

Research on Real-time Monitoring System Based on Cloud Technology

Weiwen He

School of Information Engineering, Guangzhou Nanyang Polytechnic, Guangzhou 510000, China

hww2018@163.com

Keywords: Data tracking; Cloud computing; Online monitor; Cloud data centers; World wide web

Abstract. To calculate the production data, use the spreadsheet. This is an offline data update and other system support is mandatory online. Any kind of online feedback and data update cannot be passed through this system. Now, we develop an online data tracking system that can get reports and analysis feedback online. On the other hand, organizational efficiency depends on the effective use and transformation of operational data to strategic management. Existing systems cannot enable effective information flows in the organizational hierarchy. This online data tracking system can reduce the waste of the production system.

Introduction

Accuracy and efficiency at the production lines enables a better production and utilization of the available resources. The data available should be interpreted accurately in order to identify the various faults at production level and to immediately rectify them to improve efficiency. An accurate data management and shop floor monitoring system (PMS) is equally important in improving production performance. The ability of the PMS to collect production information on real time basis would enable the production team to solve any difficulties in prompt response. This cost effective automatic data analysis, based on the Google Drive supported customized web, is the alternative to manual reporting. It significantly improves the accuracy and adventitious information flow of the valuable reports for the managements. If the true production data can be automatically captured and presented in a simple, understandable way to the operational level, they will become a more integral part of the improvement process. Front end web development incorporating the Google Drive sharing features has implied the simple representation of critical production measure i.e. efficiency, defects rate etc. The real time PMS in manufacturing industries enables both the management and the production team to continually monitor real time production status with regard to reliability, accessibility and maintainability of the equipments. Information must be collected at each shift end and disseminated accurately in order to meet the production goals [1].

Production Information Flow System

Production planning and subsequent production control follow adaption of product design and finalization of a production process. For efficient, effective and economical operation in a manufacturing unit of an organization, it is essential to integrate the production planning and control system. The real time production monitoring system should provide the right information to the respective personnel at the right time. Presenting too much production information to the

production workers or operators is not essential to their task. With too much unfocused information thrown at them, workers or operators are not able to digest what is necessary to modify on their current production outcomes. Whereby presenting too little information to the supervisors, supporting departments and the managers can be like watching the production operations through a keyhole. Each level of people in the industrial shop floor has their role in keeping up to the set goals [2]. Planning and control is an essential ingredient for success of an operation unit.

Comparison of Existing and Developed System.

In a survey conducted by the National Electrical Manufacturers Association, less than 34 percent of surveyed executives were influenced by information considerations in selecting production operating systems [3]. Existing and developed information system is being depicted in two flow charts.

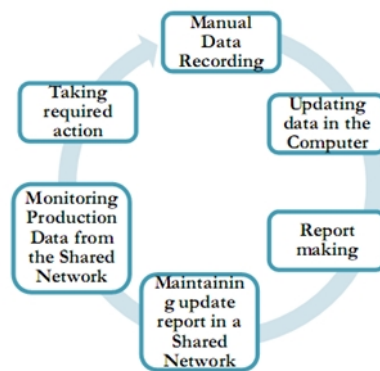


Figure. 1 Existing Production Information Flow.

The probability of data inaccuracy and information deviation is controlled in the derived system. Manufacturers

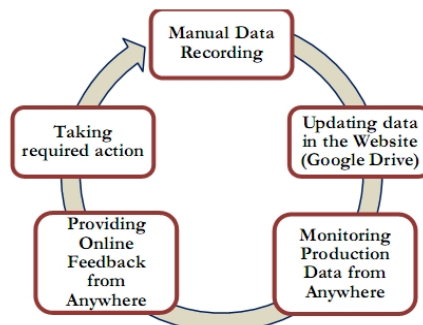


Figure. 2 Developed Production Information Flow.

preferred to consider cost, current computer capabilities, training and effect upon employee's jobs [4].

Limitations of the Existing System.

