Journal of Theoretical and Applied Information Technology
30th June 2013. Vol. 52 No.3

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

A CLOUD COMPUTING METHODOLOGY FOR INDUSTRIAL AUTOMATION AND MANUFACTURING EXECUTION SYSTEM

[1]M.GIRIRAJ, [2] S.MUTHU

[1]Research Scholar, Department of Mechanical Engineering, Anna University, Chennai, Tamil Nadu, India

[2] Principal, M. P. Nachimuthu M. Jaganathan Engineering College, Erode, Tamil Nadu, India.

E-mail: [1]giririajmannayee@gmail.com , [2] Smuthu231155@gmail.com

ABSTRACT

In this paper we investigated guaranteeing the assembly process information flow in real time, enterprise wide, from assembly station sensors directly to the company policy maker's offices, is the true solution for improving productivity competence, reducing bottlenecks movements, optimization of supply chain network, identify missing operations in the floor process and more over reducing losses and greater profits than ever. In fact, the ideal production lies in the real machine or assembly capabilities of working non-stop at maximum speed, lacking downtimes or inactivity and assembled goods reject threats. Assembly lines will be prone to stand-still and will produce defective pieces if the machines are unable to working to their full capability or demands made of them. This is often the case of misinformed factory management on real time factory floor performances. Even though equipped with original equipment manufacturer indicator knowledge about their systems, they still can't get that efficiency so needed to improve yield. Transformation is necessary to ride the expected tide of change in the current manufacturing environment, particularly in the information technology and automation landscape. Multinational company's strives to reduce computing costs, to improve plant floor visibility and to achieve more efficient energy and surroundings use of their IT hardware and software investments. Cloud computing infrastructure accelerates and promotes these objectives by providing unparalleled flexible and dynamic IT resource collection, Virtualization, floor visibility and high accessibility. This paper establishes the value of realizing cloud connect and usage state of affairs in the cloud manufacturing environment, especially in automotive assembly stations which typically have large numbers of mixed applications, various hardware and huge data amount generated from sensors and devices in real-time and event-based exploration and assembly operations. The purpose of this paper is to behavior an Information Technology automotive assembly environment Systems analysis in the case of MNC's. To validate this objective, the article has been divided into two parts: monitoring vision and control and case study with the help of the manufacturing execution assembly system. The purpose of the theory part of the study is to first introduce the concept of Cloud connect in the respective field of manufacturing execution assembly system, and then chat about the substance of Service management in information technology.

Keywords: *Cloud computing, Cloud manufacturing execution system, monitoring vision and control, Shop floor data collection, Programmable logic controller.*

1. INTRODUCTION

In this paper, we investigated the feasibility of the state-of-the-art of cloud computing and its usage of manufacturing execution system with the aim of providing a clear understanding of the opportunities present in cloud connect and upcoming scenario, along with knowledge about the boundaries and face up to in designing systems for cloud and manufacturing execution assembly environments. We squabble that this familiarity is essential for prospective adopters, yet is not readily available due to the confusion currently surrounding cloud connect and manufacturing execution assembly system environment. Cloud computing and manufacturing execution system is the notion of abstracting and outsourcing hardware or software

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resources over the web word and sophistication, often to a third party on a pay-as-you-Go basis. This up-and-coming concept is sometimes claimed to represent a completely new paradigm with the cloud manufacturing execution system, with disruptive effects on our means of viewing and accessing multiplication resources. Our findings reveal that confront connected with hosting and server systems in cloud environments include increased latency due to longer network distances between third party client and server systems, limited bandwidth since packets must cross the web world to reach the cloud computing and manufacturing execution assembly system, as well as reduced portability because cloud environments are currently lacking data security and standardization. Furthermore, systems must be designed in a loosely coupled and fault-tolerant way to fully exploit the energetic features of cloud computing, implication that existing relevance might require considerable modification before being able to fully utilize a cloud computing and manufacturing execution system environment. These faces up to also restrict some systems from being suitable for running in the cloud connect. Furthermore, we have implemented a prototype in cloud manufacturing assembly test bench to investigate the feasibility of moving an enterprise search service to a cloud environment. We base the feasibility of our approach on measurements of response time, bandwidth and scalability. We conclude that our cloud-based search service is feasible due to its opportunities for implementing dynamic scaling and reducing local infrastructure in a novel fashion.

