Neither solution, however, addresses how products ought to be built.

This phase of the product lifecycle, while more complex, costly and dynamic, is also less automated. And where technology is employed, it typically addresses an isolated aspect of the planning process, neither making efficient use of existing data nor producing information that can be leveraged in other applications.

Tecnomatix is therefore an essential requirement for implementing a PLM strategy that maximizes productivity gains and cost savings. Improvements in design and production still have an impact on product lifecycle efficiency, but manufacturing – by virtue of its unstructured technology adoption and central position in the product lifecycle – offers the best opportunity to reap the greatest business benefits.

# Proven knowledge management supporting comprehensive solutions

## Introducing Tecnomatix

Tecnomatix brings together best-of-breed digital manufacturing solutions with a proven knowledge management foundation spanning the entire product lifecycle.

Teamcenter®, UGS' industry-leading knowledge management system, is the core of Tecnomatix. By associating product, process, resource and plant data, Teamcenter greatly increases the value of the information, transforming it to structured knowledge and extending its reach throughout the product lifecycle.

Tightly integrated with Teamcenter, the Tecnomatix suite of solutions improves every aspect of manufacturing planning. By combining the complementary strengths of Teamcenter knowledge management and Tecnomatix process improvement, UGS offers companies the most extensive and proven set of solutions for digital manufacturing.

### ▶ Part manufacturing

A single solution to support all the activities for manufacturing parts – from tooling design and process planning to machining and shop floor communication

### ▶ Assembly planning

A collaborative environment for planning assembly processes, leveraging tools for assembly layout and sequencing, line balancing and process performance

### ▶ Resource management

A single source for accessing manufacturing resource information, including everything from fixtures and machine tools to robots, process templates and more

### ▶ Plant design and optimization

A comprehensive plant layout and material flow solution leveraging process simulation for designing better factory lines and workcells

### ▶ Human performance

A human task analysis solution for designing the safest and most productive workplaces for a target population of workers

### ▶ Product quality

An interactive environment for controlling dimensional variation, improving product quality and communicating quality data throughout the enterprise

### ▶ Production execution

A graphical communications solution for keeping production up to date with work instructions and documentation and for linking with MES and ERP systems



# Tecnomatix manufacturing knowledge management

By industry estimates, manufacturing engineering uses over one hundred times more data than design engineering. In addition to product designs, manufacturing engineers must factor in NC programs, tooling and fixtures, workcells and facilities, machining and build operations, human performance, production quality, work instructions, order routing and more.

The benefits of efficiently managing such a vast amount of manufacturing information are enormous. That's why the world's leading organizations are extending their PDM environments to encompass digital manufacturing. For many of these organizations, Tecnomatix has proven particularly valuable because it is powered by Teamcenter, the industry's leading product lifecycle knowledge management environment.

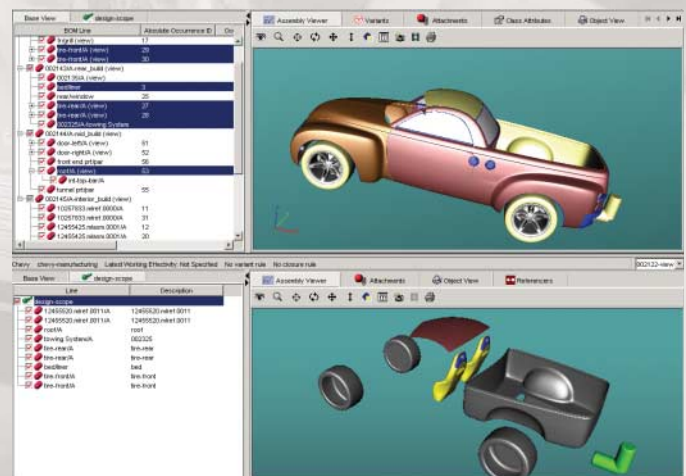
Teamcenter enables organizations to establish digital continuity from the beginning to the end of their product lifecycle. This helps break down communications barriers among design, manufacturing and production. With full visibility of the process, everyone reacts to change better, makes the right decisions earlier and contributes to building products faster and more cost effectively.

## A single source of manufacturing knowledge

According to industry reports, manufacturing engineers spend over half their time searching for data. Leveraging Teamcenter or your own PDM system, Tecnomatix makes information available on demand. Teamcenter manages all the information defining your products, processes, production resources and plant facilities. This gives users complete confidence that they're working with the correct data in configurations that simplify their job.

## Clear visibility of the impact of change

Tecnomatix associates product, process, resource and plant information together so that changes to any one facet ripple through related elements automatically. If, for instance, a design feature gets changed, the tooling for that feature may also change, as might the plant where the part is machined. Tecnomatix automatically shows you how that single design change influences every other aspect of your manufacturing planning and execution.



- open architecture
- lifecycle knowledge
- associative structures
- change management
- workflow control
- visualization
- collaboration

*With its open architecture, Teamcenter manages critical lifecycle data streams including product, process, plant and resource information. Users can visualize and collaborate on this associative data, taking advantage of powerful workflow control and change management functionality.*

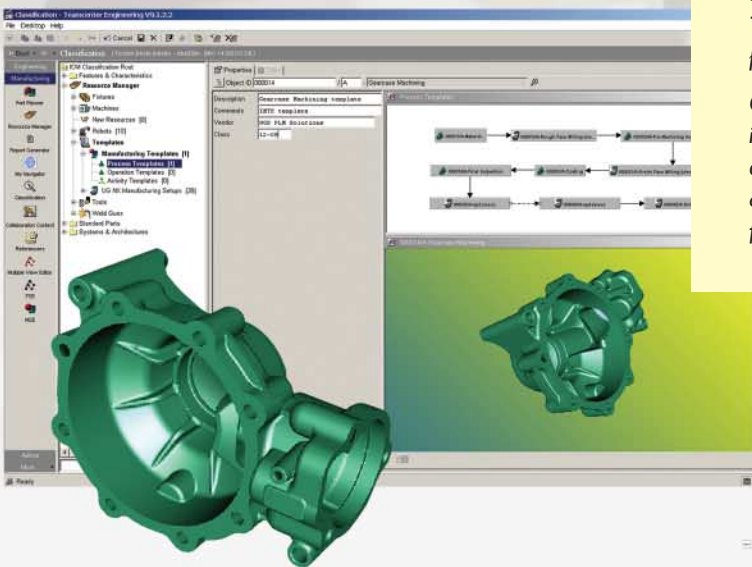
# Powered by Teamcenter and PLM Open

## Structured knowledge for sharing best practices

Tecnomatix helps companies organize their manufacturing knowledge in data structures that can be re-used in future plans. With best practices reflected in product features, resource libraries, process templates and plant layouts, organizations eliminate time wasted on duplicate efforts and ensure that they're always implementing optimal plans.

