TRAQ Manager .NET

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Abstract

This white paper, intended for a technologically knowledgeable reader, provides a description of the Wrapmation TRAQ Manager application. The intention of this document is to provide an understanding of how TRAQ Manager works, what areas of mill operations are covered by TRAQ Manager as well as the benefits it offers to paper mills and pulp producers.

Introduction

Roll tracking is the process of following paper products through a paper mill and warehouse. Proper roll tracking helps mills optimize production, minimizing under- or over- production of paper products, improving inventory management, and meeting customer demands. Before the introduction of computerized systems, mills used labor-intensive manual procedures to track information on each roll, using sequentially numbered rolls. All production information resided in logbooks making customer complaint investigations a difficult and timely task. During the mid-1970s, computerized product tracking tools began to appear, ushering in the era of automation for paper mills.

Label printing was the first automated process, using large mechanical contraptions to print the labels. These machines stamped roll information onto labels that were then glued to the rolls. From these humble beginnings, roll tracking systems began to keep track of customer and order information, so mill operators didn't have to reenter data into different systems. Seeing the benefits of tracking data, the systems evolved so that they could make the best use of all the data available. This improved inventory management and eventually the systems expanded into shipping, production reports, and product quality information. Today, these systems use a more generic term: Manufacturing Execution Systems (MES).

The current trend in the corporate world is Enterprise Resource Planning (ERP), where companies consolidate their business processes into a unified set of software modules. ERP systems are general purpose in nature, handling many of a corporation's financial reporting functions; some can handle supply chain and material requirements, and highly specialized ones can work for process industries, discrete assembly, and electronic components industries. Due to their general purpose nature, ERPs are unable to handle the various functions on a paper mill floor, which are unlike other industries. Recently, ERPs have been successfully handling customer order management but they still have difficulties in handling machine patterns, customer specs and tolerances, short shipping orders, product density changes, CD – MD profiles, and many other aspects of modern paper making.

MES manages production on the paper mill floor, fulfilling customer orders and providing production and inventory data to the ERP system, which helps evaluate operating costs and offer better customer support.

MES also interfaces with the low-level mill Distributed Control Systems (DCS) and Programmable Logic Controllers (PLC), a task ill-suited to ERP. In complex operations, an Advance Planning System (APS) usually accepts orders from ERP and feeds the production plans to MES.

Wrapmation's TRAQ Manager fulfills the product planning, tracking, product conversion, and shipping automation processes. Furthermore, TRAQ Manager was developed using the Microsoft .NET platform, easing the exchange of data between different corporate systems that are .NET aware, and making use of the Extensible Markup Language (XML) to standardize data exchange.

System Overview

TRAQ Manager oversees the various processing centers in a paper mill. Dedicated workstations, located near each mill machine, allow operators to view production plans, input production information, and acknowledge system warnings, and interface with machinery. This ensures that system information is accurate and always up-to-date. TRAQ Manager's modular design allows a mill to assemble a custom solution, using only the modules it needs. The following sections describe each TRAQ Manager module's role in roll tracking.

Order Entry Module

This is the first module of the roll tracking system. Order Entry and Order Status are the primary tools for sales and customer support staff. Production planning and transportation staff use the Order Entry Module to plan the execution of all customer orders. Every aspect of a customer's order is controlled starting with this module — from the receipt of the customer order (via fax, phone, or Internet), through all processing centers, and until the loads leave the mill. In some cases, the Order Entry Module even follows the order until payment is received. Customer order history, and standard products they regularly order, is also available for reference. TRAQ Manager can also track and adjust product pricing, based on specific parameters (product, buying consortiums, effective dates, consignee products, small roll discounts and more).

The TRAQ Manager Order Entry Module allows clerks to enter and monitor six order types. Stock Orders are standard products that a mill wishes to keep in inventory that can be sold "off the shelf". Standard Orders are orders for custom products tightly integrated into the customer's delivery schedule. Commercial Orders are for standard orders with uncertain delivery schedules, allowing production planners to plan orders by portion of orders rather than by load plans. Later loads are planned based on production plans. Customer Inventory Orders are a replenishment of customer inventory, where the mill must maintain specific minimum inventory quantities for the customer. Job Lot Orders allow clients to purchase cull inventory where exact sizes and other product specs are not vital. Pre-sold Orders are when a client receives an invoice for later delivery of a product, after the products have been made.