2. MANUFACTURING EXECUTION ASSEMBLY SYSTEMS OF CLOUD CONNECT

On top of web-based email, some online services have started expanding their offerings by providing document processing and other office applications online. Google Docs is one example, all we need is access to the Internet, and we can generate and store manufacturing execution assembly system files in these clouds-connect based applications. Intermediate documents can be uploaded from our hard drive and stored in the cloud connect, allowing us to freedom to access them from any computer, and collaborate with other users, without having multiple copies of the document spread around different computers. In Cloud-based computing, there's no software to download, and we can even store our documents online or cloud environment. Everything happens in the Cloud, via our web browser. We may already be using Cloud connect, and not know it. We are storing our cloud manufacturing execution assembly systems data in the Cloud. Other software companies are already working on the idea of Cloud computing, as an alternative to the traditional method of downloading or installing software on a hard drive. We simply enter a user name and password in order to get access to our accounting cloud connects files.

3. MANUFACTURING EXECUTION SYSTEM

A manufacturing execution system is a "manufacturing oriented system that interacts and share information with other manufacturing applications. These are the information systems that reside on a plant-floor between the planning systems in offices and direct industrial controls at the processes itself." The integration of manufacturing execution system, as the middle layer of manufacturing planning and control system, with the other levels provides real-time information and helps managers to make decision based on facts. Although specific functions are assigned to each level, there are no clear boundaries between these levels and the functions included in each level can be moved with respect to each company's circumstances. The term manufacturing execution system is examined from two aspects, first functions covered by the software and then the nonfunctional requirements that should be considered for implementing and operating manufacturing execution system solutions. Machine monitoring sensors and shop floor data collection; terminals transmit production data from the factory floor manufacturing execution system software. Manufacturing execution system software that includes supervisory control and data acquisition features can collect data from machine-mounted sensors. This information is then transmitted to a central computer for processing. In turn, software-based algorithms send real-time instructions to devices such as programmable logic controllers. Some manufacturing execution system software is designed for use with manual shop floor data collection sensors.

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4. EXPERIMENTAL SETUP

Figure1 shows the experimental manufacturing system. It's represents a component product sorting, and assembly processes that can be controlled by programmable logic controller. The upper conveyor and the lower conveyor are driven by the rotary actuator 1 and the lower conveyor rotary actuator 2 respectively.

Figure1: Manufacturing Execution system setup

A random selection of metallic pegs and plastic rings are placed on the upper conveyor. The rings and pegs need to be identified and separated. This is done by two sensors, a proximity sensor1 and an infra-red reflective sensor2. By using these two sensors a distinction can be made between the peg and the ring. By means of the sort linear actuator 3, plastic rings can be ejected down the assembly chute, which can have up to plastic rings. Metallic fasteners, meanwhile, continue on the upper conveyor and are defected down the feeder chute. The feeder chute automatically feeds fasteners onto the lower conveyor. An infrared sensor is used to determine whether or not the assembly area is empty. If it is, the assembly solenoid base rotary actuator is used to dispense a ring from the assembly channel into the assembly area. The assembly area is positioned just above the lower conveyor and, when a metallic fastener passes, the fastener engages with the hole in the ring and the two components are assembled. The lower conveyor is used to carry completed components into the collection tray. A printing module interfaced with the programmable logic controller, retrieves data from the system and print over the component with relevant parameters, like manufacturer, license no, batch no, Mfg. Date, expiry date etc... In this work, a Siemens S7-30 0 programmable logic controller is used to control the process and software called ‘‘Simatic Manager” is used to program the programmable logic controller. Programmable logic controller inputs and outputs are given in tables 1 and table 2, respectively.

4.1 Simulation Testing and Validation

Figure2 show screen short of the manufacturing execution system program, the mission to simulation, testing and validation of the assembly process are paramount to any supervision of manufacturing execution system.

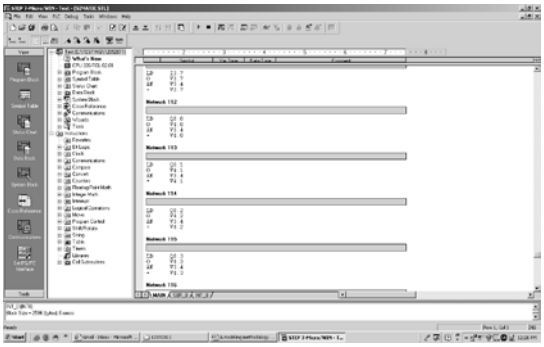

Fig2: Screen shot: Manufacturing execution system program

The more translucent process simulation, testing and validation mean more efficient floor management. End users now explicitly demand that their plant floor and progression be represented as near to reality as possible. The instant look, feel and touch experience allow to run free extra array of sensory sensitivity. The being there but not being there, virtual reality is the key factor and this is where graphics play a foremost role. Most project development time is spent in creating the real thing on screen and online monitoring vision and control is supreme in this meadow. By using the gigantic range of the most powerful online monitoring vision and control graphics ever, won’t take us long at all to achieve the real thing on screen.

