Voith Sulzer Automation – key to the "Perfect" Paper Machine strategy

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With the Millennium product family on the way to the "Perfect" Paper Machine:
Advantage Plus™
Profilmatic™
InfoPac™
Smart Paper Machinery

"Our goal is nothing short of the 'Perfect Paper Machine'," says Mr. Hans Müller, president of Voith Sulzer Paper Technology. *"This is a machine with negligible quality variations, no breaks and two minute grade changes. We can only achieve this objective with the new breed of 'smart' paper machinery that includes embedded application-specific sensors, actuators and controls to eliminate variations at their source and enable faster machine transitions."*

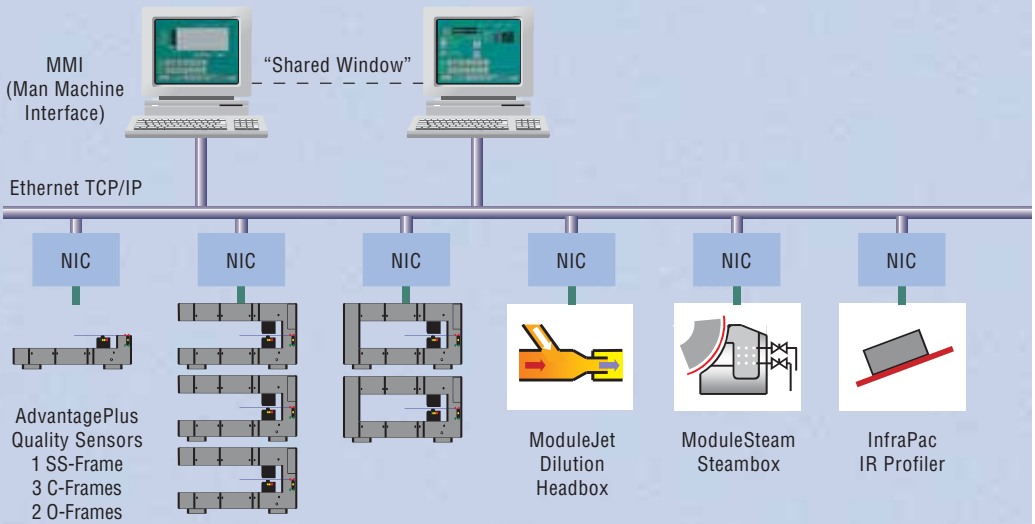


Fig. 1: Millennium system for new Voith Sulzer machine being built for Perlen in Switzerland. System includes full integration of DCS, drive system, web break and web inspection systems.