To calculate the production data, spreadsheet is used. This is offline data updating and other system support is mandatory to make the online. Any kind of online feedback and data updating is not possible by this system. Management may get the reports and analysis after manual spreadsheet analysis and updating. Generally internal mails and printed reports are provided to management by sub-ordinates. Developing this online data tracking system enables to get reports

and analysis with feedback in online. Organizational efficiency depends on the effective utilization and transformation of operational data to strategic level of management. Existing system does not enable efficient information flow in the organizational hierarchy. Developed online data tracking system reduces the wastages of production system.

Developing Online Data Trachingsystem

Web design is the creation and visual design of documents displayed on the World Wide Web. Organizations rely on websites with engaging and visually stimulating content to attract and retain consumers. The quality of the Web design is a key factor when creating or revising a website. Many factors must be considered when designing a website. meaningful and easy to navigate. It is important to leverage the power of hypertext [5].

Web Programming.

Web programming languages like HTML, XML, and XHTML provide the tools to build the foundation just as framing provides the basic yet essential structure in which to build and design the entire website.

※ Hypertext Markup Language (HTML) is a programming tool that uses hypertext to establish dynamic links to other documents. HTML documents are simply text documents that contain the content of your webpage as well as special instructions called tags. Tags provide instructions on how to display text or graphics and control user inputs. Tags are enclosed in brackets: <>. Each

Content should be organized in such a way that it is component of the site is called an element, and specified using tags. Text, images, animations each become an HTML element. Each element is structured into a hierarchy called the DOM tree, which determines the order in which each element is loaded and displayed. There are programs such as Dreamweaver designed to create HTML code for a webpage [5].

※ Extensible Markup Language (XML) is a markup programming language like HTML without predefined elements. Whereas HTML governs the appearance of information in a Web browser, XML complements HTML by adding tags to describe data. XML provides greater flexibility for adding new elements and attributes that will extend HTML capabilities.

※ Extensible Hypertext Markup Language (XHTML) is replacing HTML as the Internet standard. XHTML is a markup programming language that is similar to HTML but written using XML. XHTML is case sensitive, whereas HTML is not. XHTML works smoothly with database and workflow applications. XHTML makes it easier for designers to be creative and add new elements. It provides a more structured and conceptual way of thinking about content.

```
<!DOCTYPE html>
<html>
<head>
<title>EW Shop Floor Management & Inventory Control Software</title>

<link rel="stylesheet" type="text/css" href="stylesheet.css">
</head>
<body>
<div id="logo">

</div>
<h3><b> East West Industrial Park </b></h3>
```

Figure. 3 Example of one Web Program

Web Design.

Web design and development is a bit like building a house – an architect designs the house much like web designer designs the website. Two tools used in website design that can assist in decorating a website are cascading style sheets and JavaScript. Cascading style sheets (CSS) describes how web pages should look in a browser. It can control typography, colors, backgrounds and other design characteristics. The selector decides upon the element to which a rule is applied, while the declaration specifies exactly what should be done to that element. The property is the quality or characteristic, such as color; the value is the precise specification of the property. All pages can use a common set of CSS style sheets to leverage a common layout, font set etc. JavaScript is what lets you have dynamic, interactive elements on your web page. Most contact forms, changing image carousels, auto-suggest / auto-fill fields and the likes are all based on JavaScript. Sure there are other ways to add certain dynamic elements, but JavaScript is by an far the most popular. JavaScript is also used to change the HTML content, or load different content. The part of the website that viewers see is called the front end. The back end comprises of all the stored data, images, the server and other components. Frontend development is done in HTML, CSS and JavaScript, while back end developers normally use PHP, Ruby, Python, Java, SQL or .Net for programming [6].

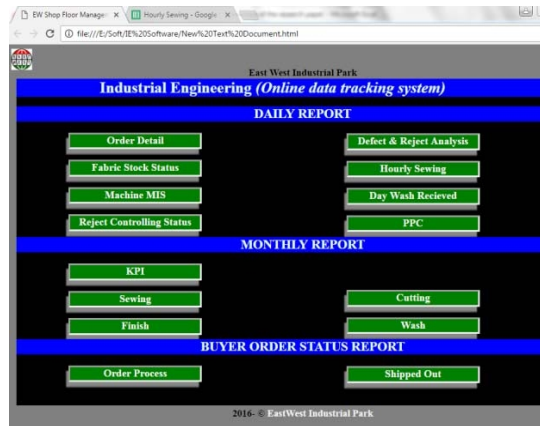


Figure. 4 Developed Web Front Page

Google Drive-Free Online Storage And Previous Reporting

Google Drive is a file storage and synchronization service created by Google. It allows users to store files in the cloud, synchronize files across devices, and share files. Google Drive encompasses Google Docs, Sheets and Slides, an office suite that permits collaborative editing of documents, spreadsheets, presentations, drawings, forms, and more. You can upload any type of file to Google Drive and convert certain types of files to a web-based Google document format: Docs, Sheets or Slides [7].

