INSTITUTO TECNOLÓGICO Y DE ESTUDIOS SUPERIORES DE MONTERREY

CAMPUS MONTERREY

DIVISIÓN DE INGENIERÍA Y ARQUITECTURA

PROGRAMA DE GRADUADOS EN INGENIERÍA

WEB BASED REAL TIME MONITORING SYSTEM FOR QUALITY CHECK

TESIS

PRESENTADA COMO REQUISITO PARCIAL PARA OBTENER EL GRADO ACADEMICO DE MAESTRO EN CIENCIAS EN SISTEMAS DE MANUFACTURA

POR:

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CAMPUS MONTERREY

Los miembros del comité de tesis recomendamos que el presente proyecto de tesis presentado por el Ing. José Elías Gallegos Arguijo, sea aceptado como requisito parcial para obtener el grado académico de:

Maestro en Ciencias en Sistemas de Manufactura

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I.

Dedicatory

I dedicate this work to my beautiful family

José Elías

Irma

Juan Carlos

Daniel Alberto

Erick Rubén

Also to my beloved friends

José Eduardo

Adhara

Emilian Navid

II.

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For his help during the software programming phase.

III.

Summary

This project describes the design and implementation of a prototype real time monitoring system.

The first chapter explains the project justification based on the actual author's experience in a modern manufacturing plant. Next in chapter number two the company's profile is described as well as the company's vision, philosophy and business groups. Chapter number three present a revision of the concepts needed to understand better the project divided in manufacturing, quality and web technologies concepts also some important terms in the manufacturing floor are explained briefly. In the next chapter a detailed explanation of the current situation that will be improved is described as well as a model diagram after this last the proposed model is discussed. Then, chapter number five presents the design phases of the system-software achieving every objective defined in the chapter number one. Chapter six describes a case study where the monitoring system is used. Finally conclusions are addressed.

IV.

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1. Chapter 1 Project justification.

1.1. Introduction

There is the need in modern manufacturing plants to make faster and more effective decisions when there are changing points in the processes.

Actually doing a report takes too long since the operations involved are too manual. Usually, a report arrives to the hands of the managerial staff quite late and unclear.

> *"In an e-manufacturing environment, the acquisition of real time quality data and information is paramount for distributed collaborative manufacturers to make quick and correct actions towards quality problems in a manufacturing process "* (Jiao, 2006).

> *"For the past decade, the impact of web-based technologies has added "velocity" to the design, manufacturing, and aftermarket service of a product. Today's competition in manufacturing industry depends not just on lean manufacturing but also on the ability to provide customers with total solutions and lifecycle costs for sustainable value. Manufacturers are now under tremendous pressure to improve their responsiveness and efficiency in terms of product development, operations, and resource utilization with a transparent visibility of production and quality control"* (Zurawski, 2006).

1.2. Hypothesis

An automated monitoring system based on actual quality control methods that handles the more time consuming manual operations will yield in best practices hence better quality control, decrement in manpower, faster time decision making and faster collaborative solutions consensus.

1.3. Objectives

1. To diminish time to take decisions over the process.
2. To design a system model inspired in E-manufacturing adapted to the actual manufacturing methods of the company.
3. To achieve data stratification.
4. To design a web based program for the automated copy of stratified information into a data base.
5. To design a database to integrate data into graphic interfaces based on web technologies.
6. To design a web based graphic interface to report process capabilities in real time.
7. To integrate the quality check robot with the web based software and the actual TCP/IP network of the company.
8. Integration of the monitoring system in the product validation activities.

1.4 Scope

1. The monitoring system will have its roots in existing web technologies, HTML, Apache HTTP server, PHP and MySQL.
2. The project will be limited to one production line that assemblies one type of product.
3. For this project only histograms will be used, in a future all the six quality tools could be integrated in the in the system.
4. To acknowledge methods for the integration of the manufacturing systems.
5. To promote preventive monitoring of quality.

2. Chapter 2 Company profile (DENSO, 2010)

DENSO is a leading supplier of advanced automotive technology, systems and components for all the world's major automakers.

DENSO operates in 32 countries and regions.

