GAIN REAL VISIBILITY OF SAP SHOP FLOOR TRANSACTIONS

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Abstract

This paper describes the main functionality and design aspects for the integration between MES and SAP r /3 systems. Massive product types, faster cycle times, smaller inventory buffers, increased customer expectations, less tolerance for errors and heightened competition. More than ever, we need to manage rapid change and reduce costs at the same time. Today, the most promising way to meet these challenges is to increase coordination between enterprise and production systems. Start with existing or optional connectivity capability in our ERP systems such as SAP's XI or xMII or using XML or other standard protocol. Next, we create a functional specification that includes compliance with ISA/ANSI S95, GAMP and other standards, depending on our situation and preferences. Then we create an interface to our plant systems using proven open standard solutions.

1. Introduction:

Many manufacturers today have a huge gap between the shop floor and supply chain. This disconnect prevents visibility into operations and inefficiency sets in. Earlier the shop floor was isolated from the rest of the supply chain. Businesses and plants that harness the power of the Inter plant networks can make huge gains in efficiency, both by reducing the friction inside their own business and by binding suppliers more tightly into the supply chain. E-manufacturing covers a single, complete set of operational capabilities including rapid plant design and deployment, real-time SAP connectivity, comprehensive asset management of people, products and processes, and a seamless coupling to the entire supply chain via the Web. SAP provides its own interface for plant data collection (PDC) called the plant data collection interface (PP-PDC). Its task is to exchange all data required for confirmations between SAP R/3 and the subsystem. The asynchronous interface transfers master data, transaction data, and production orders from SAP R/3 to an MES. The MES then enters the confirmations as time tickets or time events, which are then communicated back to SAP R/3, and the production orders updated. This approach enables real time production-process control and a greater degree of transparency in production because a production status is available. The SAP Manufacturing Execution application is a comprehensive, integrated, manufacturing operations solution. It helps manufacturers gain visibility into manufacturing operations, manage process and hence achieve shop-floor control.

Key words:- PLC, OPC, SAP r/3. LSMW

2. Ethernet PLC/WinPLC Data Collection

Softwares like Combination of PLC and OPC are used to connect Ethernet enabled PLCs for easy data collection and can be used by the management for monitoring the floor area thereby increasing transparency, visibility and enables quick decision making. They easily connect Ethernet enabled DirectLOGIC PLCs and WinPLCs, to standalone PCs or network servers for simple data logging. This means that any PC or server on the network can receive valuable PLC/WinPLC data without the need for special PC programming or any 3rd party HMI, SCADA, or DAQ software application. Productivity systems on the shop floor can be connected to Microsoft Access, SQL or ODBC compatible database server. The combination of PLC and OPC software installed on a PC or file server can enable the PLC logic to write data to delimited text files or CSV files onto the networked PCs or a file server. The PC will have complete control of storing the data and can connect any networked productivity system to a supported database or product line-up.

2.1 Combination of PLC and OPC

Production data can be fed to networked PCs or file servers for Statistical Process control and decision

making after making sure the data collected is valid. Archive data is stored in a secure server file location with built-in date/time stamping features to satisfy quality assurance or audit trailing procedures. Its use in data acquisition applications as source content for historical trending can be used by higher level business system applications, transferring, updating and retrieving data into/from a network database. Softwares such as Combination of PLC and OPC Software bridges the gap between MES and SAP systems. Combination of PLC and OPC /WinPLC Server runs as a Windows service and is equipped with an easy-to-use graphical interface to start, stop, or pause services. The service can be installed or uninstalled easily in the windows software. Top level management can monitor and have direct control over the shop floor systems during any emergency situation.

3. Data Collection

PLCs cannot store database but a memory map can be done using SQL statements and information can be stored in database either in a notepad or spreadsheet. The database is configured, connectivity is established and operations are performed in an easy to use GUI. The Server has a useful Diagnostic Error Log window to help with troubleshooting the server if a problem arises. The Error Log will show the status of the server and indicates whether the server is started, stopped, or paused, and if the data received from the PLC matches the data configured in the server RBE (Report by Exception) technology. An exception report is a short report mainly highlighting the differences between the data aquired and the reference data. Usually this report is prepared when such differences are substantial.