The creator of a file or folder may also set an access level for regulating permissions. The three access levels offered are "can edit", "can comment" and "can view". Users with editing access can invite others to edit. Searching for files by name and content, sharing files and folders with others is enabled in Drive.

Sharing.

Google Drive incorporates a system of file sharing in which the creator of a file or folder is, by default, its owner. The owner can regulate the public visibility of the file or folder. Ownership is transferable. Files or folders can be shared privately with particular users having a Google account, using their @gmail.com email addresses. This generates a secret URL for the file, which

may be shared via email or private messages. Files and folders can also be made "public on the web", which means that they can be indexed by search engines and thus can be found and accessed by anyone.

Third-party apps.

A number of external web applications that work with Google Drive are available from the Chrome Web Store. To add an app, users are required to sign in to the Chrome Web Store, but the apps are compatible with all supported web browsers. Some of these apps are first-party, such as Google Docs, Sheets and Slides. Drive apps can also be made the default for handling file formats supported by them. Some of these apps also work offline on Google Chrome and Chrome OS [8].

Developed all report from the system.

1) Daily Reports: Daily reports those are generated from the system are: Hourly sewing and finishing production status, Daily defect and reject analysis, Production planning and control (PPC), Machine MIS.

The screenshot displays a Google Sheet titled 'Hourly Sewing Monitoring Summary Page' for the date 8-Jan-2017. The sheet is divided into two main sections: 'Hourly Production Report' and 'Hourly Finishing Report'. Each section contains a table with columns for 'Factory Line', 'T/L', 'New', 'T/L Target', 'Hourly Target', and various hourly production metrics (1st Hr, 2nd Hr, 3rd Hr, 4th Hr, 5th Hr, 6th Hr, 7th Hr, 8th Hr, 9th Hr, 10th Hr, 11th Hr, 12th Hr, 13th Hr, 14th Hr, 15th Hr, 16th Hr, 17th Hr, 18th Hr, 19th Hr, 20th Hr, 21st Hr, 22nd Hr, 23rd Hr, 24th Hr). The 'Hourly Production Report' section shows data for lines 1 through 16, with a total production of 5287 units. The 'Hourly Finishing Report' section shows data for lines 1 through 4, with a total production of 526 units.

Figure. 5 Hourly Sewing Monitoring Summary Page

The screenshot displays a Google Sheet titled 'Factory wise Sewing Data Entry Sheet' for the date 17-01-17. The sheet is divided into two main sections: 'Hourly Production Report' and 'OT Manpower'. Each section contains a table with columns for 'Line', 'Name', 'Type', 'P/L', 'H/L', 'S/L', 'T/L', and various hourly production metrics (1st Hr, 2nd Hr, 3rd Hr, 4th Hr, 5th Hr, 6th Hr, 7th Hr, 8th Hr, 9th Hr, 10th Hr, 11th Hr, 12th Hr, 13th Hr, 14th Hr, 15th Hr, 16th Hr, 17th Hr, 18th Hr, 19th Hr, 20th Hr, 21st Hr, 22nd Hr, 23rd Hr, 24th Hr). The 'Hourly Production Report' section shows data for lines 1 through 16, with a total production of 5287 units. The 'OT Manpower' section shows data for lines 1 through 4, with a total production of 526 units.