Approximately 120,000 employees are active in all aspects of the automotive business-sales, product development and design and manufacturing-working in cooperation with regional car manufacturers and suppliers to provide the most suitable solutions to regional requirements.

Global consolidated sales totaled US$32.0 billion for fiscal year ended March 31, 2009.

2.1 Philosophy

The "DENSO Philosophy" guides our corporate actions, ensuring that we will continue to be a corporation that is trusted by people around the world.

Mission

Contributing to a better world by creating value together with a vision for the future.

Management principles

1) Customer satisfaction through quality products and services.

2) Global growth through anticipation of change.

3) Environmental preservation and harmony with society.

4) Corporate vitality and respect for individuality.

Individual spirit

1) To be creative in thought and steady in action.

2) To be cooperative and pioneering.

3) To be trustworthy by improving ourselves.

2.2 Vision

DENSO VISION 2015

Achieving Our Goal

"Consideration" and "Fulfillment"

We will contribute to the achievement of a future automotive society where there are fewer worries about environmental hazards and traffic safety.

Action Principles

Sharing DENSO Spirit, we will make it the basis for achieving our Goal

DENSO Spirit is company assets we have cultivated since its founding, and condenses into Foresight, Credibility, and Collaboration of the DENSO Group.

Slogan

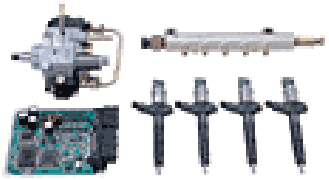
Beyond All Expectations

The slogan encompasses our driving passion to surpass our previous achievements and break through the limits previously drawn around us.

2.3 Business groups

To promote a sales system that stresses globalization, borderless business, and increased speed in operations, and to create a lean and simple organization, we have adopted a system in five Product Groups.

Power train Control Systems Business Group



Incorporates three divisions involved in the development and manufacture of engine management systems and components for both gasoline and diesel engines in order to promote a comprehensive approach to system development.

Electric Systems Business Group

Incorporates two divisions involved in the development of and manufacture of starters, alternators, and other automotive electrical products, including components for electric hybrid vehicles in order to promote synergistic development of related technologies.

Electronic Systems Business Group

Incorporates two divisions developing and manufacturing engine ECUs and other integrated circuits or electronic devices for automotive control systems in order to promote synergistic development of both software and hardware.

Thermal Systems Business Group

Incorporates two divisions developing and manufacturing air conditioners, radiators, and other components utilizing automotive heat exchange technologies.

Information & Safety Systems Business Group

Incorporates several divisions developing and manufacturing ITS products, safety systems, and body electronics in order to promote development of systems that provide driver-assistance.

3. Chapter 3 Concepts revision

In this chapter a revision of some concepts are addressed. Firstly some manufacturing concepts are reviewed since the need of the system was detected in a modern manufacturing plant, after technology concepts transcendental for the monitoring system conception are briefly explained, next some important quality concepts are mainly discussed since the purpose of the system is to assure the quality of the product and finally some important terminology used in the floor to describe better the project is presented.

3.1 Manufacturing concepts:

3.1.1 Lean manufacturing:

Lean manufacturing was developed as an alternative to traditional mass production. Mass production is based on producing large volumes of limited items at low cost in an environment where workers perform minute task in repetitive fashions and a separation of powers exists between management and labor. On the other hand, lean manufacturing is aimed at producing large varieties of high-quality items very quickly in a flexible and continuously learning organization with multiskilled workers at all levels of the organization.

> *"Lean manufacturing is a system of manufacturing that seeks to achieve more with less resources. It is a manufacturing approach that focuses on total quality management, just-in-time production, waste elimination, continuous improvement, multifunctional teams, product design, and supplier partnerships "* (Schonberger, 2000).

> *"Lean manufacturing does not only focus on core production activities, but it is also aimed at product development, component procurement, and product distribution"* (Ahlstrom, 1996).

"The ultimate goal of lean manufacturing is increased productivity, lower costs, increased quality of products, shortened lead times, faster and reliable delivery of products, and enhanced flexibility" (Schonberger, 2000).