The Order Entry Module also allows for corporate order entry, where a company uses a corporate sales or an ERP system or our Web-based Order Entry system. Orders are then sent to TRAQ Manager.

Production Planning Module

The Production Planning Module supports long-term demand forecasting and capacity allocation and short term block scheduling and trim optimization. Short-term planning supports four basic models. The first model is based on matching demand forecasts with production capacity forecasts (make-to-stock). The "Make-to-stock" model uses the efficient reservation mechanism that adapts to downgrades, inventory transfers and disruptions in the distribution process. In the second model, production process is driven by firm orders to the producer (make-to-order). Production plans serve as a base for transportation planning. The third model is "just-in-time" or "make-to-load" where customer orders are immediately transferred into loads with fixed delivery dates. Production planning is loads-based. This model provides the highest responsiveness to customer needs. The last model is a continuous replenishment model or Vendor Managed Inventory (VMI) approach. Under a VMI agreement, the producer is responsible for managing the inventory of its customer. The customer provides the daily consumption to the producer so it can build a production-distribution plan that meets the fixed service level as well as optimize the usage of its production-distribution resources.

The **Block Scheduling Module** provides a graphical representation of the Block Schedule which highlights the impact of scheduled & unscheduled changes.

The **Production Planning Module** creates production plans to fill customer orders as efficiently as possible. Using stock orders and other orders to optimize the trim, TRAQ Manager uses an automatic trim program to determine the optimal running schedule. The trim program uses heuristic and multi-level program algorithms to determine the "best" cutting patterns for the winder. The trim program can also plan intermediate rolls for rewinders and sheeters.

The trim program provides multiple solutions, allowing production planners to make the best possible decision, based on changing parameters, machine operating efficiencies and market conditions. When analyzing the orders, the trim program considers options for the minimum trim loss, the fewest slitter knife movements, the best shipping schedules, and various combinations thereof. Production planners can

place greater importance on one parameter to get the plan that best meets current needs. TRAQ Manager offers fixed or moving average densities for each grade to minimize over- and under-runs.

Operators can configure the trim program to produce bundled rolls together. Other trim features include: creation of larger rolls for later rewinder production, limitation of the number of knives used and knife movements, small roll production limits, end roll restrictions, loading dock restrictions, and intermediate roll creation for sheeters, based on final sheet size requirements. Trim optimizes end rolls to meet the percentage of end rolls that customers will accept.

After finalizing production plans, they are distributed to the appropriate workstations on the mill floor for execution. TRAQ Manager tracks actual production against the production plans, ensuring the proper quantities are produced. All workstations have access to view customer order, customer feedback and complaints, shipping, and other information to empower people for making informed decisions.

TRAQ Manager provides an accurate dynamic production date in terms of hours and minutes for every order and shipment in the system merging rough and fine production and distribution plans with actual production output adjusted by the amount of lost production.

Quality Management Module

The Quality Management Module encompasses the entire TRAQ Manager system to ensure the client receives the proper quality product. The module records requirement specifications for all grades, expressed as a target, establishing Upper and Lower Control levels and Upper and Lower Error levels. The module maintains any overriding grade specifications for each client or to each order-item, ensuring that each order meets the expectations. The system also enables grade compatibility substitutions, tracking any variance in profits based on the substitution.

The module collects quality information from various systems for every reel turned up. This information includes gauging systems, lab test equipment, PI and LIMS, as well as manually entered test data. TRAQ Manager interfaces with a variety of lab instruments, DCS, and gauging systems to collect product quality information automatically. Standard deviation and statistical analysis normalizes aberrations in the data. Lab operators modify quality data if re-test results differ, automatically re-qualifying all rolls cut from the jumbo to the order they are assigned to. This new quality data helps determine if all rolls still meet client specifications or not.

When any TRAQ Manager workstation processes a roll, the system automatically re-checks the quality to ensure it still meets client specifications. This attention to detail not only prevents the shipping of any "off-spec" rolls to a client but also alerts the production people to make more paper if the grade is still being made. The module can be configured to "warn", or "warn and reject" rolls that do not meet specific quality requirements. In all cases, operators must acknowledge warnings. If the system is configured to "warn and reject", the operator must re-assign or downgrade the roll in question.