## Targeted visualization for intelligent collaboration

Tecnomatix promotes efficient collaboration with interactive, lightweight visualization tools. Users can easily obtain multiple data views targeted specifically for their task. The entire Tecnomatix collaborative process is tightly controlled through rules for handling data configurations, revisions, security and workflow. This "role-based" approach to collaboration ensures that people only see the information they need and nothing more.



With Tecnomatix knowledge management, you can capture and classify process templates of best practices for use in defining future processes.

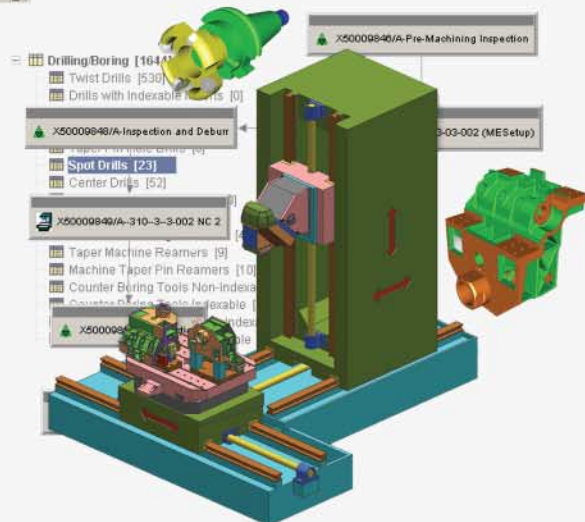
## ▶ PLM Open: Open foundation, open applications, open for business

To improve competitiveness, manufacturers must be able to leverage best-in-class solutions from a variety of vendors and partners. Many organizations, for instance, need to leverage CAD data from multiple systems. With the rise of global outsourcing and extended enterprises, an effective digital manufacturing strategy must accommodate data from third-party and legacy systems.

UGS is committed to developing technology and conducting business in a way that meets customer requirements for openness. All UGS applications are developed to provide access to every level of operation, including the user interface, program APIs and functional components.

UGS applications share a common data model called the lifecycle data architecture (LDA). LDA ensures that applications are tightly integrated and managed within the open Teamcenter environment. Software tools such as JT Open, PLM Vis and PLM XML help Teamcenter regulate the persistent and real-time flow of product, process, resource and plant data throughout the PLM process.

Openness is more than just a technological challenge at UGS; it's a way of doing business. UGS has organized communities of customers, partners and technology adopters that are dedicated to advancing the principle of open communication for open innovation.



## Solutions for your industry processes

Tecnomatix solutions are geared to support and improve processes specific to a variety of industries, including automotive, trucking, heavy equipment, aerospace, defense, electronics, consumer goods and more.

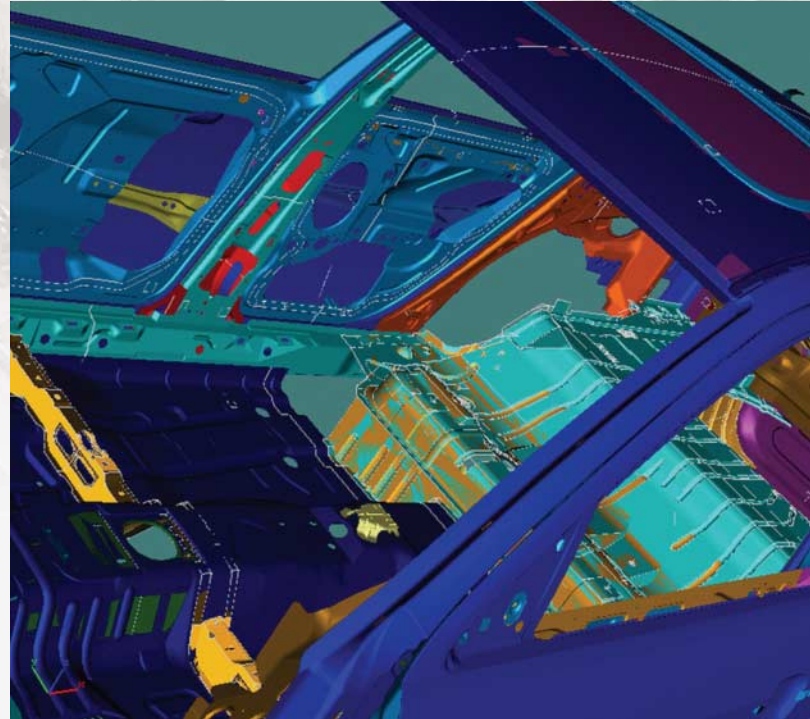
Tecnomatix makes it easy for organizations to implement digital manufacturing solutions leveraging their industry's best practices. Within the Tecnomatix knowledge management environment, organizations can readily configure data structures, workflows and business rules to their needs. And their best practices can be re-used through product features, resource libraries, process templates and plant layouts.