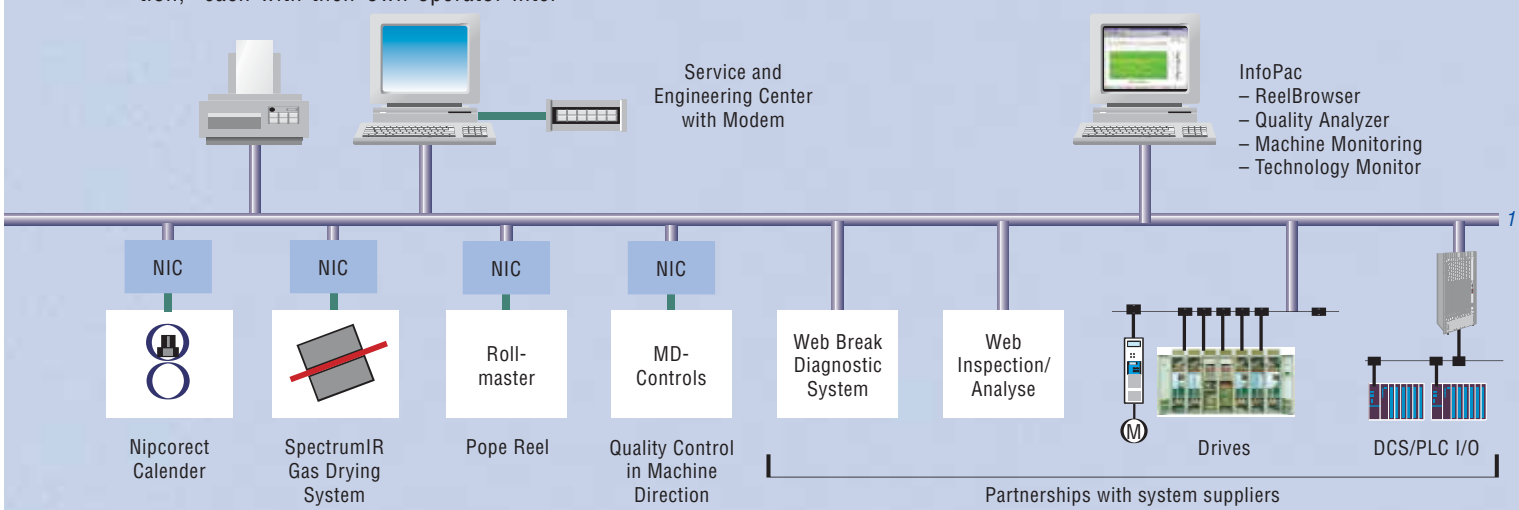
Toward that end, Mr. Müller announced the formation of Voith Sulzer Automation (headed by Geoffrey Lawrence), a new company formed by the combination of Impact Systems (acquired by Voith Sulzer in January 1998) of Los Gatos, California and Voith Sulzer Controls, of Heidenheim, Germany. Impact Systems pioneered the development of CD actuators and IR dryers, and later introduced an innovative on-line Quality Control System (QCS); Voith Sulzer Controls is well-known for its development of ModuleJet dilution headbox as well as major advancements in CD control theory.