TRAQ Manager Quality Management Module produces a Quality Certificate for all rolls in a load. This Certificate of Analysis reports required and actual specifications. The mill can also specify that the certificate reports only the tests the customer requires for that load.

Paper Machine Module

The Paper Machine Module identifies turned up jumbo reels at the dry end. The workstation produces a reel ticket (with a barcode) that remains with the jumbo reel during the production run. The reel ticket's barcode can also include quality data.

This identification process creates the jumbo inventory.

Winder Module

The Winder Module presents the production plans as a series of cutting patterns to the winder operator. Each series is known as a Machine Run or Grade Run. The operator mounts a jumbo and the system verifies if the jumbo quality matches the rolls in the current cutting pattern. The workstation uses colors to display which rolls meet client quality requirements and which are out of tolerance. The operator can substitute a different order in any position if the original roll will not match the customer's requirements to optimize yield.

After the winder operator accepts the pattern, the rolls are cut and the set is turned up at the winder. The operator examines and grades each roll as saleable, rewind, B-grade, or CULL. If the operator grades a roll as not saleable, a reason must be selected from a predefined list of reason codes classifying why the roll is not saleable as prime. When the operator is unable to grade a roll immediately, a "Quality Hold" mark indicates that the system must grade the roll later.

After grading all the rolls in a set, the operator accepts the pattern and the system creates the rolls in the computer as in-process inventory and prints one core tag for each roll. TRAQ Manager then prompts the operator to enter any losses and any other required statistics or comments related to the produced set. TRAQ Manager can be configured to track (or not to track) butt rolls. Butt roll losses can be tracked to the scale and weighed, or the butt roll weight can be theoretically calculated and the butt roll is beatered. The production reports use this information to accurately reflect production losses.

Rewinder Module

The Rewinder Module is a paper conversion tool containing two modes: salvage and conversion. The module can only process rolls with a REWIND status. The salvage mode rewinds rolls in an effort to repair a problem or simply to inspect the roll for problems. Salvaged rolls are saleable as part of the original order. The conversion mode rewinds rolls according to a production plan for different order(s).

Child rolls are assigned new roll numbers that identify the rewinder station and position where the roll was rewound. TRAQ Manager always maintains the genealogy to track the rolls back to the parent rolls.

The Rewinder Module can run off a rewinder production plan or can also offer a list of orders that meet the quality criteria of a selected parent roll to be cut. After the operator selects the new orders, the rewinder operator cuts the child rolls to meet the order specifications, and TRAQ Manager records the production of new rolls to the new orders and the consumption of the parent roll.

Wrapper Module

Because no two wraplines operate the same way, the Wrapper Module needs to be customized for a wide variety of wrapping systems from a completely manual to fully automated wraplines. TRAQ Manager communicates with the wrapline Programmable Logic Controller (PLC), providing the necessary information for wrapping, stenciling, labeling, and other finishing instructions for the rolls, and controlling the movement of rolls at strategic wrapline stations, such as the stenciller and label applicator.

As a roll enters the wrapline, a barcode scanner identifies the roll by "reading" the core tag. After identifying the roll, TRAQ Manager sends the wrapping, stenciling, grouping, labeling and other finishing information to the wrapline PLC. Multi-roll packages can be bundled at the winder or wrapline.

In the case of a manual or semi-automatic wrapline, after the roll is identified, the weight is retrieved from the scale, and finishing instructions appear on the workstation. This informs the operator on roll wrapping and other instructions. After the operator accepts the information, roll labels are printed and the roll moves to the warehouse. Rolls are dynamically assigned to zones or loads based on loading dock status, demand by the roll reservation, and other criteria. TRAQ Manager automatically updates inventory, order, and load status.

The Wrapper Module offers an "Auto Reject" mode to allow the operator to deal with problems on the line or automatically reject problem rolls. This is handy during peak operating conditions, where production cannot wait for the operator to resolve problems. Wrapmation's exclusive "What You See Is What You Get" (WYSIWYG) label designer lets mills custom design their roll labels using our graphical label design program.