3.1 PLC-Server Interface

The plc-server interface should have features like the "service" application of Microsoft Windows. This means the interface should run even if nobody has logged onto the PC as in MSC Software's ADAMS server package (i.e.) whether or not anyone is presently logged in on the PC, the Server application will start as a service. Another advantage of the server running as a service is that the user need not manually start the application every time the computer restarts. The application "listens" for information from the Interface environment and logs the data into a file configured from the Monitoring application. The server is capable of collecting an unlimited amount of data from an unlimited number of PLCs.

The concept of RBE technology can be used rather than the usual data collection through polling PLCs, RBE makes the Server "listen" for data that has changed before it stores the information sent by the PLCs when needed. The common method of collecting data by continuous polling creates lot of network traffic and causes the CPU utilization to dramatically increase thereby causing delay in data transfer. In most cases such applications requires a dedicated PC. In contrast, the RBE method gives the PLC complete control to store data to a networked PC or file server hard drive and store the data locally if the network is down.

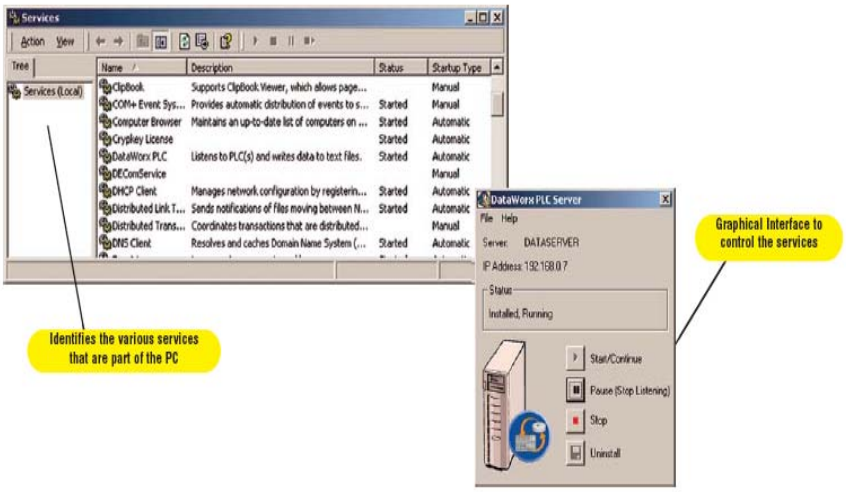
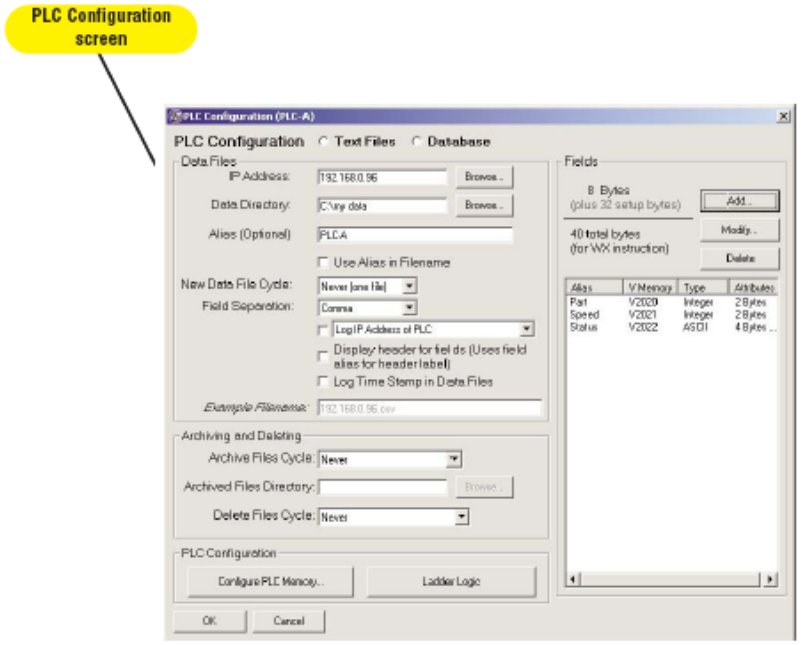


Figure 3:

3.2 PLC & PC Hardware Setup and Configuration:

The server's file creation cycle and PLC listings is configured and monitored by the software. The Monitoring software also allows the user to view or save the data files stored on the server. Files can be opened and viewed in Notepad, Excel, or another chosen program. The user may select to create files on a daily, monthly, or yearly basis. The Monitor application is able to conveniently run from any PC that is networked with the server. Connect productivity to Enterprise system. Multiple M-series PLCs to a single PC running TLServer by connecting every PLC's RS485 in a daisy-chain manner to the PC's RS232 port. RS232-to-RS485 converter to connect the PC's RS232 port to the RS485 network. TRiLOGI can log-in to the TLServer and have

immediate access to all the PLCs on the RS485 network just by specifying the ID address of the PLC concerned. Up to 32 Standard M-series PLCs can be networked to a TLServer. Ii is replace the RS485 driver IC by a 1/8 power type can link up to 256 PLCs to a single TLServer for programming and monitoring.