3.1.2 Lean thinking:

*"**Muda.** It's the one word of Japanese you really must know. It sounds awful as it rolls off your tongue and it should, because muda means "waste", specifically any human activity which absorbs resources but creates no value: mistakes which require rectification, production of items no one want so that inventories and remaindered goods pipe up, processing steps which aren't actually needed, movement of employees and transport of goods from one place to another without any purpose, groups of people in a downstream activity standing around waiting because an upstream activity had not been delivered on time, and goods and services which don't meet the needs of the customer.*

Fortunately there is a powerful antidote to muda: lean thinking. It provides a way to specify value, line up value-creating actions in the best sequence, conduct these activities without interruption whenever someone requests them, and perform them more and more effectively. In short, lean thinking is lean because it provides a way to do more with less and less-less human effort, less equipment, less time, and less space-while coming closer and closer to providing customers with exactly what they want. Lean thinking also provides a way to make work more satisfying by providing immediate feedback on efforts to convert muda into value. And, in striking contrast with the recent craze for process reengineering, it provides a way to create new work rather than simply destroying jobs in the name of efficiency" (Womack, 2003).

3.1.3 e-Manufacturing:

"e-Manufacturing is a transformation system that enables the manufacturing operations to achieve predictive near-zero-downtime performance as well as to synchronize with the business systems through the use of web-enabled and tether-free (i.e., wireless, web, etc.) infotronics technologies. It integrated information and decision-making among data flow (of machine/process level), information flow (of factory and supply system level), and cash flow (of business system level)" (Zurawski, 2006).

"e-Manufacturing is a business strategy as well as a core competency for companies to compete in today's e-business environment. It is aimed to complete integration of all the elements of a business including suppliers, customer service network, manufacturing enterprise, and plant floor assets with connectivity and intelligence brought by the web-enabled and tether-free technologies and intelligent computing to meet the demands of e-business/e-commerce practices that gained great acceptance and momentum over the last decade. e-Manufacturing is a transformation system that enables e-Business systems to meet the increasing demands through tightly coupled supply chain management (SCM), enterprise resource planning (ERP), and customer relation management (CRM) systems as well as environmental and labor regulations and awareness" (Zurawski, 2006).