TRAQ Manager supports TAPPI, NARI, IFRA and CEPI roll number schemas as well as proprietary standards to meet export requirements.

Shipping Module

TRAQ Manager supports many shipping methodologies, including shipping by zone management; peel-off shipping barcodes and scanning, preprinted picker lists, and radio terminals.

Computers onboard the clamp trucks can eliminate the need for a checker or shunter. In traditional shipping environments, the shunter assigns vehicles to a dock and assigns a load to that dock. In TRAQ Manager, the clamp truck driver can handle these tasks. After a load is assigned to a loading dock, rolls for that load are scanned and moved to the loading dock. Load data is verified roll by roll and before the load is closed and released. TRAQ Manager then prints, faxes, or emails roll lists, bills of lading and customs invoices, and quality documents automatically. EDI or electronic manifests are transmitted to the customer. TRAQ Manager supports X-12, EMBARC, and PapiNET protocols. A client document profile manages the documents required by the client, truck driver, carrier, customs, as well as the method of transmission – printing, fax, email, or EDI.

A few hours after releasing the shipment, a shipment transaction is posted to the invoicing/accounting system. This delay lets you return loads for adjustments without posting the interim transaction to the invoicing/accounting system.

Beater Module

The Beater Module manages the disposal of cull rolls back into the pulper. The operator identifies each roll before putting the roll into the pulper by scanning the core tag or barcode label. TRAQ Manager warns the operator if the roll is not appropriate for the current process, allowing the operator to cancel the operation (e.g. the system will warn if you try to beater a roll with a *phosphorous* content into a *non-phosphorous* batch). The Beater Module can run on an independent workstation, or it can share its functionality with a nearby workstation, such as the Winder or Clamp Truck workstations. Because operators do not always scan beater rolls before pulping them, TRAQ Manager produces a report on aged beater rolls, allowing mill operators to decide if the roll may have already been beatered and destroy the old rolls that cannot be found. These rolls are then automatically deleted from inventory

Configuration Manager Module

TRAQ Manager is an extremely flexible system, with thousands of configurable parameters, to meet very specific requirements. The configuration parameters define how the different TRAQ Manager modules interact and operate. Using the Configuration Manager Module, the System Administrator can easily view and change a host of system operating parameters. The module also contains system administration utilities to manage audits and to delete obsolete data.

Logging

TRAQ Manager maintains an extensive audit trail of all events that affect production and inventory. Every event, such as a set turn up or a roll re-wrap, produces audit transactions. Even a clamp truck driver scanning a roll creates an audit transaction. These audit transactions are invaluable when examining the history of a roll. The audit trail can also produce reports and provide diagnostics information to help in looking for lost or misplaced rolls.

The System Administrator has broad abilities for managing the old TRAQ Manager data, archiving or purging obsolete data. The System Administrator can configure TRAQ Manager to purge obsolete data automatically. The system can never delete important data, such as rolls still in inventory or active orders.

Security

TRAQ Manager includes two security models, one for user groups, where multiple users share a common workstation, and another for individual user accounts accessing the system through a Windows NT login procedure. Both security models are highly configurable; different access privileges can be assigned to different users of a common module. The privileges are issued to users based on their roles.

Reports Module

TRAQ Manager offers an extensive array of reports including production, inventory, downgrading reports, and more. Because TRAQ Manager runs on a standard SQL database, data sorting can use almost any criteria. Furthermore, it is easy to implement any of the wide variety of industry-standard report writers or historians. TRAQ Manager uses Crystal Reports as well as Microsoft Reporting Services.

Transportation Module

The Transportation Module maintains information related to freight rates, carriers, equipment, load tendering to carriers, reverse billing to carriers and track vehicles in the yard. After planning the loads, the transportation clerk reviews the next week's load shipments and makes adjustments to provide balanced loading operations and resource (people and equipment) usage. TRAQ Manager provides the information required to determine if the rolls planned for a load will be ready on time, or if rescheduling of loads is required. Any rescheduling that affects a client triggers an alert to the sales representative.

The Transportation Module supports complex multi-leg shipping scenarios where rolls from different loads are split or mixed together in remote warehouses and then shipped farther by different carriers.