### Tecnomatix for automakers

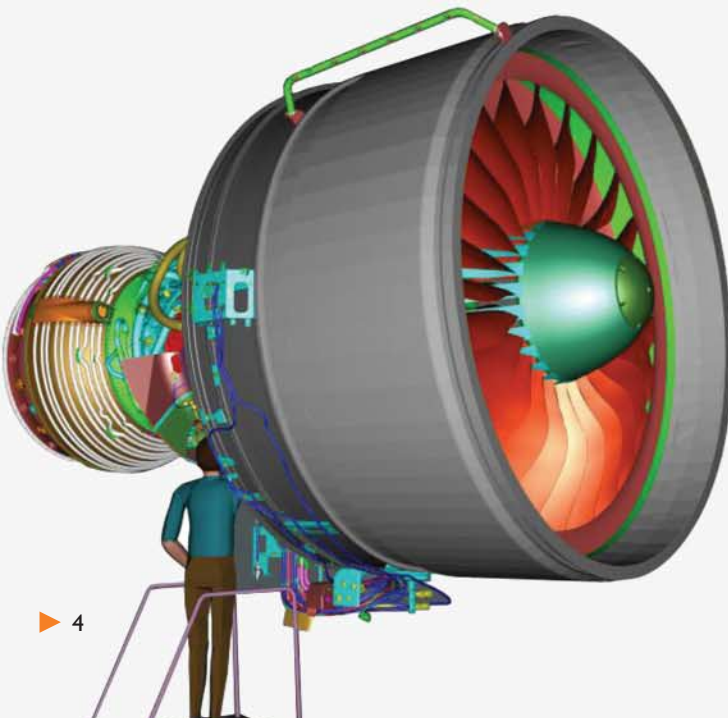
Tecnomatix provides a tailored environment for planning, verifying and communicating automotive powertrain, body-in-white and final assembly processes. For powertrain operations, Tecnomatix provides a set of tailored solutions for part fabrication, assembly planning, process simulation and more. For body-in-white, Tecnomatix helps engineers design and verify spot welding and painting operations. Automakers can define robotic, ergonomic and process sequences for whole lines or individual cells, optimizing them for peak line performance. For final assembly, Tecnomatix enables automakers to optimize processes for such activities as inserting car seats, instrument panels and windshields. They can also improve the ergonomics of assembly tasks and ensure that work sequences are tuned for maximum productivity. And using Tecnomatix production execution, automakers can ensure that their processes are carried out as planned and that any deviation from that plan is fed back into future planning. Orders can be tracked and traced utilizing real-time information collected from shop floor devices such as PLCs and barcode scanners.

### Tecnomatix for automotive suppliers

Tecnomatix helps automotive suppliers work with OEMs in a collaborative environment that tightly manages the flow of information between companies. With Tecnomatix knowledge management, suppliers are integrated into an OEM's extended enterprise through controlled access to a common system. This helps ensure not only that suppliers can respond rapidly to OEM changes and RFPs, but also that OEMs can better address supplier changes. With this interactive collaboration, suppliers can more reliably meet the expectations of their OEM partners.



*Tecnomatix supports all the lifecycle processes unique to a particular industry. Automotive OEMs, for instance, can rely on Tecnomatix to enhance their body-in-white, powertrain, final assembly, paint and plant design processes.*

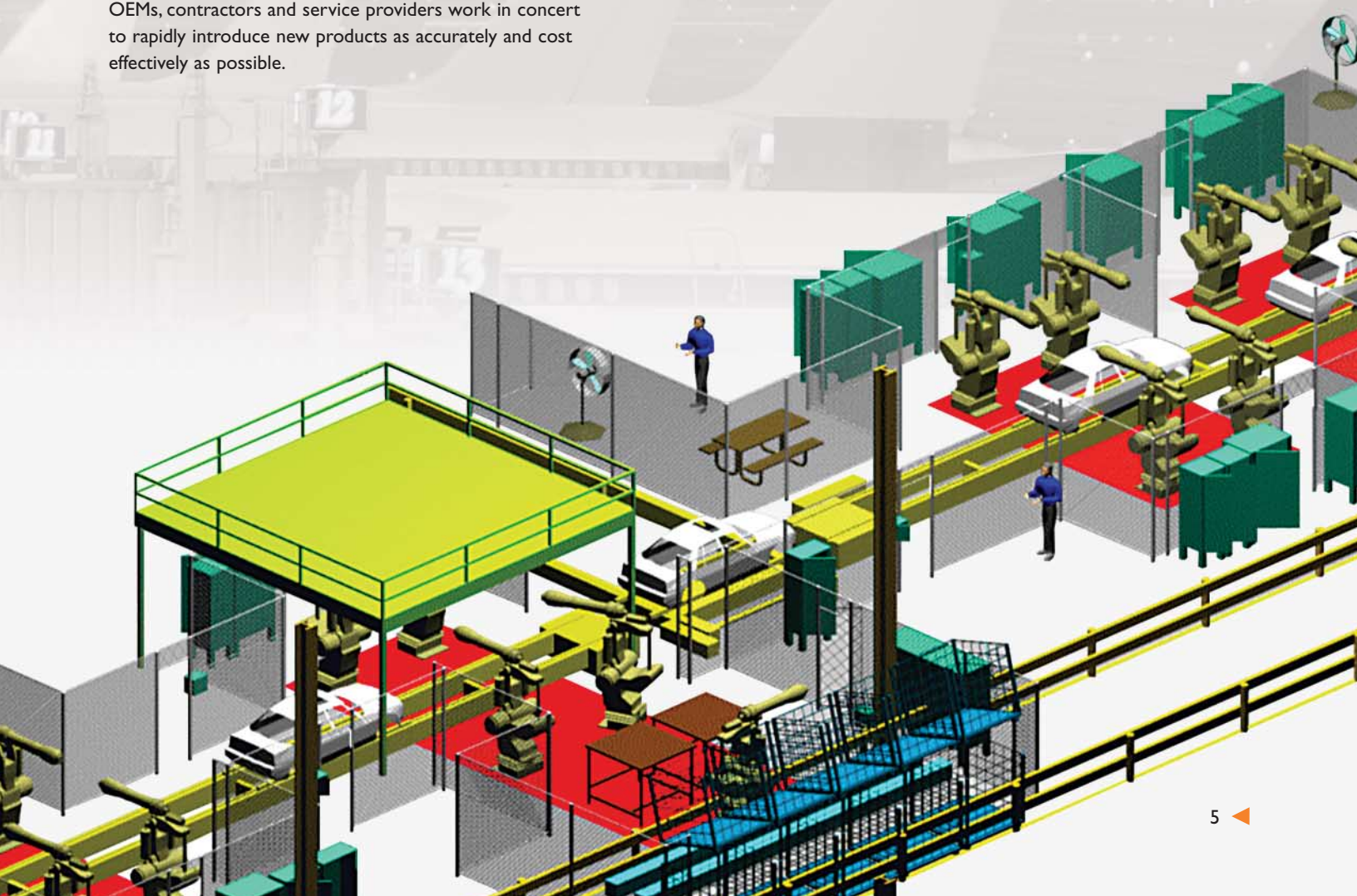
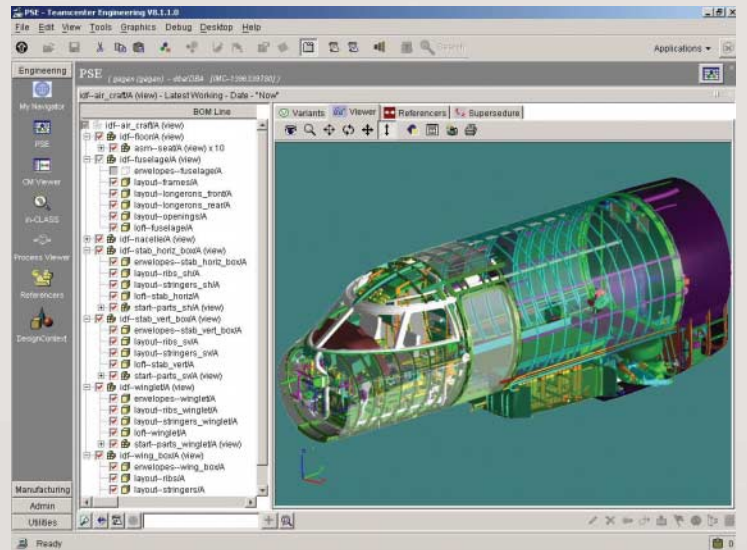