4.2 Manufacturing Execution System Data Captivating and Visualization

The mission to visualize the assembly process is paramount to any supervision of manufacturing execution system. The more translucent process visualization means more efficient floor management. Users now explicitly demand that their plant floor and progression be represented as near to reality as possible. The instant look, feel and touch experience allow to run free extra

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4.3 Interfaces with MES and Assembly System

Communicating in the fast lane safely at top speed is necessary for the manufacturing execution assembly system. The supervision systems are meeting points of all process data. The crossroads of non-stop production (sensor) information flow of execution enterprise resource planning systems. The communication's strategic role is deeply rooted in monitoring vision and control, Monitoring vision and control provides with a rich library of Input and output drivers, integrated and included free in the product. Communication with control systems (manufacturing execution assembly system) has never been so quick to configure and never been so quick performing. It is very helpful wizards are at hand to automatically import and configure project variables directly from the Programmable logic controller, helping we beat configuring times and reduce the risk of making errors. The Input and output driver library supports all programmable logic controllers and systems found on the market today, and can be added to by third parties using an appropriate software development kit. The monitoring vision and control applications guarantee maximum security and reliability. The end user and password management, complete and robust, has been explicitly designed to guarantee that projects are realized. Monitoring vision and control ensures maximum data and system access protection. Manufacturing execution assembly system end users can be shared with the domain, allowing the option to integrate and centralize user profiles. All the security criteria have been fully integrated and can be configured with the electronic Signature management system, unauthorized persons access attempts control, and password expires, automatic log-off and the audit Trail management. Monitoring vision and control also lets you define protection levels and traceability directly in each single Tag, independently from the commands they have been associated with. Moreover, Monitoring vision and control supports the windows services and consents total or partial access block to the Windows desktop. Data is recorded on the safe relational database system.

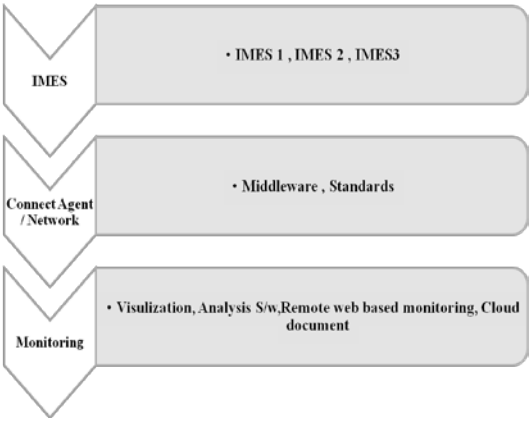

Figure 3: Real time database of manufacturing execution assembly system

Figure 3 shows a real time database guarantees top level managers all the information they need for analyzing ways to improve identify and isolate the anomalous behavior of the execution system. The manufacturing execution assembly system job is to consent data aggregation, define and set data recording and archive management modes in the plant-floor visibility. Monitoring vision and control provides all the tools we will ever need to accomplish plant floor data. Monitoring vision and control provides three recording servers, based on an open database connectivity top level manager replica to guarantee maximum performance in data. Monitoring vision and control supports all relational database management systems by proposing an automatic selection between structured query languages, MS Access via open database connectivity. Monitoring vision and control uses the Microsoft Structured Query Language server for default, If not specified otherwise. Each of the three engines has different tasks. One records process data using the data logger resource, other logs events while the remaining one is assigned the powerful and sophisticated. Windows as the main tool, the data loggers permit simple and robust process data acquiring. Database table records can be executed on preset time domain frequencies, event or variations. Data recorded on the data

