WHITE PAPER

Increase Engineering Capacity and Reduce Your Labor Costs

www.ldcglobal.com

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Global Edge® 2011 – Automated Workflow

The Power to Succeed in a Global Market

Executive Summary

The principal driver for the success of a manufacturing company in a competitive global marketplace is to produce innovative products better, faster and cheaper. Low cost foreign labor has contributed to the outsourcing of US production to foreign countries. When countries like China grow their world market share, the primary driver of that growth has been driven more by low labor costs, and less by innovation. Most US products that are outsourced to foreign countries, like China, tend to be commodity products. As the costs for foreign countries increases (labor and fuel costs), the advantages of outsourcing start to decrease.

The ***Next Great Leap in Manufacturing*** is achieved with **Automated Workflow** that provides manufacturers an innovative method to increase capacity while reducing labor costs. As more and more products are outsourced overseas for low cost labor, it is imperative that domestic manufacturing companies find innovative methods to eliminate time consuming engineering workflow tasks that help speed the flow of information from quoting to final product shipment.

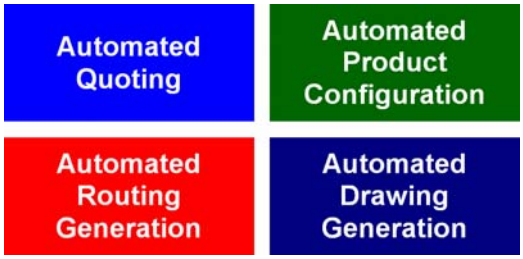
The four key areas of automated workflow include:

1.0: Automated Quoting

2.0: Automated Product Configuration

3.0: Automated Routing Generation

4.0: Automated Drawing Generation



Objectives of Automated Workflow

The primary objective of **Automated Workflow** is to achieve a manufacturing environment that works with your existing software and hardware technologies to keep what works well, and supplement technologies that can be improved upon. It makes little sense to replace your entire business system with a new system that delivers a marginal return on investment and does little to speed up the engineering and manufacturing workflow process. The key to **Automated Workflow** is to identify improvement areas in the engineering and manufacturing workflow process to provide a significant return on investment. These improvement areas are typically associated with the management of the intellectual assets within the engineering and manufacturing workflow process. This white paper will identify and explain the potential improvement areas that can be achieved with **Automated Workflow**.

- ☑ **Increase Quoting Capacity with Better Cost Accuracy**
- ☑ **Greater Product Flexibility with Shortened Delivery Times**
- ☑ **Generate Faster & Better Information at Quoting Stage**
- ☑ **Expanded Customer Product Offerings at Lower Cost**
- ☑ **More Efficient Use of People / Machine Tools**
- ☑ **Achieve Economy of Scale for Small / Short Production Runs**
- ☑ **Gain Market Share in Global Marketplace / Increase Profitability**
- ☑ **Rapid Return On Investment**

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Potential Improvement Areas

The goal of **Automated Workflow** is to automate many of the manual tasks normally associated with the engineering and manufacturing workflow process. Achieving an **Automated Workflow** begins with the process of indentifying potential improvement areas and determining workflow tasks that make sense to automate. This process starts with the Potential Improvement Areas Checklist (**Figure 1**).

1.0 – Automated Quoting

Most custom and engineered to order products generally require engineering involvement at the quoting stage to either create and/or modify the design of a quoted product, or to validate the product being quoted. Automated Quoting provides a simplified method to automate many of the workflow steps associated with the quoting process.

2.0 – Automated Product Configuration

The task of configuring products based on customer and/or product specifications can many times be a manual and time consuming process. Automated Product Configuration provides a simplified method to automatically configure your products.