Combination of PLC and OPC Productivity3000 Server

The Combination of PLC and OPC P3K server software maximizes the value of industrial data by allowing you to collect data and connect Productivity system to networked database servers. Collect real-time data from the plant floor and store it into a compatible database. The unique report-by-exception technology allows direct communication between the Productivity and the database(s). It gives control of the data logging and storage to the CPU so it can send data only when needed, greatly reducing the amount of network traffic.

3.3 Connecting productivity system and enterprise system:

Combination of PLC and OPC gives an inexpensive solution for connecting productivity system to SAP systems by providing direct database interaction. Productivity is able to conduct its own database operations, so records are always accurate and up-to-date. Combination of PLC and OPC connects people to the plant, putting valuable information in the hands of those who need it to make crucial decisions.

4. Benefits of integration MES and SAP:

Manufacturing business of all sizes in all sectors are using the network in many different ways to work with partners , suppliers and top level management , for procurement, for internal activities such as knowledge sharing and new product development, and much more. It is makes industrial data directly and readily available to those who need it to make organizational decisions. MES and SAP integration allows data to flow freely between plant floor and enterprise system. This scenario store set and change recipes to improve reliability in operations using multiple formulas and set-points, and it is responsive for log valuable production data into a database for convenient storage, easy retrieval and organized displays. Moreover archive test data in a secure database with built-in batch details and stamping features to satisfy quality assurance or audit procedures.

5. Data Migration of Non-SAP Systems to R/3:-

The LSM Workbench is an R/3-based tool that supports when transferring data from non-SAP systems ("Legacy Systems") to R/3 once or periodically. The tool supports conversion of data of the legacy system in a convenient way. The data can then be imported into the R/3 system via batch input, direct input, BAPIs or IDocs.

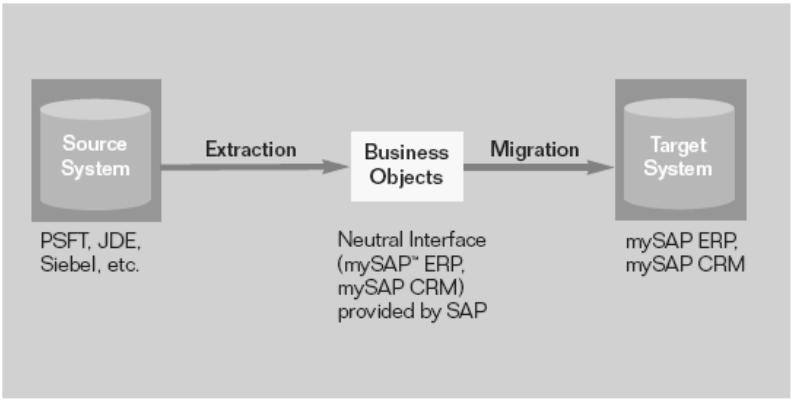


Figure : The Data Migration Process

SAP Accelerated Data Migration applies a business object–oriented, two-step approach that uses a neutral interface as a staging area and predefined migration content for the conversion and upload of data. The neutral interface enables the SAP tool to generate predefined migration content and prevents all potential legal issues regarding the intellectual property of any source-system vendor. The whole data migration process from the source to the target system consists of just two steps.

1. Data is extracted from the source system into the standard interface as XML files.
2. Data migrates from the interface into the mySAP Business Suite database. The migration is based on a new "migration workbench" engine developed by SAP based on the SAP NetWeaver® platform. All requirements for mapping structures and fields and developing complex conversion rules are solved within this engine. Once the migration is complete, business-unit end users have access to all the legacy data in the new applications as if it had originated there. They can continue to work on the existing business process items in the new applications and benefit from improved functionality.