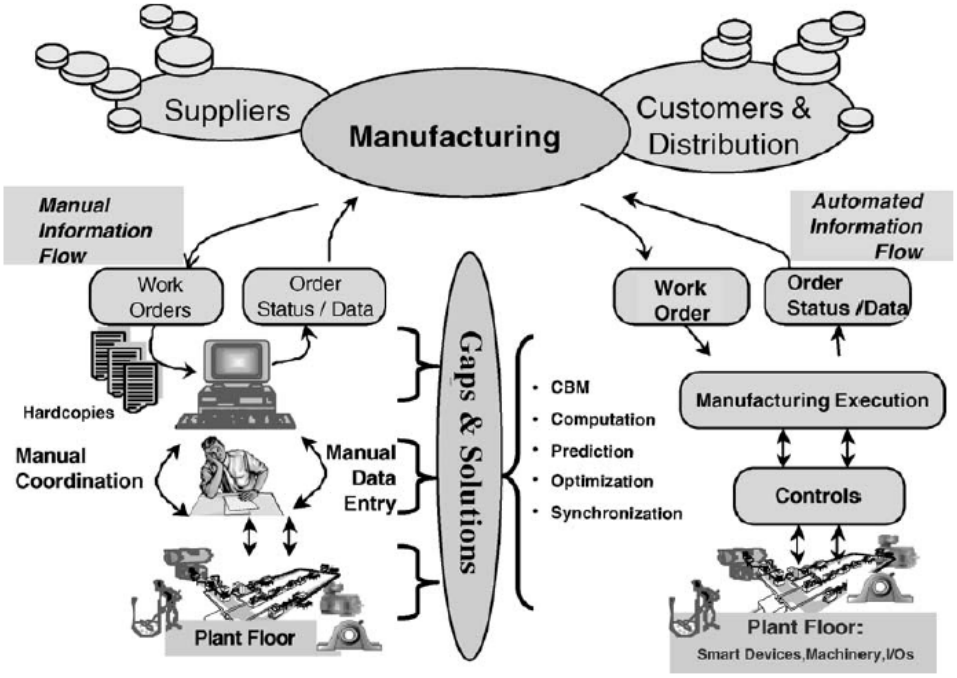


Figure 1 Gap in today's manufacturing enterprise systems

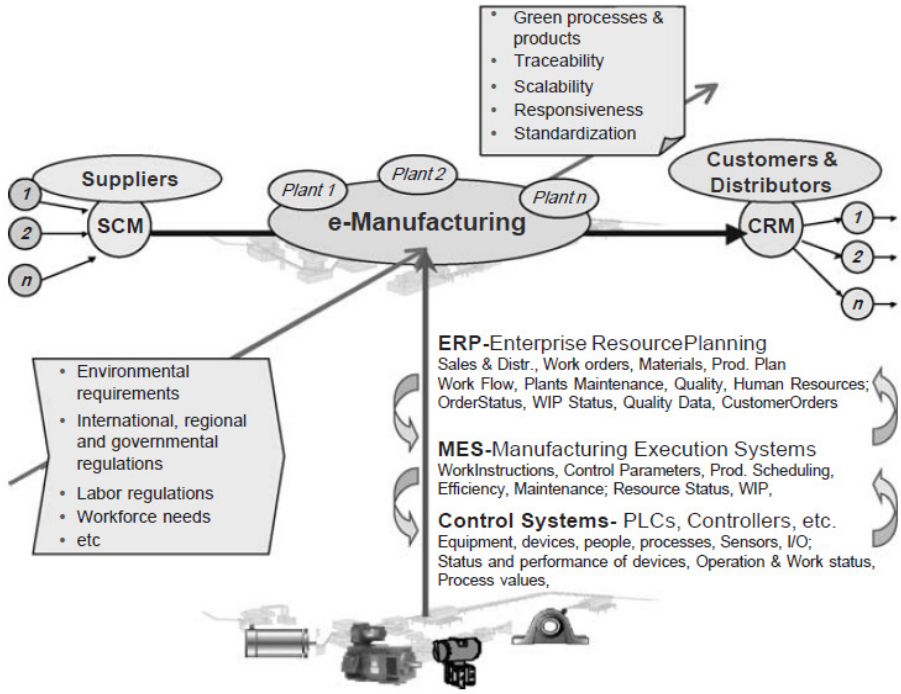


Figure 2 Integration of e-manufacturing and e-business systems.

3.1.4 Lean adaptative enterprise:

Lean adaptative enterprise as described by the LAI (Lean aerospace initiative) is the evolution of lean manufacturing.

"IT technology innovative architectures & emerging data capture standards provides the basis for fully integrated, adaptable supply chain infrastructures, scalable to companies of all sizes (Shaw, 2004).

Characteristics:

- *Real Time Decision Focus.*
- *Decision Modeling and Simulation.*
- *Adaptive Supply Chain.*
- *Decision System Metrics and KPI's.*

Capabilities

- *High Quality Alternate Sources.*
- *Broad Range of Products and Services.*
- *Highly Agile and Efficient Network Management.*
- *Product Offerings Value Optimized Rapid and.*
- *Predictable Response to New Orders.*

Actions

- *Coordinate Collaborative Adaptive Vision and Objectives.*
- *Require Network Lean Assessment (Internal/External).*
- *Establish Network Lean Requirements Capability.*
- *Select Primary and Alternate Network Entities.*
- *Implement Collaborative Adaptive System.*
- *Architecture and Systems.*

Enablers

- *Validated Lean Network Entity.*
- *Network Node IT Proficiency.*
- *Agile and Qualified Network Entities.*
- *Broad Capacity Range of Network Entities (Flexible Outsourcing).*
- *Collaborative and Adaptive IT Architecture and Systems*."