### Tecnomatix for aerospace and defense

Aerospace and defense manufacturers face unique challenges. These organizations must contend with more expansive supply chains, stricter maintenance requirements, uncompromising quality demands, unique facilities challenges and special data management needs due to the long lifecycle of aircraft and weapon systems. Tecnomatix helps these manufacturers implement custom knowledge management systems that accommodate large supply chains and legacy systems. Tecnomatix also provides ergonomic solutions to ensure efficient maintenance procedures, plant layout solutions tailored for aircraft facilities and quality solutions to support Six Sigma and Lean initiatives.

### Tecnomatix for electronics

Tecnomatix's electronics manufacturing solution enables organizations to create, test, optimize and manage product introductions for printed circuit boards and final product assemblies (box build). OEMs, contract electronics manufacturers and electronic manufacturing service providers can collaborate in planning and designing manufacturing processes where one or more functions have been outsourced. This solution helps OEMs, contractors and service providers work in concert to rapidly introduce new products as accurately and cost effectively as possible.



# Part manufacturing

Your part manufacturing process can only achieve maximum efficiency when everyone is working together – from tooling designers and manufacturing engineers to NC programmers and production personnel.

Tecnomatix part manufacturing brings these disciplines together in a single managed environment. Tooling designers define products more efficiently. Manufacturing engineers create more effective plans earlier. NC programmers work faster and smarter. And production personnel are informed every step of the way. The result: your part manufacturing process reaches its maximum potential, producing the highest quality parts as fast as possible with the leanest operation.

## Leaner tooling design

Tecnomatix part manufacturing includes applications from UGS NX™ product engineering for designing better tooling at lower cost. The industry's leading digital product development system, NX enables tool designers to quickly model production tools, ensuring accurate fit and function to part designs. Through Tecnomatix knowledge management, tooling models can be associated to part geometry so that changes in product development are automatically reflected in tool designs.

## Faster process planning

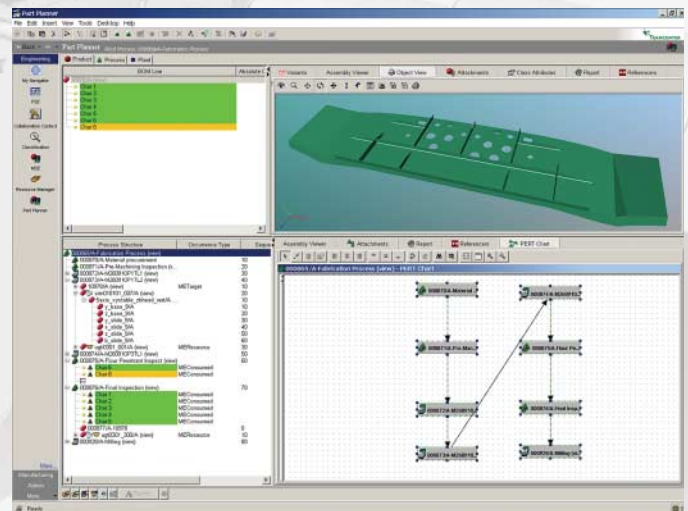
Tecnomatix part manufacturing helps organizations create process plans that leverage part definitions, machine programs and production resources. Manufacturing engineers can define plans in both a hierarchical structure and a graphical process sequence. Proven processes can be captured in “best practices” templates for instant re-use in future operations.

## Smarter machine tool programming

NX Machining is a vital component of Tecnomatix part manufacturing. The industry's most dependable machine tool programming system, NX Machining provides a full set of applications for toolpath verification, machine simulation, programming development and more. These applications support faster and more efficient programming for such operations as 2- and 3-axis milling, 5-axis milling, drilling, turning, merging lathes, EDM, feature-based machining and high-speed machining.