Figure. 6 Example of Factory wise Sewing Data Entry Sheet

2) Monthly Reports: Different types of monthly summary is generated and Key Performance Indicator (KPI) report is annexed here

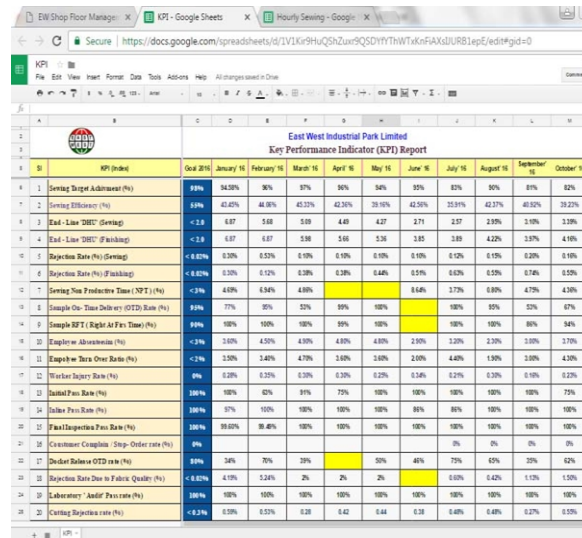


Figure. 7 Monthly KPI Report

Previous status of this report generation.

Manual data entry and normal spreadsheet (.xlsx) analysis with few measure points was maintained in the reports. Management would have reviewed and communicated with specific people regarding the status. Important measure like efficiency, DHU, deviation from plan could not be possible in the general spreadsheet in the existing system. Developed system facilitated the many user interfaces and data ubiquitous and this generated different measure of production information.

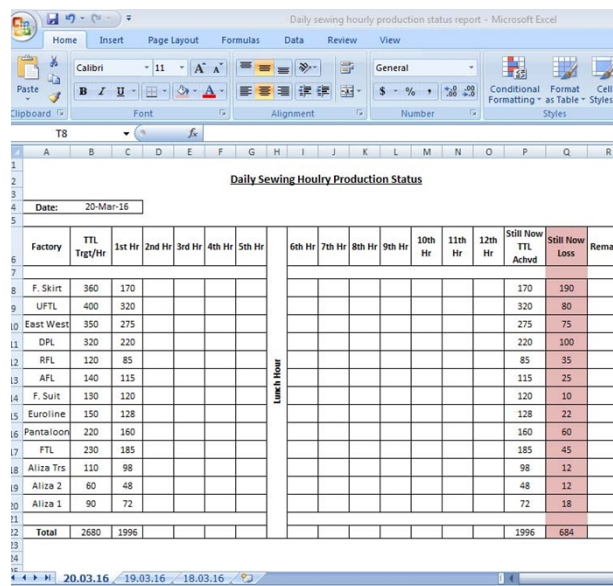


Figure. 8 Previous Hourly Sewing Monitoring Report

System Requirements

The most important requirements of any data collection and reporting system is that the system is economical, accurate and easy to set up on a production system. Supervisors generally have an aversion to computer based systems because of ongoing headaches with custom made software and other solutions. They are often more comfortable with a production monitoring system (PMS)

which is capable of providing straightforward connectivity to switches, sensors, PLC outputs and other common industrial equipments. If a PMS can be easily connected to each work stations and machineries on a production line, then management needs for this critical data can be easily satisfied.

As embedded technology advances, more functionality that currently is hosted on powerful back end systems and intermediate supervisory devices can now be pushed down to the shop floor level. This system requires functional and non-functional elements. Internet enabled computer, smart phone and network is the functional requirement; security support is the non-functional requirement.

The task of a PMS is to assist the production team to produce their best within the available resources. Apart from that PMS helps in improving quality matters and reducing overheads. Employee those have a bit little idea on computer and internet browsing, they can update and track with this system.

Supreme flexibility, enhanced collaboration, reduced overhead costs: it's no wonder cloud computing in general, and Google Drive in particular, has become one of the most popular business tools for modern companies. And the trend is still growing: according to the Cisco Global Cloud Index, 78% of workloads will be processed by cloud data centers by 2018 [9].

This system requires the Internet connection, Internet enabled devices i.e. computer, cell phone or any other gadgets and is cost effective setup comparing others available PMS. Easily manageable financial support as a fixed development cost is required to install this system in simple manufacturing organization whereas other complicated Online data tracking System requires both fixed and variable cost as an enormous amount of investment. Google gives every user 15 GB of free Drive storage space, which is shared across files in Google Drive, messages and attachments in Gmail, and pictures and videos in Google Photos [10].