3.0 – Automated Routing Generation

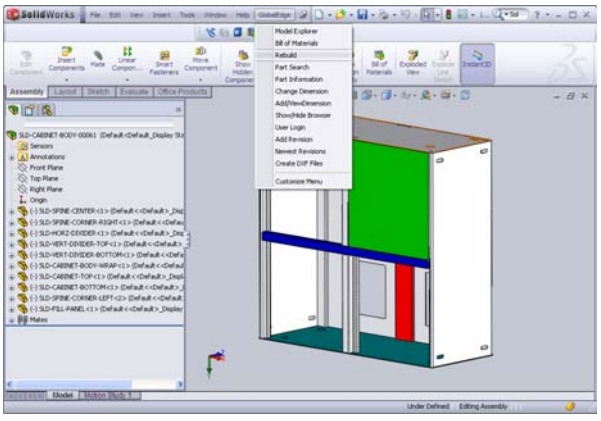
A major component of automated workflow is the ability to automatically select machine tools and processes based on the most cost effective route to manufacture a part. This includes the ability to automatically analyze parts and determine the attributes that are important in deciding which machine tools are the best suited to manufacture the part.

4.0 – Automated Drawing Generation

The engineering workflow process is greatly enhanced with the ability to automatically produce CAD drawings for quoting, design and production based on customer specifications.

Potential Improvement Areas Checklist
1.0 – Automated Quoting
1.1 – Automated CAD Drawing Analysis **1.2 – Automated Product Configuration** **1.3 – Automated Material & Process Cost Roll-Ups** **1.4 – Automated Delivery Time Estimation**
2.0 – Automated Product Configuration
2.1 – Automated Bill of Materials Generation **2.2 – Automated Dimension Generation** **2.3 – Automated Material Selection** **2.4 – Automated Engineering Calculations**
3.0 – Automated Routing Generation
3.1 – Automated Part Dimension Analysis **3.2 – Automated Machine Tool / Process Selection** **3.3 – Automated Blank Size Selection**
4.0 – Automated Drawing Generation
4.1 – Automated Sales Quote Drawing Generation **4.2 – Automated Engineering Drawing Generation** **4.3 – Automated Flat Pattern Drawing Preparation** **4.4 – CAD to ERP Integration**

Figure 1



Learn what steps can help your business to increase capacity and reduce labor costs …

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1.0 – Automated Quoting

Automated Quoting

Automated Workflow includes the ability to produce fast, accurate sales quotes based on actual material and process costs. Most engineered to order products typically start with a new design and/or modification of an existing product design. The starting point of the engineering and manufacturing workflow process generally starts with quoting. Engineered to order products typically require some type of engineering involvement to either design and/or validate a product that is being quoted. Quoting is an area that many companies tend to overlook as an area that can be automated.

Speed Up Your Quoting Process

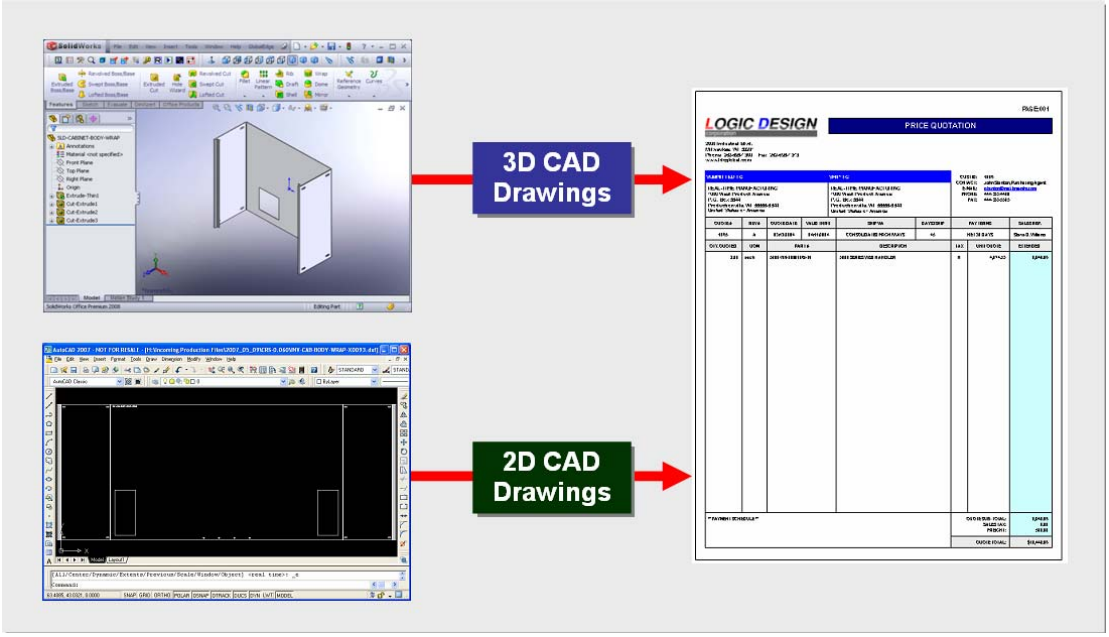
With many engineered to order products, a significant amount of time can be expended designing and customizing the product and compiling accurate costs for a sales quote. Additionally, it is not always known at the quoting stage what the best route to manufacture a part is. If the part is a sheet metal part, when does it make the most sense to turret punch the part versus laser cutting the part? At what quantity and price point does it make sense to outsource a part? When does delivery time become more important than price? Having this knowledge at the quoting stage can make the difference between making and losing money on each order. It can also mean the difference of winning or losing business. If your company does not produce accurate and timely sales quotes, or spends a significant amount of time on the quoting process, quoting can be an impediment to success. This is why automating the quoting process can have a major impact on your bottom line.