Rates

The rate system tracks rates for each equipment, carrier and destination. The system can use a fixed rate or a minimum weight plus a CWT price, optimizing for the lowest rate. The clerk can pre-enter unlimited surcharges by fixed amount or percentage and advanced rate change dates with effective dates. TRAQ Manager records and archives all shipment and rate history information for future transport cost analysis. Destination management allows a mill to group clients in a common area into a single destination, simplifying rate management by having rates for a destination rather than individual consignees. Carrier performance, such as on-time delivery, equipment history, and more can also be tracked based on a data link from the carriers or manually entered data.

Automatic Load Tendering

With automatic load tendering, the transportation clerk approves loads and TRAQ Manager sends faxes / emails to each carrier to advise them of the loads assigned to them, when the loads will be ready, and when they should deliver the empty vans into the yard. Depending on the mill operations, this tendering can be done once a week, or once every few days. TRAQ Manager can set limits on the number of shipments to any single client or carrier. If a load is delayed, the system automatically notifies the carrier of the delay. The tendering can also be done via the web.

Reverse Billing

TRAQ Manager's reverse invoicing creates invoices for all loads with destination, rate used, weight and surcharges, and automatically faxes these invoices to the carriers and the mill's accounts payable

system. If the carriers do not dispute the invoice, the mill simply issues checks to the carriers. TRAQ Manager eliminates the need to reconcile carrier invoices with shipments.

Load Utilization

Because the mill usually pays for transportation, TRAQ Manager encourages maximum equipment utilization. A warning screen appears each time a shipper is trying to close a load that has not met the requirements of the shipping plan. All under-utilized (underweight) load plans appear in blue and all late loads appear in red. TRAQ Manager will NOT let operators close overloaded vehicles.

Clamp Truck Module

The Clamp Truck Module uses a standard Windows computer with wireless LAN access mounted on the clamp truck. Using wireless technology provides the truck driver access to the TRAQ Manager system. Because the computer runs Windows, all TRAQ Manager functions from other TRAQ Manager modules and all TRAQ Manager data becomes available to any clamp truck equipped with a computer with wireless LAN access This reduces the development time because all applications are Windows compatible.

To use the clamp truck computer, the driver must first log in. This allows the system to passively record who is handling the rolls, enabling accountability for all roll movements. Using an extra-long-range hand scanner, the driver identifies every roll picked up by scanning the barcode on the label and scanning the barcoded zone sign where the roll is deposited. Every time the driver scans a roll, the Clamp Truck Module determines and displays where the roll should be placed. If the driver deviates from the plan, by putting the roll in a different zone, he scans the zone sign and the Clamp Truck Module automatically warns him. If he accepts it, the system will offer to change the default zone for future rolls for all rolls of the same product or order. The system can even attach digital photographs of the load *at departure* to document the condition of the load when leaving the mill. Loading patterns can be graphically displayed to illustrate the positioning of rolls and dunnage inside a vehicle.

Warehouse Management Module

The Warehouse Management Module allows TRAQ Manager to identify and record the different zones in a warehouse. This offers the warehouse coordinator maximum flexibility to use zones. TRAQ Manager supports two zone models. The first model is for standard sizes, where the zone contains a single product, or a limited number of different products. The second model is where a zone is equivalent to a load unit for staging a shipment or just-in-time (JIT) shipping.

Coordinators can assign zones for specific grades, products, sizes or special usage. Establishing limits to a zone, for example weight, number of rolls, volume, or height, allows the Wrapper Module to automatically assign a roll to an alternate zone when the current one becomes full. The warehouse coordinator can configure the staging zones to receive specific loads or load types automatically, if the loads meet specific conditions.

TRAQ Manager tracks the rolls and shipments in every zone. When the first roll of a shipment arrives, the system automatically recommends a zone. The clamp truck driver can put the roll in the recommended zone or override the computer, placing the roll in a different zone. The system then recommends this new zone to keep the rolls in a load together. The system also automatically warns operators when a load weight exceeds the planned vehicle limit. The system always remembers the roll's *actual* location.

Weekly loading schedules provide the "big picture" of what will be loaded and how much labor or other resources are required on a day-to-day basis.