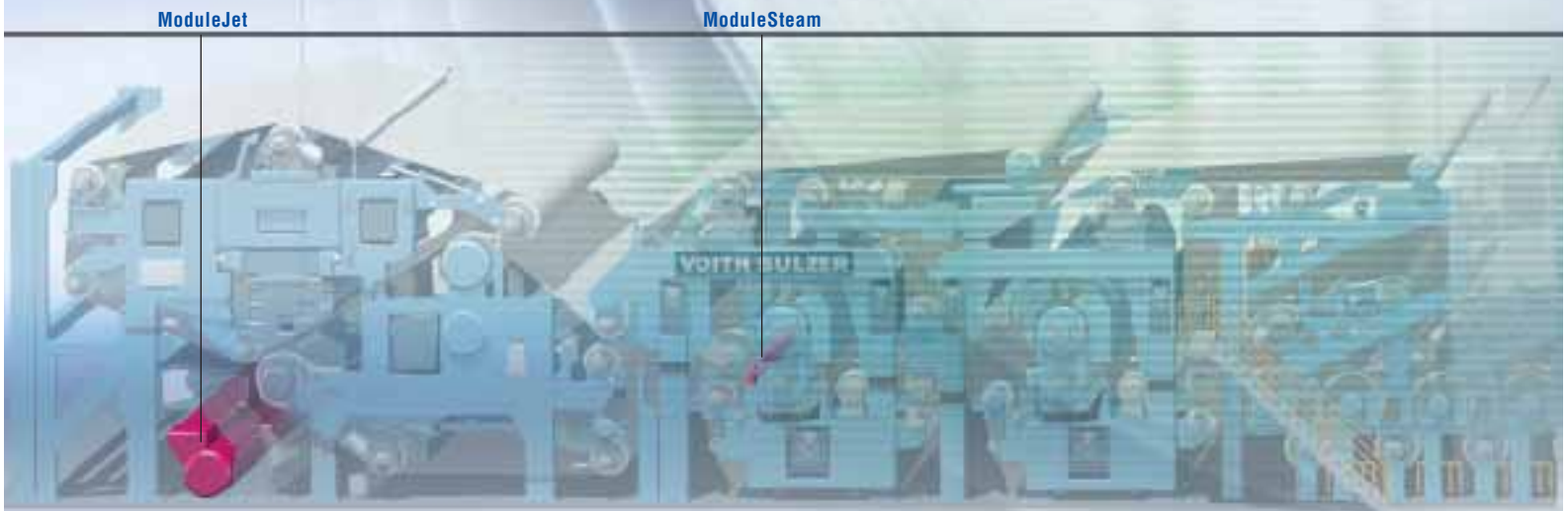
A new paradigm in paper machine control

During the last decade, process control systems have moved from stand-alone PLC, DCS and QCS "islands of automation," each with their own operator interface, toward "single window" systems integrated into a single DCS platform. Though a step forward in system evolution, these single DCS platform solutions present several drawbacks including restricted access to information, excessive complexity, high maintenance costs, and limited flexibility and expandability. In addition, in recent years the QCS functionality has shown signs of a maturing with few new products that add significant value for the paper mills and their customers. Consequently, most paper mills are quickly approaching a **"results ceiling"**.

Voith Sulzer Automation provides new application-specific solutions to paper-making problems by introducing the Millennium-concept. The major strength of the Millennium architecture is the distribution of QCS functionality into fully functional, stand-alone subsystems (e.g. scanning platforms, CD actuators, etc.) that are integrated on a high-speed Ethernet network.

AdvantagePlus™	Measurement of quality data	Scanners and Sensors
Profilmatic©	Reduction of quality deviations	Actuators and CD Controls
Smart Paper Machinery	Components with embedded quality controls	e.g. ModuleJet dilution headbox with Profilmatic MQ, embedded stockflow control
InfoPac™	Analysis and Diagnostics of quality and machine parameters	e.g. quality maps of reels and rolls, video surveillance of sheet breaks





AdvantagePlus™

Measurement Platforms

The scanning platform, AdvantagePlus, measures all relevant quality data during the paper-making process, see *Fig. 2*.

Profilmatic™

Actuators and CD Control Systems

The Profilmatic family of subsystems includes actuators, e.g. the gas drying system SpectrumIR, the electric drying system InfraPac or the caliper profiler ThermaJet and the CD controls for the various systems and applications.

Each subsystem freely communicates with any other through its Network Intelligent Controller (NIC). The result is an integrated Quality Control System with all the benefits of full network distribution including subsystem independence, true "plug-and-play" modularity, independent subsystem maintainability, and highly flexible expandability.

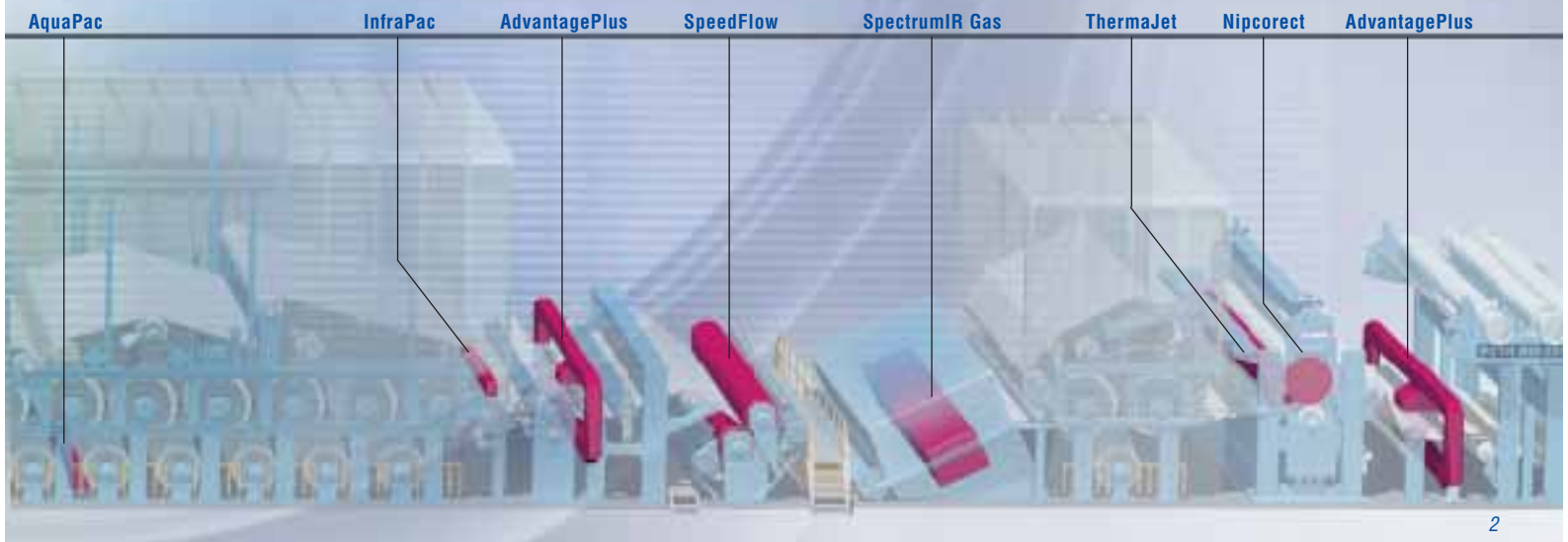
System communications, both internally and externally, conform to the latest Microsoft and other open communication standards, allowing easy and complete integration with other standards-based control and information systems.