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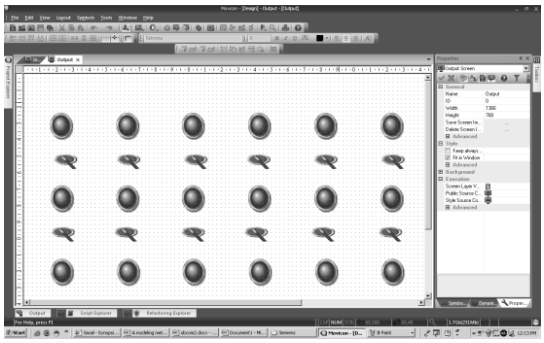
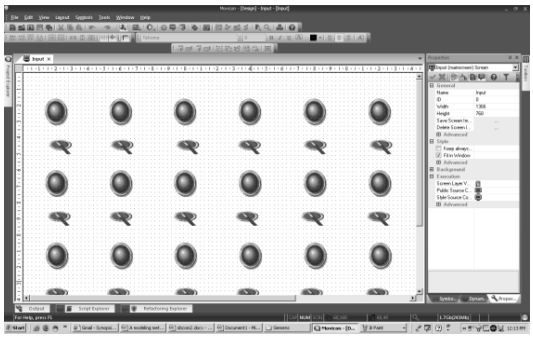
ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

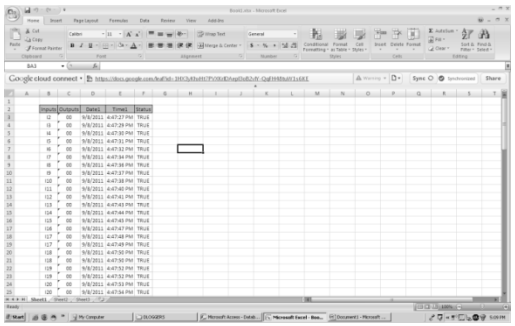
base is then automatically available in the manufacturing execution assembly system through deliberately designed graphical objects, which includes database table display windows, grids, trends, reports. Monitoring vision and control has supreme improved report management. This feature now has an additional and authoritative built-in report generator based on the .Net technology, which consents influential reports to be generated visually with statistical and graphical chart and graph functions to further simplify report generating within the manufacturing execution assembly system. The Monitoring vision and control report designer is one of the most influential reporting tools to have in any supervisory system. The great simplicity of the textual reports allows we create reports on RTF or HTML files also for simple compact systems.



(a) Input Screen



(b) Output Screen



(c) Real time database of manufacturing execution assembly system

Figure 3: Input Screen, Output Screen Real time database of manufacturing execution assembly system

4. 4 Intelligent Manufacturing Execution System data

Figure 4 shows a screen shot of MES data access through middleware. Manufacturing execution system, plant floor automation programs in this level are developed based on middleware principle. The plant floor system may extract programmable logic controller data (through interactive PPI communication Level), Plant-floor production can be tracked with the aid of sensory systems and middleware. Manufacture data from one assembly process can be viewed in another process. All the data can be saved into a database in plant floor system, such as Oracle or Microsoft access. The screenshot shows MS access of manufacturing execution system data base. This data base posted to ERP software.

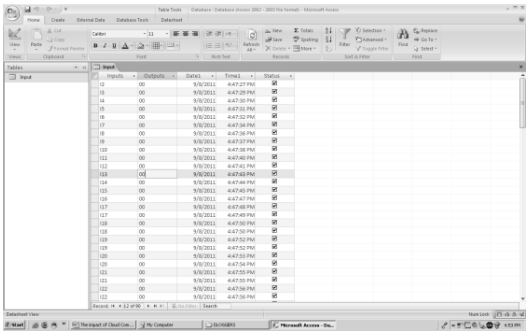


Fig4: Screen shot: Manufacturing execution system data (Microsoft access)

4. 5 Manufacturing Execution System-Reports Uploading - To Cloud Connect

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Figure 5 shows MES reports and these documents were uploaded to cloud database. Cloud Connect helps us to bring manufacturing execution assembly system files to the cloud as cloud connects docs or cloud computing documents.