Remote Warehousing

TRAQ Manager supports multiple local and remote warehouses. Warehouse coordinators can manage remote third-party warehouses virtually from the mill. Alternatively, the remote warehouse can also manage its own inventory using TRAQ Manager through a Virtual Private Network (VPN), the web, terminal services, Application Service Providers or with web services

The Remote Warehousing Module provides visibility to remote warehouse for all shipments inbound to them, as well as inventory available on their floor. TRAQ Manager allows remote warehouse users to generate BOL/Roll List/Custom Invoice/ Rail BOL EDI/ & Advance Shipping Notifications documentation which will be required by Carriers / Customers /Custom Brokers. Rolls from different inbound shipments can be mixed together and shipped by boat, rail or truck.

Customer Inventory Management

TRAQ Manager can manage customer warehouse inventory or rolls in pressrooms or box plant and automatically plan to replenish rolls as needed.

Web Access and EDI

TRAQ Manager Web Sales Module allows customers to enter new orders through the web. Customers can use an order template or copy from past orders. The web application will send the order to the Sales system and automatically alert the CSR. The same platform is used for interfacing with corporate order entry system through EDI.

CSR can change the details of the order and send an order confirmation to customers. Customers can query possible production period and the availability of non-reserved stock info. Customers can query order status and know how much is scheduled for production, how much is in stock, how much has been shipped, and see shipment details.

TRAQ Manager can link with carriers' systems, so customers can track shipment status online. Document archival allows customers to re-generate the documents and ask the system to automatically distribute them.

All customer requests have to be reviewed and accepted by CSR before transferring to production.

Claims and Feedback

Claims and Feedback Module allows customers to make claims in a consistent and efficient manner. Customers ask questions; send concerns, complaints and suggestions online.

Best-of-Breed Solution

As paper mills become increasingly more information driven, they face a decision regarding the processes that make up their core business activity. MES focus on the plant floor. Often, MES link to related ERP, DCS, APS, and Accounts Receivable/Payable (Accounting).

ERP systems are usually configured to meet the business needs of the corporation. This can include financial practices, business flows and supply chain processes. If the ERP is not concerned with the mill

floor operations, the configuration is somewhat standard. When the ERP process involves order entry, the process becomes more complex and highly customized.

DCS are customized to the machinery and the processes of the mill. Usually, MES are customized to handle floor operations — especially when it comes to interfaces, processes, and machinery in the mill.

Financial Systems are fairly straightforward to the business practices. With ERP, MES, and DCS, it is often best to follow best practices to ensure an upgrade path for future releases. By deviating from standard solutions, a mill benefits from a better solution tailored for the operation, but it sacrifices the ability to update to later versions/releases of the core product. With a Best-of-Breed solution, the sacrifice is only with the modules or systems that do not fit into your business model, and other systems can remain industry standard. Best of Breed is the only way to build an IT infrastructure for a paper mill that is agile enough to meet the complexities of today's needs.

Single source suppliers are realizing that they cannot do everything as efficiently as the Best-of-Breed vendors can. With today's truly open architecture and standards, connecting the various modules is easier and more stable. The decision to go with Best of Breed seems to be easier to select.

Ready-made systems are rather inexpensive and can tie into other related systems within the enterprise (such as accounting or customer relations management). The ready-made solutions are analogous to software a consumer purchases "off-the-shelf" — the solution addresses specific tasks. Accounting systems are common off-the-shelf systems.

Microsoft .NET Integration

There are three principal driving factors for the development of TRAQ Manager on the Microsoft .NET platform: enhanced and simplified security, integration into other corporate systems, and data access technology. These factors help simplify interaction with the TRAQ Manager software by providing a native Windows environment, all while communicating with disparate enterprise systems using the Extensible Markup Language (XML) to exchange data.

TRAQ Manager leverages the mill's Microsoft-based corporate NT infrastructure. Integration of TRAQ Manager fits into a familiar Windows administration environment. System Administrators simply create and manage a set of NT user groups. Groups are assigned specific access privileges in TRAQ Manager. Then NT users become members of the appropriate groups, according to the work the users do with the application. System Administrators can configure individual user accounts to determine which parts of the TRAQ Manager system can be accessed, in much the same way that user accounts define access rights and permissions on a corporate network.