In addition, the operator and maintenance video displays from the Millennium subsystems and from other suppliers control and information systems are integrated on a "shared window" using web-browser, ActiveX and other display standards. This unique approach provides all the benefits of a "single window" without the major disadvantage of having to rewrite the displays in the DCS platform.

Thus, the Millennium architecture permits Voith Sulzer Automation to focus all of our resources on paper machine optimization, while offering full integration of the 'best-of-breed' general purpose automation systems (e.g. PLC, DCS, roll-tracking, etc.).

The performances of the Millennium system has been very impressive. The Profilmatic CD controls have shown astounding results at a recent installation at a customer in the United States. The new Millennium control algorithms, achieved a **56% and 62% improvement** in CD weight and CD moisture control respectively. Voith Sulzer Automation achieved these results using the mill's existing CD actuators.

Also the new Voith Sulzer LWC paper machine at Perlen in Switzerland benefits



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from the power and flexibility of the Millennium system *(Fig. 1)*. It includes the full integration of PLC/DCS, drive system, and other systems from outside suppliers.

Smart Paper Machinery

Paper Machine Components with embedded sensors and quality controls

In a next step we are working on combining paper machinery, process knowledge, and automation expertise to create embedded application-specific sensors and controls into the various sections of the machine (e.g. headbox, former, presses, coater, dryers, etc.). These new "smart" machines eliminate variations at their source. For example, Voith Sulzer Automation has developed a consistency sensor to be embedded in each dilution approach line to the ModuleJet headbox *(Fig. 2)*. The sensor and new related controls will reduce short-term CD and MD variations and significantly decrease grade change times. The patented ModuleJet was the first dilution control headbox, and today there are over 120 successful installations worldwide. ModuleJet, using the unique Profilmatic M controls, has already produced paper with ±0.1 g/m^2 2-sigma CD basis weight variation.

InfoPac

Information Systems for Paper Machines

Papermakers can look to Voith Sulzer Automation for innovative process-improvement solutions. For example, the new "InfoPac" family of Paper Machine Information Systems has proven to be a big hit in the mills. Over 20 InfoPac orders have already been received, for use with Millennium and other control systems. Our customers like the fact that they can map the quality of a full reel or roll, and trend paper machine performance for any selected time period. The InfoPac "ReelBrowser" has been particularly well received. In just about every case when we started up ReelBrowser, within hours the mill detected performance problems that they simply didn't know existed *(Fig. 3)*. If a mill moves to a complete millwide information system, then InfoPac readily ties in since it follows standardized database and communications standards.

Your vision is our mission

The "Perfect Paper Machine" – with no breaks, two-minute grade changes, and negligible paper quality variations, – is the mission of Voith Sulzer and Voith

Fig. 3: InfoPac ReelBrowser showing quality map for one reel of paper. Mill determined that high moisture streak was caused by felt shower.