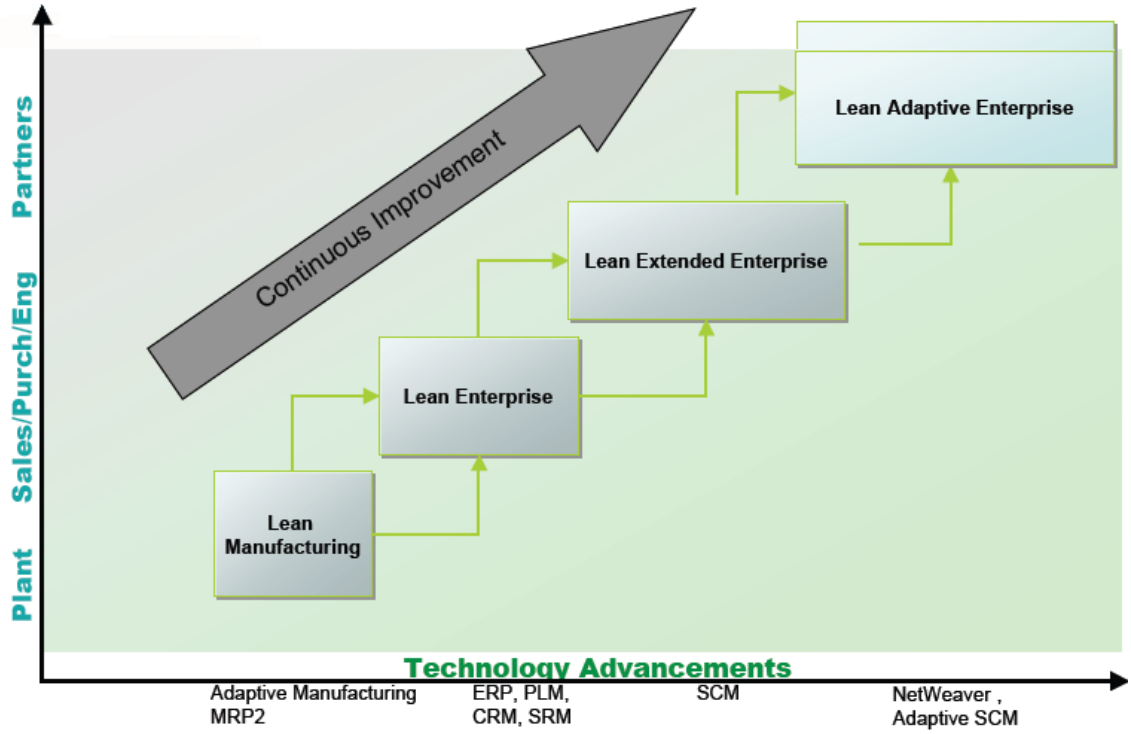


Figure 3 Lean manufacturing evolution

3.2 Web technology concepts

3.2.1 HTML

HTML is the short for HyperText Markup Language, the authoring language used to create documents on the World Wide Web.

3.2.2 XML

Short for Extensible Markup Language, a specification developed by the W3C.. It allows designers to create their own customized tags, enabling the definition, transmission, validation, and interpretation of data between applications and between organizations.

3.2.3 The Apache HTTP Server Project.

The Apache HTTP Server Project is a collaborative software development effort aimed at creating a robust, commercial-grade, feature-full and freely-available source code implementation of an HTTP (Web) server. The project is jointly managed by a group of volunteers located around the world, using the Internet and the Web to communicate, plan, and develop the server and its related documentation (The Apache Software Foundation, 2009).

3.2.4 PHP

PHP (recursive acronym for PHP: Hypertext Preprocessor) is a widely-used open source general-purpose scripting language that is especially suited for web development and can be embedded into HTML (The PHP group, 2010).

3.2.5 MySQL

MySQL is the world's most popular open source database software, with over 100 million copies of its software downloaded or distributed throughout its history. With its superior speed, reliability, and ease of use, MySQL has become the preferred choice for Web, Web 2.0, SaaS, ISV, Telecom companies and forward-thinking corporate IT Managers because it eliminates the major problems associated with downtime, maintenance and administration for modern, online applications. Many of the world's largest and fastest-growing organizations use MySQL to save time and money powering their high-volume Web sites, critical business systems, and packaged software — including industry leaders

such as Yahoo!, Alcatel-Lucent, Google, Nokia, YouTube, Wikipedia, and Booking.com (Oracle, 2010).