Conclusion:

The Combination of PLC and OPC Manufacturing Execution application is a comprehensive, integrated, manufacturing operations solution. It helps manufacturers gain visibility into manufacturing operations, achieve shop-floor control, and manage process and product traceability. The benefits of MES-to-ERP integration go far beyond the rudimentary integration efforts. To become lively and responsive, manufacturers must gain vision into their operations to enable them to make decisions based on real-time information, understanding both the impact of those decisions and the alternatives that may be available to them. Joining manufacturing with planning systems is the first step toward that liveliness. Today, there really is no lack of communication mechanisms to constrain the successful integration of MES – and with standards such as ISA 95, and ANSI's version of the ISA specification, an MES that conforms to those standards can greatly ease the efforts of that development. It also assures that the terminology, functionality, and communication capabilities are consistent. Finally, an integrated system will show real returns: from the ability to monitor – in real time – key performance indicators on productivity, quality, yields, and throughput; to managing inventory locations and raw materials; through remediation processes to isolate and or rework nonconforming products. Integration, rather than merely a blending of two discrete systems, becomes the key enabler for a more profitable, responsive business.

References:

[1] SAP-R/3 in process industries: expectations, experiences and Outlooks Andreas Schumann Hoechst AG. TP5"-('584. 65t)26 Frakfturt. Gennum

[2] A.C. Deuel. The benefits of a manufacturing execution system for plant wide automation. Honeywell IACD, 16404 N. Black Canyon Highway, M / S AZ15 / N12, Phoenix, AZ 85023, USA.

[3] Shaw C. Feng, Manufacturing Planning and Execution Software Interfaces Manufacturing Systems Integration Div., Manufacturing Engineering Laboratory, National Institute of Standards and Technology (NIST), Gaithersburg, Maryland, USA.

[4] Pascal Blancb Isabel Demongodinb, Pierre Castagnaa .,A holonic approach for manufacturing execution system design: An industrial application,aIRCCyN, UMR CNRS 6597, Ecole Centrale de Nantes, Universite´ de Nantes, 1 rue la Noe, BP 92101, 44321 Nantes Cedex 3, France bLSIS, UMR CNRS 6168, Campus de Saint Je´roˆme, Avenue Escadrille Normandie-Niemen, 13397 Marseille Cedex 20, France Received 26 March 2007; received in revised form 12 December 2007; accepted 7 January 2008.

[5] HsiuJu Rebecca Yena, Chwen Sheub, Yuan-Ze University, Chung-li, Aligning ERP implementation with competitive priorities of manufacturing firms: An exploratory study ,ceived 1 September 2002; accepted 1 August 2003.

[6] Albert Y.T. Suna,_, Abe Yazdania, John D. Overendb, Achievement assessment for enterprise resource planning (ERP) system implementations based on critical success factors (CSFs)

[7] V. Botta-Genoulaz a,, P.-A. Millet a, B. Grabot b A survey on the recent research literature on ERP systems

[8] David Zhengwen Zhang, Anthony Ikechukwu Anosike , Ming Kim Lim, Oluwaremilekun Mowanuola Akanle,An agent-based approach for e-manufacturing and supply chain integration.

[9] C.D. Tarantilis a,, C.T. Kiranoudis b, N.D. Theodorakopoulos b A Web-based ERP system for business services and supply chain management: Application to real-world process scheduling.

[10] Jean Marcelo Simˇao a,b, Paulo C´ezar Stadzisz a, G´erard Morel b ,Manufacturing execution systems for customized production, Techniques – BP 239 – 54506 Vandoeuvre Cedex, Vandoeuvre-Les-Nancy, France.

[11] Indranil Bose a,1, Raktim Pal b, Alex Ye ,ERP and SCM systems integration: The case of a valve manufacturer in China

[12] Jan B.M. Goossenaerts a, Alexander T.M. Zegers b, Jan M. Smits c , A multi-level model-driven regime for value-added tax compliance in ERP systems.

[13] Jan B.M. Goossenaerts a, Alexander T.M. Zegers b, Jan M. Smits c , multi-level model-driven regime for value-added tax compliance n ERP systems.

[14] Jan B.M. Goossenaerts a,, Alexander T.M. Zegers b, Jan M. Smits c , multi-level model-driven regime for value-added tax compliance n ERP systems.

[15] Tay-Jin Chua_, Ming-Wei Liu, Feng-Yu Wang, Wen-Jing Yan, Tian-Xiang Cai , intelligent multi-constraint finite capacity-based lot release system for miconductor backend assembly environment