Integration of TRAQ Manager into the Microsoft .NET platform allows TRAQ Manager to communicate with other corporate systems (such as ERP, accounting, or customer management systems), as well as external, third-party systems. Web services are the underlying framework for the interaction between these different systems. The web services use XML for the data exchange process, ensuring that disparate systems can recognize not only the data, but the nature of the information as well.

TRAQ Manager can publish web services, providing access to information for business partners, such as transport companies, core suppliers, and of course customers. When these clients enable web services on their own systems, they can query the TRAQ Manager system's web services for information.

Some of the services that TRAQ Manager can publish are status of orders, loads, roll quality information, and stock inventory status. On the client side, this information can easily integrate into existing systems making the mill data look like a part of its own system. TRAQ Manager's .NET integration accelerates the interaction between client, partners, and manufacturer.

The real-time data exchange maximizes resource utilization. For example, core suppliers can look at production plans and deliver cores just in time. Transport companies can use web-enabled cell phones to determine when loads are ready. Press rooms can look at roll quality data from different paper mill gauging systems. Mills can look into carriers' web services to determine delivery time performance. Mills can use web services to optimize backhauls if carriers publish web services that expose their empty capacity available.

TRAQ Manager uses a client/server model. The data access technology provided by the Microsoft .NET platform reduces the network and system resources. TRAQ Manager uses disconnected data access, allowing an application to resume an action after a reconnect, rather than having to re-initiate the entire function. Caching allows the client computer to work more independently from the server; this provides functionality that is more robust when the client is unable to communicate with the server.

In a typical client-server environment, the exchange of information is a continuous push/pull of data between the two machines. In a wired environment, connection persistence is reliant on the connection of the two machines. In a wireless or Internet environment, several factors can compromise the persistence of connection between the client and the server; loss of communication means that the client must re-start the application or function only after the connection to the server resumes. Through caching, the Microsoft .NET platform allows the client machine to smoothly resume its application or function after restoring the connection.

The ability to access data seamlessly, despite communication disconnections, allows using devices that do not depend on a continuous connection and maximizes the productivity of available resources. This is especially important when a clamp truck, equipped with a wireless device, tries to access TRAQ Manager and subsequently moves into a "dead zone". When the truck moves, it automatically restores its connection to the system, and the data exchange continues as if nothing had happened.

The .NET platform is architected to easily "keep pace" with new business and market opportunities in an ever-changing world. Companies that can leverage the .NET web services become more agile, quickly adapting to customer needs in real time and becoming proactive, rather than reactive. .NET is not necessary for the implementation of Business-to-Business connections; it merely enables a formal and robust standard to work with.

TRAQ Manager greatly benefits from the .NET platform from an integration point of view because deployment becomes easier. Rather than install client application updates on individual computers, TRAQ Manager uses xcopy to deploy to the server and the application's self-updating feature that checks and updates to the latest version every time the client restarts. The .NET platform simplifies localization for multi-lingual deployment.

Hardware

TRAQ Manager uses standard off-the-shelf Intel platform machines. For fault tolerance, TRAQ Manager can run on Microsoft Clustering. TRAQ Manager is available with MS-SQL or Oracle. TRAQ Manager uses Ethernet-based RS-232 converters to interface with serial devices to eliminate proprietary *black-box* interfaces.

Conclusion

In this rapidly changing business world, information is a precious commodity. Timely information adds value to products, as it enables decision makers to act on the most up-to-date information. The accuracy of this information gives the perception of a dependable supplier. Paper mills can benefit from a system

like TRAQ Manager, because its "Best of Breed" design allows integration into existing business systems without the massive investment of scrapping existing systems. Business partners and customers get up-to-the-minute order and production information through web services.

Paper mills benefit from a fully integrated system that automatically distributes data to the modules and systems that need the information, regardless of whether they are a TRAQ Manager module, or a third-party application or business system. The ability to know and follow the status of an order from entry to client delivery provides the ultimate in process control for the producer. From a client perspective, they can track the progress of their order, and prepare contingency plans if the delivery runs late. Leveraging the Microsoft .NET platform provides paper mills with the agility to meet ever-changing markets.

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