3.3 Quality concepts.

3.3.1 TQC (Total Quality Control).

"*TQC is a thought revolution in management* (Ishikawa, 1985).

1. *Quality first-not short-term profit first.*
2. *Consumer orientation-not producer orientation. Think from the standpoint of the other party.*
3. *The next process is your customer-breaking down the barrier of sectionalism.*
4. *Using facts and data to make presentations-utilization of statistical methods.*
5. *Respect for humanity as a management philosophy-full participatory management.*
6. *Cross-function management."*

3.3.2 TQM (Total Quality Management).

"TQM: Total Quality Management is a strategy for implementing and managing quality improvement activities on an organization wide basis. TQM began in the early 1980s, with the philosophies of Deming and Juran as the focal point. It evolved into a broader spectrum of concepts and ideas, involving participative organizations and world culture, customer focus, supplier quality improvement integration of the quality systems with business goals, and many other activities to focus all elements of the organization around the quality improvement goal. Typically, organizations that have implemented a TQM approach to quality improvement have quality councils or high-level teams that deal with strategic initiatives, workforce-level teams that focus on

routine production or business activities, and cross-functional teams that address specific quality improvement issues" (Montgomery, 2009).

TQM DENSO activities try precisely to improve the administration of quality.

These activities as considered as methods to assure a fast achievement of long term policies including the company vision established in accordance to the basic company's principles.

The basic company's TQM principles are:

Customer first: When taking actions, always think from the customer's point of view. Mot products and services are determined as good or bad based on customer judgment.

Continuous kaizen: Kaizen and innovation are always promoted to achieve aggressive goals, and not to be satisfied with the status quo. As for Kaizen, effectively utilize scientific control methods in addition to the engineering technology and skills. Also, make sure to always keep in mind the principles and rules for each job sites, part, and each point in time.

All members participation: All employees to share goals and issued and contribute their individuality and creativity. The activities should be the results of all of these efforts in order to resolve various issues.

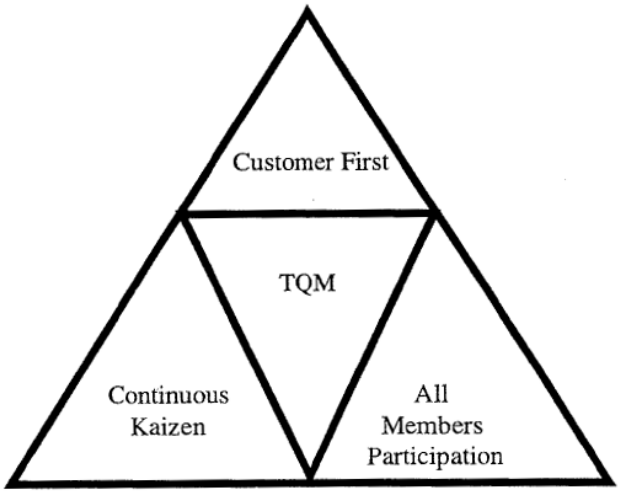


Figure 4 Basic concept of TQM

DAW (Denso approach of work): It is a set of steps to the solution of problems based on PDCA (Plan Do Check Act) where 8 steps are defined to achieve the objectives.

1. To identify the problem.
2. To understand the actual situation.
3. To fix the goals in SMART terms (Specific, measurable, attainable, relevant, time-bound).
4. To determine the nature of the problem.
5. To generate countermeasures.
6. To implement countermeasures.
7. To confirm the impact of the countermeasure.
8. To maintain the implementation and results in similar areas.

3.3.3 Statistical Process Control (SPC)

"SPC (Statistical process control): Use of the statistical concept and tools with the purpose of analyzing the process or its production in such a way that, it allows us to take appropriate actions to achieve and keep the statistical control" (Arreola, 2009)

"If a product is to meet or exceed customer expectations, generally it should be produced by a process that is stable or repeatable. More precisely, the process must be capable of operating with little variability around the target or nominal dimensions of the product's quality characteristics. Statistical process control (SPC) is a powerful collection of problem-solving tools useful in achieving process stability and improving capability trough the reduction of variability" (Montgomery, 2009).