## Better teamwork in production

Tecnomatix part manufacturing automatically communicates vital information to production in highly visual and readily understandable formats. Process plans, setup sheets, tool lists, manufacturing BOMs, work instructions and other reports can be delivered directly to the shop floor, purchasing teams, suppliers and more.



*With a single managed environment for tooling design, process planning, NC programming and production teamwork, Tecnomatix part manufacturing ensures that your operation achieves maximum results.*

# Assembly planning

Time-to-market and time-to-volume are critical success factors in today's manufacturing environment. The organizations that can implement the most efficient and flexible processes in the shortest amount of time are most likely to gain a competitive advantage in their industries.

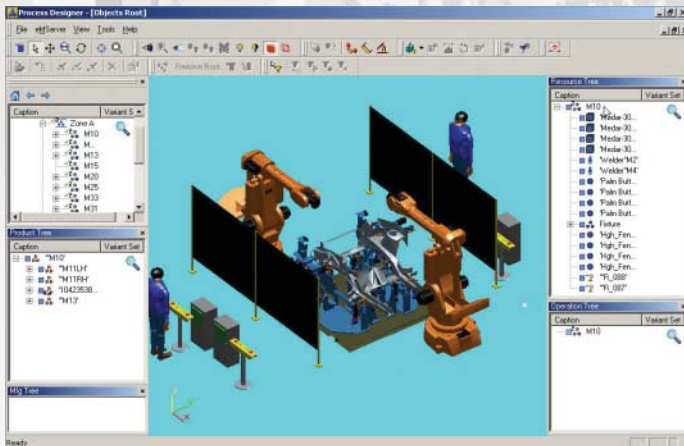
Tecnomatix assembly planning helps organizations quickly define and evaluate manufacturing process scenarios to arrive at the best plan for building their products. Combining knowledge management with process improvement applications, Tecnomatix process planning ensures that manufacturers begin production earlier, create products faster and respond better to change.

## Improving your assembly process

Tecnomatix assembly planning provides a broad range of applications to optimize assembly sequences; coordinate operation timing; verify line performance, including throughput and resource utilization; plan for multiple variants; and analyze production costs. The result is an electronic process plan. Containing a full description of the processes by which a product is assembled, manufactured, tested and packaged, this plan becomes the basis for collaboration among planning teams, plants and contractors.

## Giving your planners the tools they need to ensure optimal performance

With Tecnomatix assembly planning, your manufacturing engineers will be able to define product assembly sequences, create simulations and verify the manufacturability and serviceability of your products. In addition, you can define and manage the cycle time of a single operation or a set of operations. The time value is determined using either operations libraries that include predefined time values or by using the integrated MTM timetables. Analyzing performance, throughput, bottlenecks and cycle times can be accomplished with discrete event simulation, the results of which can be stored in the process database for future use. Line balancing can be managed using charts that display the workload assigned to each resource. The charts allow identification of critical paths in the production line, taking into account product variation mix, process constraints such as direction and sequence of assembly and availability of resources. Finally, your assembly planners can estimate the costs of a line based on the cost of resources and consumables.



# Resource management

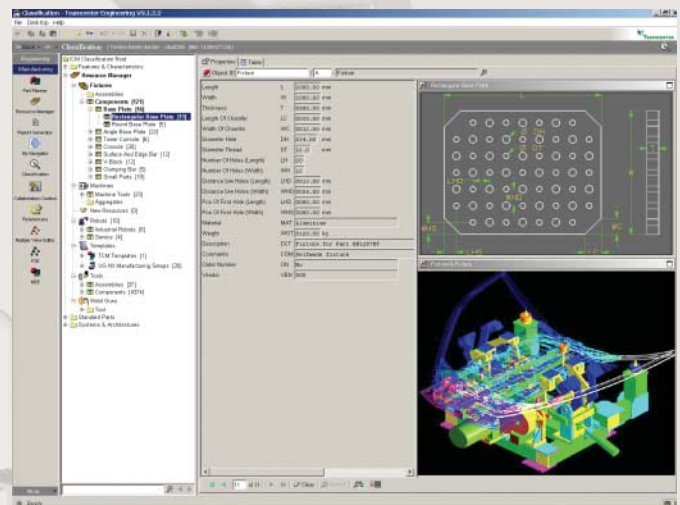
Managing resource data – information on such assets as machine tools, fixtures, robots, welding guns and process templates – is a difficult challenge. Too often this type of data is fragmented across multiple locations and can't be accessed by the applications that need to use it. Manufacturing engineers often have no recourse but to develop new resource plans because they simply can't find the data they need to build on proven processes. In these cases, time is wasted and inventory stock levels needlessly mushroom.

Tecnomatix resource management provides a common graphical repository for all the information related to an organization's production resources. The solution helps organizations define a comprehensive structure under which data can be classified and furnishes tools for users to conduct parametric search queries to retrieve data within seconds. A 3D graphics viewer makes verifying that the right resources are retrieved much easier than combing through text records.

Tightly integrated within the Tecnomatix knowledge management environment, the resource management solution makes data available to improve part manufacturing, tooling design, process planning, machine programming, shop floor communication and other activities.

## Special tools for optimizing press line operations

Tecnomatix resource management features a comprehensive press line programming and analysis tool called Stamping. It allows key elements of a press line job to be prepared and optimized early in the planning phase. Through a full virtual representation of the press line, dies, tooling equipment and work pieces, Stamping provides valuable information for engineers long before any part is manufactured. The software supports different tasks in the sheet metal process, material flow planning, tool and die design and shop floor setup.



## PROVEN RESULTS

▶ *“With Tecnomatix, we can see our factory and our plane as very detailed virtual designs, down to the smallest rack of shelves on the assembly floor and the last rivet in the aircraft.”*

*Eclipse Aviation*

# Plant design and optimization

Producing and selling more products doesn't always lead to more profit. If operations are inefficient, building more products forces companies to spend more money compensating for mistakes. Good product design can improve revenues, but the factory determines how much of that revenue becomes profit.