1.1 – Automated CAD Drawing Analysis
- ☑ **Eliminates Manual Analysis of Parts for Quoting**
- ☑ **Provides Accurate Foundation for Routing Generation**

1.2 – Automated Product Configuration
- ☑ **Automates the Configuration of Parts and Assemblies**
- ☑ **Automatic Routing Generation Based on Part Parameters**
- ☑ **Helps Insure Valid Quote Configurations**
- ☑ **Offer More Options to Your Customers**
- ☑ **Significantly Speeds Up Quoting Process**

1.3 – Automated Material & Process Cost Roll-Ups
- ☑ **Quotes Based on Actual Material, Machine & Process Costs**
- ☑ **Quantity Pricing Based on Actual Production Costs**

1.4 – Automated Delivery Time Estimation
- ☑ **Estimates Delivery Time Based on Machine Tool Capabilities**
- ☑ **Provides Profitability Versus Delivery Time Options**



Generate Sales Quotes Directly from Your CAD Drawings

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2.0 – Automated Product Configuration

Automated Product Configuration

Automated Workflow provides the capability to automate the process of configuring simple-to-complex products to reduce engineering time and provide customers with more product options. Automated Product Configuration makes it possible to produce accurate bill of materials and routing information that serves as a foundation for a paperless manufacturing environment. This helps insure valid and accurate information is produced at the design stage.

Doing More with Less

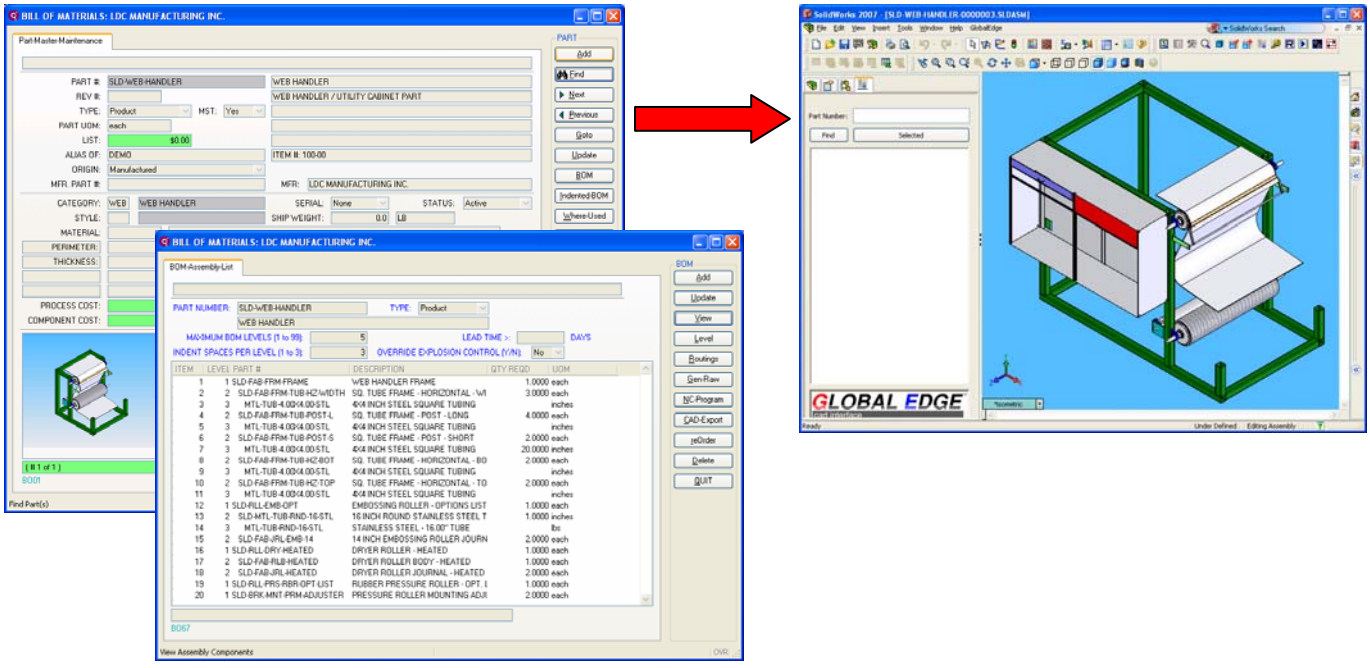
In today's competitive manufacturing marketplace, it has become important to offer more product options to your customers. Manufacturing companies that deliver more product options at lower cost can gain a competitive advantage. Automated product configuration is a powerful engineering tool that automates many of the tasks normally associated with configuring engineered to order products. Automated product configuration is based on a product configuration engine that includes the ability to automatically generate a bill of materials for configured parts and assemblies. It also includes the ability to automatically generate dimensions for each of the configured parts and assemblies that serve as a foundation for automatic drawing generation. The automated product configuration process performs numerous engineering calculations to insure that products are configured correctly and the proper materials are selected.