Impact on Mis and Real Time Follow Up

Real-time monitoring helps to improve customer relationships as everyone in the supply chain has access to the same production information. It eliminates the unnecessary downtime as production and maintenance issues are identified before they become a problem. Real-time machine tool data collection isn't just about helping manufacturers improve productivity and profitability, although that's certainly a promised outcome. It's also an essential first step toward a data-driven, high-tech manufacturing sector that is globally competitive.

Following efficacious effect is being found by scrutinizing the developed system over the previous system-

- . Spontaneous and adventitious information flow
- . Operational level data is easily transformed and converted to strategic level
- . No information sharing blockage
- . Better PPC coordination and easy troubleshooting of the production system
- . Enabled Real Time data tracking feasibly

In a survey, data managers stated that their two top priorities were "aligning Management Information Systems (MIS) with business goals" and "data utilization" [11]. Today's data-collection and monitoring solutions already help manufacturing operations management to see, analyze and quickly act upon time-sensitive data coming off the shop floor.

Conclusion

A number of production floors are utilizing manual methods of data collection for producing

reports. Manual data compilation leaves room for both inconsistencies and inaccuracies. When the data is collected without the help of a PMS then the data can be inaccurate. Where there is human intervention on the recording or collection of data, the truthfulness of the collected data is no longer reliable. HTML is the markup language that is surrounded with content, to denote browsers about headings, lists, tables, etc. CSS is the style sheet language that contains style the page with, to indicate browsers to change the color, font, layout, and more.

This paper implies the feasibility and usefulness of an online data tracking system and visualization of operational measures. Once the data is incorporated in the system, it is transferred into computerized spreadsheet and summarized as authorized reporting purposes. The system will generate an automated report which stays in place and the management only needs to act base on the results.

References

- [1] Siva Kumar a/l Subramaniam, Siti Huzaimah binti Husin, Yusmarnita binti Yusop and Abdul Hamid bin Hamidon, 2009, SMS or E-mail alert system for centralize mail compartment, *Proceedings of the 8th International Conference on Applications of Electrical Engineering*, Page(s): 52-56.
- [2] Siva Kumar a/l Subramaniam, Siti Huzaimah binti Husin, Yusmarnita binti Yusop and Abdul Hamid bin Hamidon, "Real Time Production Performance Monitoring System a Production Aid for all Industries". *The 6th WSEAS International Conference on Circuits, Systems, Electronics, Control and Signal Processing (CSECS'07) World Scientific and Engineering Academy and Society*, 29-31 December 2007, Page(s):181-184.
- [3] I. S. Jacobs and C. P. Bean, "Fine particles, thin films and exchange anisotropy," in *Magnetism*, vol. III, G. T. Rado and H. Suhl, Eds. New York: Academic, 1963, pp. 271–350.
- (20) Rolland, W.C. "Flexible Automation Demands Flexible Management," *National Productivity Review*, Volume 4, Number 4, Autumn 1985, pp. 345-353.
- [4] Johnson, A. "MRP? MRPII? OPT? FMS? JIT? Is any System Letter-Perfect?" *Management Review*, September 1986, pp.22-27.
- [5] Anonymous 1, <http://study.com/academy/lesson/web-page-design-and-programming-languages-html-xhtml-xml-css-javascript.html>, Retrieved, 19 Jan-2017.
- [6] Anonymous 2, <https://www.sitepoint.com/web-designers-guide-to-programming/>, Retrieved, 19 Jan-2017.
- [7] Pichai, Sundar (April 24, 2012). "Introducing Google Drive... yes, really". Google. Retrieved October 22, 2016.
- [8] Chitu, Alex (April 25, 2012). "Chrome and Google Drive's Third-Party Apps". Retrieved October 30, 2016.
- [9] Anonymous 3, <https://cloudfindhq.com>, Retrieved, 01 Jan-2017.
- [10] Bavor, Clay (May 13, 2013). "Bringing it all together: 15 GB now shared between Drive, Gmail, and Google+ Photos". Google. Retrieved October 22, 2016.
- [11] Herbert, M. and Hartog, C. "MIS Rates the Issues," *Datamation*, Volume 32, Number 22, November 15, 1986, pp.79-86.