Tecnomatix plant design and optimization enables organizations to create factory models faster and ensure that they're operating at peak efficiency before production ramp-up. By enabling engineers to see the outcome of plans in virtual plants, organizations avoid wasting resources fixing problems in real plants.

## Designing better plant layouts faster

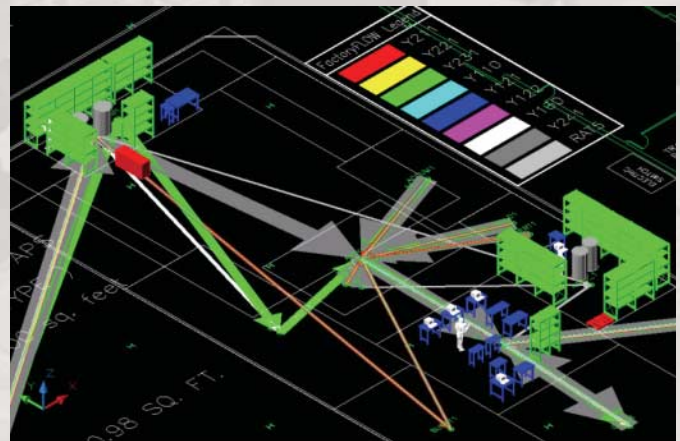
Tecnomatix plant design and optimization includes FactoryCAD, a design application that helps organizations create intelligent factory models quickly and easily. FactoryCAD uses 3D "smart objects" that represent all your factory resources – from conveyors, mezzanines and cranes to containers, AGVs and operators. FactoryCAD layouts can be created much faster than 2D CAD drawings. And since these 3D models have embedded object intelligence, they're easier to visualize and more informative than 2D drawings.

## Optimizing material handling operations

Reducing material handling costs and improving material flow are vital for factory efficiency. Tecnomatix plant design and optimization delivers these benefits with FactoryFlow, a material handling optimization tool. FactoryFlow enables engineers to analyze layouts based on material flow distances, frequency and costs. Layouts are evaluated using part routing information, storage needs and material handling equipment. Analysis results help improve material flow, reduce indirect labor costs and avoid rework costs.

## Simulating processes to eliminate bottlenecks

Manufacturing processes in Tecnomatix plant layouts can be fully optimized using Tecnomatix discrete event simulation. Leveraging knowledge management, FactoryCAD layouts can be brought into Tecnomatix simulation software to verify process feasibility, eliminate bottlenecks and determine throughput potential. Extensive analysis tools help engineers evaluate different scenarios and make fast, accurate decisions concerning process improvement options.



## PROVEN RESULTS

► *“Having tools that let you plan and evaluate different factory scenarios is much more effective than the old methods that involved lots of assumptions and relied on the experience of the engineer. Using Tecnomatix solutions, Mack has optimized plant layouts and saved millions of dollars in unnecessary capital costs.”*

*Mack Trucks*



# Human performance

For organizations in various industries, the importance of factoring human performance into their products, workplaces and processes is paramount. When workers build ergonomically sound products in safer and more productive environments, organizations achieve dramatic improvements in quality, cost reduction, time-to-market and morale.

Tecnomatix human performance helps organizations improve the ergonomics of product designs, manufacturing tasks and maintenance operations. The main character driving these solutions is Jack, a biomechanically accurate digital human that users can insert into virtual environments and assign tasks to analyze behavior. Jack (and Jill) tell engineers what they can see and reach, how comfortable they are, why they're getting hurt, when they're getting tired and other important ergonomics information.

## Designing human-centered products

Tecnomatix Jack helps designers develop products that are safer, more comfortable and more responsive for their targeted user population. Jack can test product designs to help evaluate whether real people would have the visibility, reach and strength to use them comfortably. A special occupant packaging toolkit works with Jack to improve the ergonomics of vehicle and aircraft interiors.

## PROVEN RESULTS

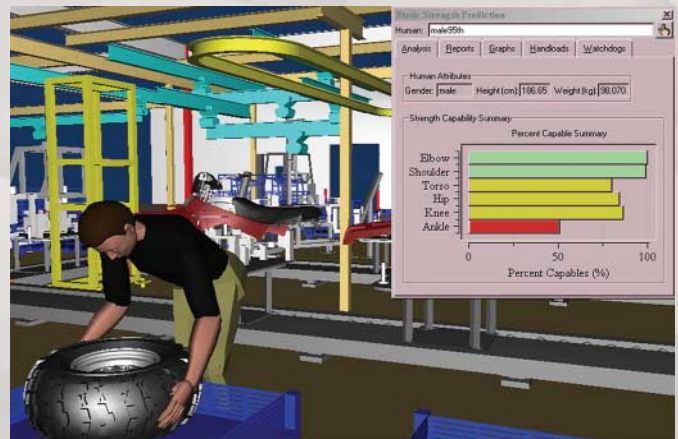
▶ *“With Jack, we build in maintainability from the start, so we don’t have to make expensive design changes later. That and the fact that we don’t need a physical prototype are significant cost savings for us. The optimizations we’re able to make lead to cost savings for our customers.”*  
Pratt & Whitney

## Making the workplace more productive

Tecnomatix Jack helps engineers design workplace tasks that are safer, more efficient and less costly. Using specialized toolkits to simulate human movement and analyze the ergonomics of those movements, Jack tells you when you’re exposing him to the risk of injuries based on posture, muscle use, load weight, task duration and frequency. Jack also reports how long tasks should take based on the MTM-I system.