2.1 – Automated Bill of Materials Generation
- ☑ **Automated Configuration of Simple-to-Complex Parts**
- ☑ **Automatically Generates Accurate Bill of Materials**
- ☑ **Helps Insure Accurate Information at Design Source**
- ☑ **Speeds Up Design Process**

2.2 – Automated Dimension Generation
- ☑ **Formulas to Size Parts within Valid Product Limits**
- ☑ **Formulas to Size Parts Based on Performance Requirements**
- ☑ **Generation of Part Dimensions to Drive Drawing Generation**

2.3 – Automated Material Selection
- ☑ **Material Selection Based on Cost / Performance Requirements**

2.4 – Automated Engineering Calculations
- ☑ **Support of Complex Equations to Determine Part Dimensions Based on Material Type and Product Structure**



Automate the Configuration of Simple-to-Complex Products

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3.0 – Automated Routing Generation

Automated Routing Generation

Automated Workflow includes the ability to quickly generate accurate routings. Automated routing generation can help determine the most cost-effective route to manufacture a part based upon geometry, material used and production run quantity. Automated routing generation includes storing the tribal knowledge of your engineering staff to automatically determine standard and alternate routings for a specific part type. This helps insure that your company manufactures products utilizing the most cost effective manufacturing processes and machine tools.

Produce More Accurate Costing

Automated routing generation helps insure that your company is making the most cost effective use of machine tools on the shop floor. Automated routing generation starts by automatically analyzing the dimensions of a CAD part by utilizing the capabilities of the Automated CAD Drawing Analysis functionality. Automated routing generation then compares part dimension information directly with your machine tool parameters to automatically determine the most cost effective route to manufacture a part. Additionally, automated routing generation automatically determines the most efficient blank size for a part from standard sizes and when a custom blank size is appropriate. Automated routing generation can help your company increase production capacity while reducing the amount of time preparing information for production.