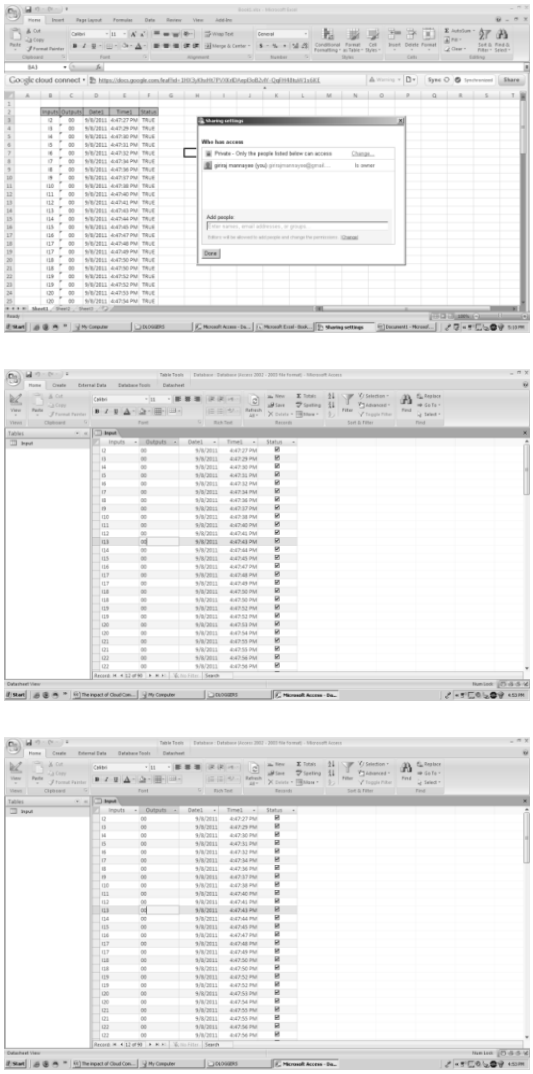

Fig 5: MES reports are uploaded to cloud connect

Cloud connects integration was never so easy. This is a very useful add-in for those who use cloud connect docs like cloud computing doc's spreadsheets and manufacturing execution assembly system documents on a daily or shift basis. We need to upload the files or create a new file in cloud connect docs and add content to that. We can share those documents with whomever we want. We can directly save and share documents directly from cloud connect. This add-in helps us to share, backup, and simultaneously edit manufacturing execution system documents with coworkers. We need to authorize Google Cloud Connect to connect to our cloud computing account. Also we can select cloud connect document sync options as manual and automatic.

4.6 Reports view or download from cloud connect

Fig 6 shows cloud connects manufacturing assembly execution system real time report. It is downloaded from cloud connect and it can be used to work together on a document. If what we all like best is to work on our document in the office on our own computer, this could be the solution for us. Each person can download and edit the document, according to ERP requirement and then sync it to the cloud. If you're all working on it at the same time, we might get messages. Fig 6 shows cloud connects document.

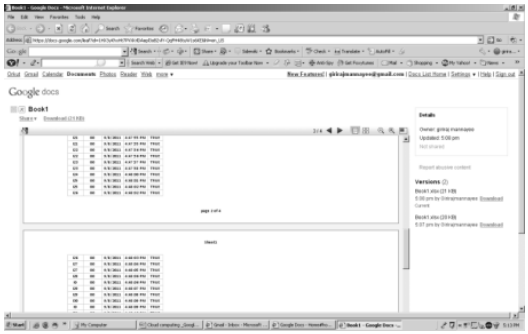

Fig.6 Reports upload to cloud connect

5. CONCLUSION

Cloud connects is shifting the way cloud manufacturing automation industries and enterprises do their dealing. With wider cloud adoption, access to dealing -significant data and analytics will not just help the visibility of plant floor operation. Stay ahead; it will also be crucial to their existence. There are three architectural features of cloud computing in terms of the execution system end-users, enterprises that use the cloud to connect as a platform, and cloud providers themselves. These architectural features play a major role in the adoption of the cloud connect exemplar as mainstream goods in the plant floor inspection world. Cloud connects is emerging as one of the major enablers for the manufacturing industry, transforming

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

manufacturing execution assembly system its production information, helping it align product innovation with business policy. The type of cloud connects adoptions in the manufacturing sector have been suggested, manufacturing with direct adoption of cloud connect technologies and cloud manufacturing the manufacturing version of cloud computing. In terms of direct adoption of cloud computing in the manufacturing sector, the key areas are around IT and new models. And moreover this paper discussed the essentials of manufacturing execution system as well as the enabling middleware for its implementation. In order to fruitfully implement the manufacturing execution system, the followings could do with to be developed: (a) sensory intelligence, (b) data-to-information-to-knowledge transformation middleware, (c) enterprise culture that has the flexibility of local vibrant decision-making and strength of worldwide competition.

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