## Ensuring efficient maintenance procedures

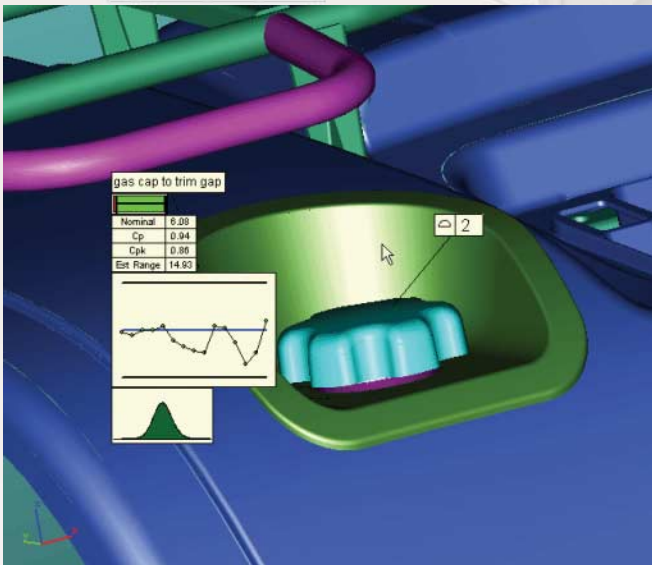
Products that are easier to maintain help organizations improve operational responsiveness. This is especially important in aerospace and defense. Jack helps engineers design products for optimal maintainability and define processes that maximize technician performance. A virtual reality toolkit captures the actual movements of technicians performing tasks and serves as an immersive training aid.



# Product quality planning

The growing adoption of Six Sigma and Lean Manufacturing initiatives highlights the importance manufacturers place on improving product quality. However, despite the priority given to quality, many manufacturers have difficulty providing their quality improvement teams with the information they need to build quality into their processes.

The Tecnomatix product quality planning solution helps manufacturers enhance their Six Sigma and Lean initiatives by providing a graphical environment to analyze dimensional variation and share quality data. By ensuring that parts fit and work together properly in a digital environment, manufacturers avoid expensive build problems related to variation. And by making quality information more accessible and easier to understand, companies attain their quality objectives faster and more cost effectively.



## PROVEN RESULTS

► *“Dimensional analysis was performed on all the major tooling used in the assembly process of our disk drive suspension. It has helped us make dozens of design, tooling and assembly process improvements early in the product development cycle – before physical parts were made.”*

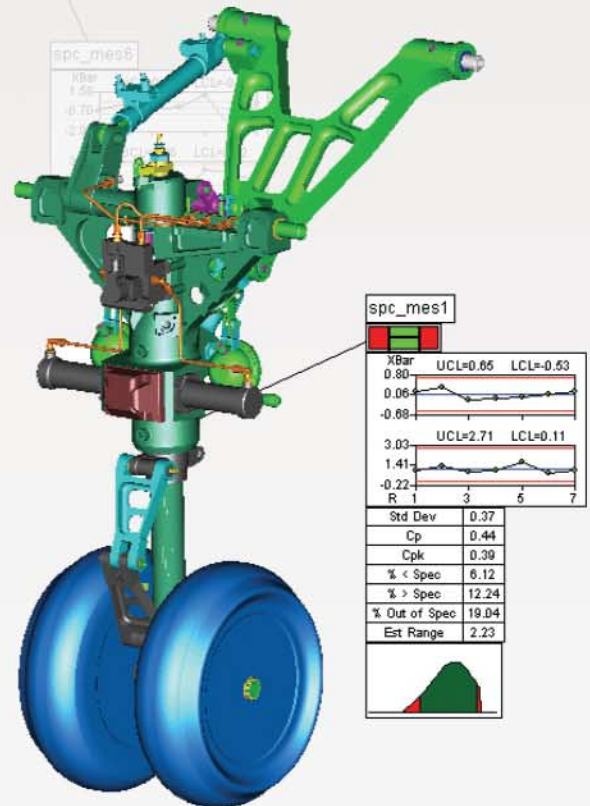
*Hutchinson Technology*

## Reducing variation through dimensional analysis

Tecnomatix product quality planning includes a powerful dimensional analysis tool to predict the amounts and causes of variation in manufacturing processes. This helps organizations reduce the negative impact of variation on product quality, cost and time-to-market. With this tool, engineers can create a 3D digital prototype to simulate the production run, including a full representation of parts, tolerances and process variation. The model predicts if there will be assembly build problems and identifies their root causes – before physical parts are made or tooling is cut.

## Sharing quality information throughout the enterprise

In the Tecnomatix product quality planning environment, production measurement data can be graphically displayed, analyzed and communicated throughout the extended enterprise. Engineers can create and share reports combining measurement inspection data with lightweight 3D geometry. These reports can include statistical process control (SPC) charts, customized views of geometry, cross sections and text markups. By making visually compelling quality data available on every desktop, manufacturers ensure that their quality improvement teams have the information they need when it can make a difference.



# Production execution

The Tecnomatix production execution solution offers a complete and scalable shop floor environment that enables manufacturing organizations to decrease costs, improve agility and capture operational knowledge. The solution leverages manufacturing execution systems (MES), real-time process monitoring and control (SCADA/HMI) and process planning capabilities.

## Tracking your manufacturing operations

Tecnomatix production execution includes Xfactory, an application that tracks all aspects of discrete manufacturing production, providing total visibility, defect tracking, traceability, route and materials enforcement, labor tracking, material management and complete and accurate product genealogy – so work-in-progress is reduced, quality is improved, customer orders are more accurate and on-time, and warranty and regulatory compliance costs are minimized. Unlike any other application in the market, Xfactory can be seamlessly linked with other Tecnomatix applications to include assembly planning, supervisory control, data acquisition and statistical control and analysis (see below).