3.1 – Automated Part Dimension Analysis

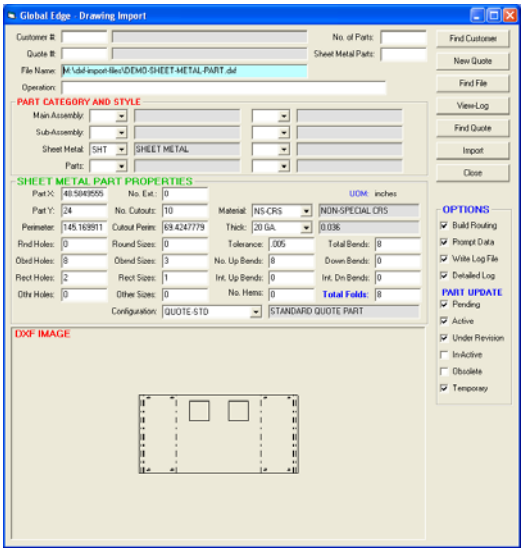
- ☑ **Automated Routing Generation from CAD Part Parameters**
- ☑ **Automated Determination of Part Size, Cutout Type & Count**
- ☑ **Automated Determination of Bend Type & Count**

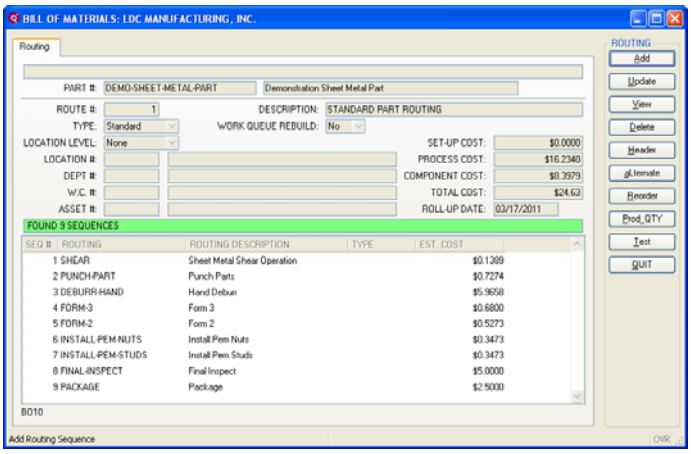
3.2 – Automated Machine Tool / Process Selection

- ☑ **Automated Selection of Machine Tools Based on Part Parameters**
- ☑ **Automated Machine Tool Selection Based on Cost**
- ☑ **More Efficient Use of Machine Tools**
- ☑ **Automated Determination if Process Fits Part Geometry, Material, Finish / Edge Quality, Etc.**
- ☑ **Determines Most Cost Effective Method to Manufacture Part**

3.3 – Automated Blank Size Selection

- ☑ **Automated Selection of Most Efficient Standard Blank Size**
- ☑ **Automated Determination of Custom Blank Size When Appropriate**





Generate Routings Directly from CAD Part Parameters

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4.0 – Automated Drawing Generation

Automated Drawing Generation

Automated Workflow includes the ability to automate the workflow of engineering tasks that range from design to preparation of information for the shop floor. This generally includes creating 2D or 3D part drawings from templates and modifying them. Automated CAD Drawing Generation is made possible by using the data generated by automated product configuration such as bill of materials and part dimensions. This provides your company with the ability to automatically produce CAD drawings for quoting, design and production based on customer specifications.