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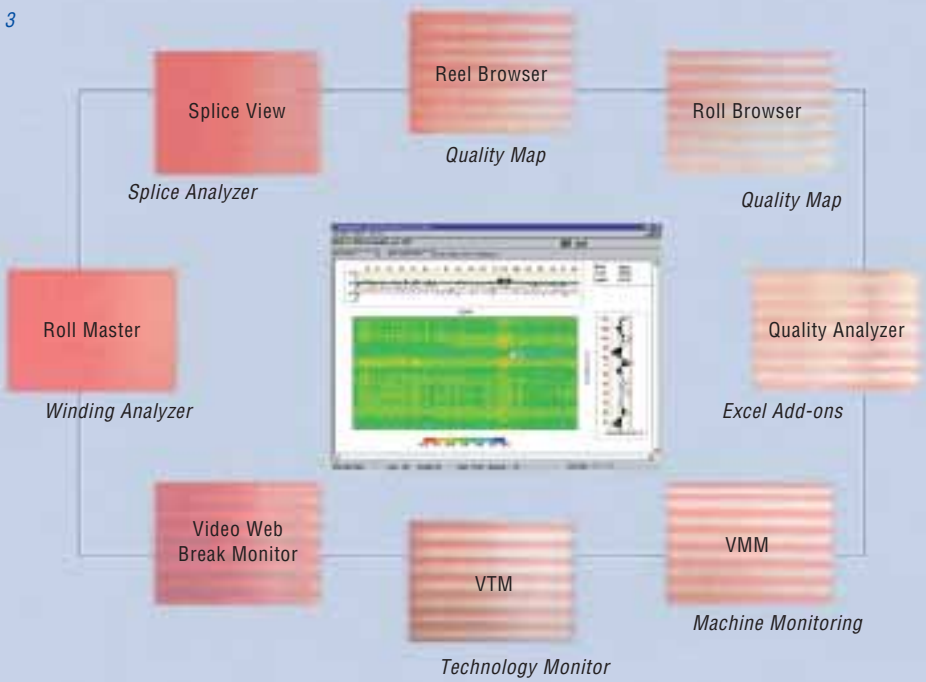

Sulzer Automation. We are moving rapidly toward this objective by combining world-leading paper machinery knowledge and advanced automation expertise. Our new generation QCS along with new "smart" paper machinery and integral paper machine information systems now allow mills to gain a new level of benefits. These new capabilities are already producing some dramatic results; we are breaking through the "results ceiling" now being approached by traditional QCS "add-on" systems. The paper business is our only business, and our mission is aligned with the visions of papermakers worldwide. Together we will move toward the "Perfect" Paper Machine... indeed, that future is not so far away.

New "NIC" Technology

The Millennium System provides a new modular architecture, including a "Network Intelligent Controller" (NIC) associated with each subsystem (e.g. scanner, actuator, etc.) on the Ethernet network. The NIC technology allows each subsystem to operate independently, freely communicating with any other subsystem. The overall system operates as if it were programmed on one large computer, though it is distributed over the network using a highly efficient communications technology. Today's scanning sensors each generate a high-resolution profile array of 500 or more data boxes every 10-25 seconds, and various CD actuators need this data immediately. These demands could easily overload traditional communication networks and compromise control performance. The new Voith Sulzer Automation "Data Distribution System" (DDS) addresses this issue by providing the next generation in real-time control communication technology. Each subsystem NIC is "publisher" and "subscriber" for sending and receiving information.

For example, a scanner NIC is a publisher that transmits the high resolution profiles immediately after each scan and each CD actuator NIC is a subscriber that receives the appropriate profile data immediately. This automatically occurs without any custom communications setup or configuration.

Full distribution of functionality to stand-alone subsystems allows Voith Sulzer Automation to build, test, install and troubleshoot the system more efficiently; allowing for faster installation and startup, less risk of total system failure and lower ongoing maintenance costs.

The stand-alone subsystem design provides the system with a new level of modularity, allowing "plug and play" additions of new subsystems without expensive upgrades and reprogramming. Millennium users now have unlimited expandability, allowing them to take full advantage of future Voith Sulzer Automation developments.