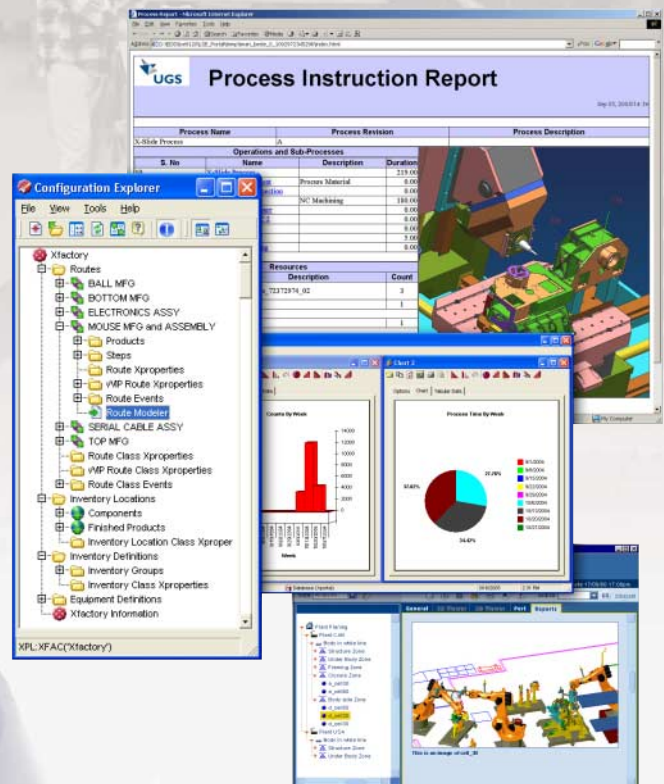
## Monitoring and controlling your industrial operations

Tecnomatix production execution also includes FactoryLink, a production automation application that monitors, supervises and controls industrial processes enabling customers to perfect their processes and products using real-time data. Built on an advanced open architecture, FactoryLink delivers the highest performance and flexibility to customers building vertical applications in a wide range of industries.

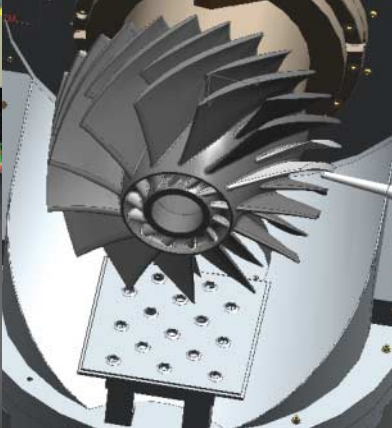
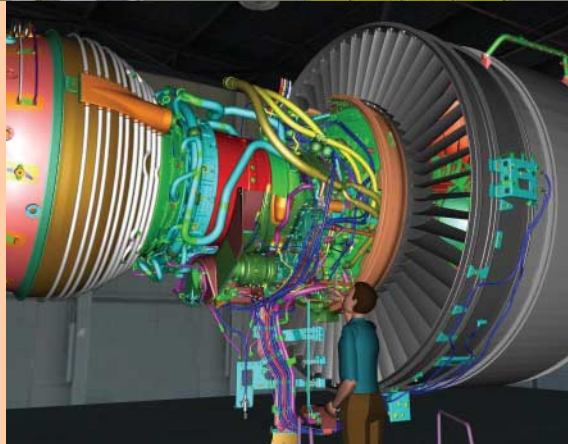
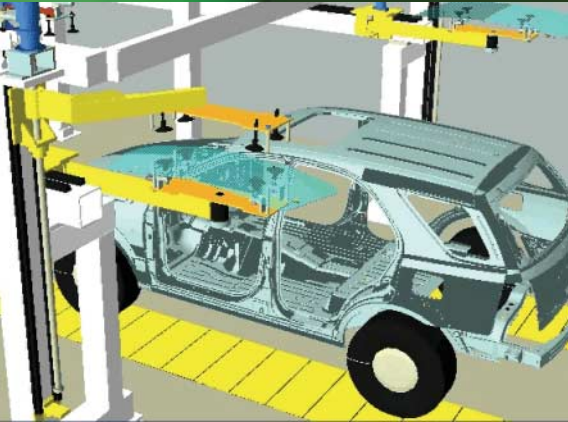
FactoryLink can be used to build virtually any size application, from the simplest human-machine interface (HMI) systems to the most complex and demanding supervisory control and data acquisition (SCADA) systems.

## Production execution for electronics

For the electronics industry, Tecnomatix offers a unique production execution solution tailored to the needs of printed circuit board (PCB) and electronics assembly (box) manufacturing. The solution accelerates and improves electronics quality management, repair and rework, performance monitoring, material management and traceability covering material, machines, processes and products. Tecnomatix electronics production execution masks the complexity of managing and presenting critical shop floor information to help manufacturers better serve customers and meet regulatory demands such as WEEE and RoHS. By doing so, it creates new opportunities to realize more profit from manufacturing operations.



## Tecnomatix advantage



### Proven knowledge management

Tecnomatix is powered by Teamcenter, the industry's leading product lifecycle management environment. What makes Teamcenter such a valuable digital manufacturing foundation is that it manages design, manufacturing and production information all in a single system – and that it's delivered proven benefits to leading manufacturers all over the world.

### Open architecture

A complete digital manufacturing system must be able to accommodate data from multiple CAD applications, best-of-breed third-party tools and legacy systems. Only UGS provides standards-based software tools to ensure that these data sources are integrated with the product, process, resource and plant data flowing throughout the PLM process.

### Comprehensive solutions

Manufacturing engineering involves a variety of complex and interconnected activities – from part and assembly process planning to plant design, ergonomics analysis and quality planning. Your digital manufacturing solution must be able to support and streamline all of these activities. Without a solution as robust as Tecnomatix, your manufacturing planning process will not operate at peak efficiency.

### Proven success

Hundreds of organizations throughout the world in a variety of industries have implemented UGS solutions and are achieving such measurable benefits as lower operational costs, faster time-to-volume, higher productivity, reduced inventory and improved quality. Many of these companies report multi-million dollar bottom-line improvements from their UGS systems.

## About UGS

UGS is a leading global provider of product lifecycle management (PLM) software and services with nearly 4 million licensed seats and 42,000 clients worldwide. The company promotes openness and standardization and works collaboratively with its clients in creating enterprise solutions enabling them to transform their process of innovation and thus begin to capture the value of PLM. For more information on UGS products and services, visit [www.ugs.com](http://www.ugs.com).

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