Reduce Drawing Generation and Prep Time

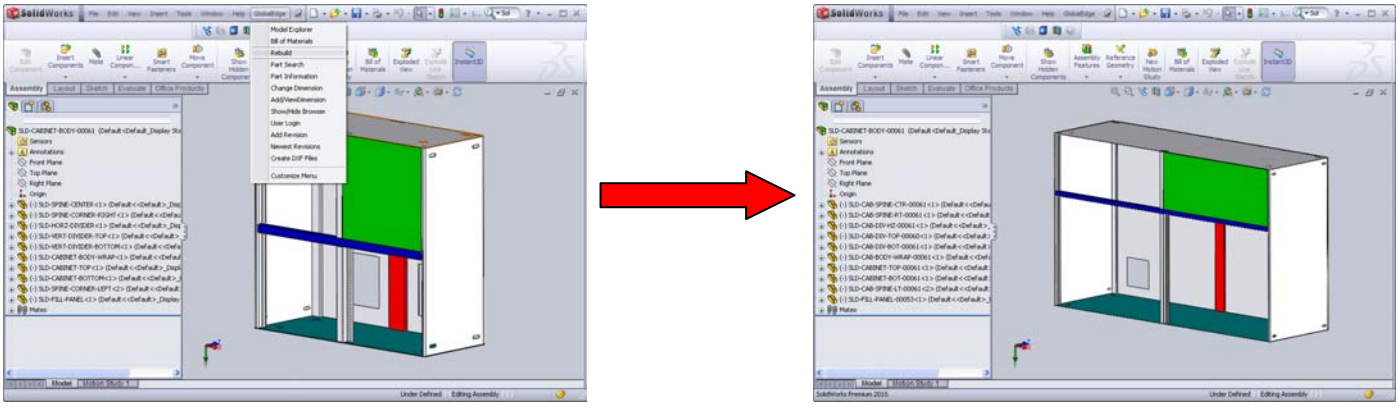
With most engineered to order products, much of the design and manufacturing engineering workflow process centers around creating and modifying CAD drawings. Automated drawing generation provides a simplified method to generate CAD drawings from part and assembly dimensions that are generated by the product configurator at either the quoting and/or design stage. It also includes generating CAD drawings for the shop floor by integrating automated drawing generation with daily production orders. This can include the automatic resizing of CAD models based on the bend radius produced by different press brakes and folders the part may be routed to. An additional component of automated drawing generation is CAD to ERP integration that automatically synchronizes a CAD bill of materials with your ERP bill of materials which eliminates the retyping of information from one system to the next. Additional benefits of CAD to ERP integration include the elimination and reduction of duplicate and orphan parts throughout your enterprise. **Automated Workflow** and automated drawing generation help improve information accuracy and help your company to better manage intellectual assets through task automation.

4.1 – Automated Sales Quote Drawing Generation
- ☑ **Generates Drawings Based on Sales Quote Parameters**
- ☑ **Produce Accurate and Timely Sales Quote Drawings**

4.2 – Automated Engineering Drawing Generation
- ☑ **Generates Drawings Based on Design Parameters**
- ☑ **Eliminates / Reduces Manual Resizing of CAD Drawings**

4.3 – Automated Flat Pattern Drawing Preparation
- ☑ **Automatically Generates 2D DXF Files from 3D CAD Models**
- ☑ **Automatically Prepares Drawings for Nesting Software**
- ☑ **Eliminates Manual Preparation of Shop Floor Drawings**
- ☑ **Automatically Generates Drawings Based on Daily Production Orders**
- ☑ **Automatically Resizes CAD Drawing Based on Machine Tool Part Routed to**

4.4 – CAD to ERP Integration
- ☑ **Synchronizes CAD Bill of Materials with ERP Bill of Materials**
- ☑ **Eliminates Retyping of Engineering Data into ERP System**
- ☑ **Eliminates / Reduces Engineering Clerical Work**
- ☑ **Eliminates / Reduces Duplicate and Orphan Parts**



Generate CAD Drawings Based on Configuration Parameters

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Founded in 1983, Logic Design Corporation is a Software Development and Technology Integration Company that specializes in innovative, leading edge software solutions that help Engineer-To-Order manufacturing companies transform engineering and manufacturing to design and build products better, faster and cheaper. LDC helps your company stay ahead of the competition with proven products and services that are practical to implement and deliver a Rapid, Significant Return On Investment. LDC enables manufacturing companies to achieve high levels of engineering and manufacturing productivity and help attain an "INTEGRATED DIGITAL FACTORY" environment with products and services that include:

- ***Global Edge® 2011 – Automated Workflow***
- INTEGRATED DIGITAL FACTORY
- **2D / 3D CAD Programming**
- **Shop Floor Integration / Automation Planning**
- **Technology Integration Programming**

Johnson Controls, Cooper Power Systems, Siemens, and Lambda Electronics are some of the many companies that have benefited from the products and services of Logic Design Corporation. Benefits provided have included significantly reducing engineering and manufacturing cycle times by automating many of the manual time consuming workflow tasks that range from product configuration to drawing generation, to providing the shop floor with complete information when and where needed. For more information on how the products and services of Logic Design Corporation can help your company achieve significant productivity gains, faster delivery times, improved product quality, and reduced costs.

Please visit **www.ldcglobal.com** or contact Logic Design Corporation to schedule a demonstration of the ***Global Edge® 2011 – Automated Workflow***.

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Mission Statement

"Our Goal is to provide manufacturers with innovative, cost-effective solutions for reducing costs, improving productivity and streamlining operations to achieve a competitive global edge."