SPC is one of the greatest technological developments of the twentieth century because it is based in sound underlying principles, is easy to use, has a significant impact, and can be applied to any process. Its seven major tools are:

1. Histograms or steam-and-leaf plot.
2. Check sheet.
3. Pareto chart.
4. Cause-and-effect diagram.
5. Defect concentration diagram.
6. Scatter diagram.
7. Control chart.

"Although this tools, often called the "the magnificent seven", are an important part of SPC, they comprise only it technical aspects. The proper deployment of SPC helps create an environment in which all individuals in an organization seek continuous improvement in quality and productivity. This environment is best developed when management becomes involved in the process. Once the environment is established, routine application of the magnificent seven becomes part of the usual manner of doing business, and the organization is well on its way to achieving its quality improvement objectives" (Montgomery, 2009).

3.3.4 Process capability: The concept.

"Process capability is the measured, inherent reproducibility of the product turned out by a process.

- *Process: his refer to some unique combination of machine, tools, methods, materials, and people engaged in production. It is often feasible to separate and quantify the effect of the variables entering this combination. Such separation can be illuminating.*
- *Capability: This word is used in the sense of a competence, based on tested performance, to achieve measurable results.*
- *Measured: This refers to the fact that process capability is quantified from data which, in turn are the results of measurement of work performed by the process.*
- *Inherent reproducibility: This refers to the product uniformity resulting from a process which is in a state of statistical control, i.e., in the absence of time-to-time "drift" or other assignable cause of variation. "Instantaneous reproducibility" is a synonym.*
- *Product: The measurement is made on the product because it is product variation which is the end result.*

Machine capability versus process capability: Some practitioners distinguish between these two terms. Machine capability refers to the reproducibility under one set of process conditions (e.g.: one operator, homogeneous raw material, uniform manufacturing process). Process capability refers to the reproducibility over a long period of time with normal changes in workers, material, and other process conditions.

Process capability as defined above is a measurable property of the process (much as volume in liters is a measurable property of a container). The resulting measure is expressed in terms of 6σ of variation and is unrelated to the process tolerance "the process doesn't know what the tolerance is". However, the capability measurement is compared to the tolerance in order to judge the adequacy of the process.

A major reason for quantifying process capability is to be able to compute the ability of the process to hold product tolerances. For process which are in a state of statistical quality control, a comparison

of the variation of 6σ to the tolerance limits permits ready calculation of percent defective by conventional statistical theory" (Gryna, 1988).

3.1 Terminology used in the floor.

1. QC: Quality control.
2. FAI: Final assembly inspection.
3. PQ: Parts quality.
4. PR: Production.
5. MT: Maintenance.
6. PE: Production engineering.
7. ***Genba:*** Floor.
8. ***Yokonirami:*** To copy the improvement to other areas.
9. ***Muda:*** Waste.
10. ***5S***:
    a. Seiri (To clasify).
    b. Seiton(To order).
    c. Seisō (To clean).
    d. Seiketsu (To standarize).
    e. Shitsuke (To keep).
11. ***Atarimae:*** Actions to be implemented as a common sense matter in the quality assurance.
12. ***5Gen:*** Fundamentals of the everyday work. Gen (Actual).
    a. ***Genbutsu:*** Actual thing or actual object.
    b. ***Genchi:*** Actual place.
    c. ***Genba:*** Actual process.
    d. ***Genjistu:*** Actual situation.
    e. ***Genri:*** Actual principle.
    f. ***Gensoku:*** Actual law.
13. ***Kaizen:*** Continuous improvement.
14. ***Nemawashi:*** To prepare the land.
15. ***Hansei:*** Personal thought about something.

16. Jig: A device that allows the product to be integrated or guided in an operation.
17. ***Asaichi:*** Meeting to talk about process status.

4. Chapter 4 System description.

4.1 Lay out description.

A summarized line layout is show below in figure 5. In-process is called to all the stations where the assembly occurs. Next-process is called all the stations where inspection occurs.

The measurement control box is a computer where all the raw data is saved; the raw data contains useful fields to identify each type of characteristics. Some of the objectives of this project are to make this raw data easily gathered, readable and value added information to the user.

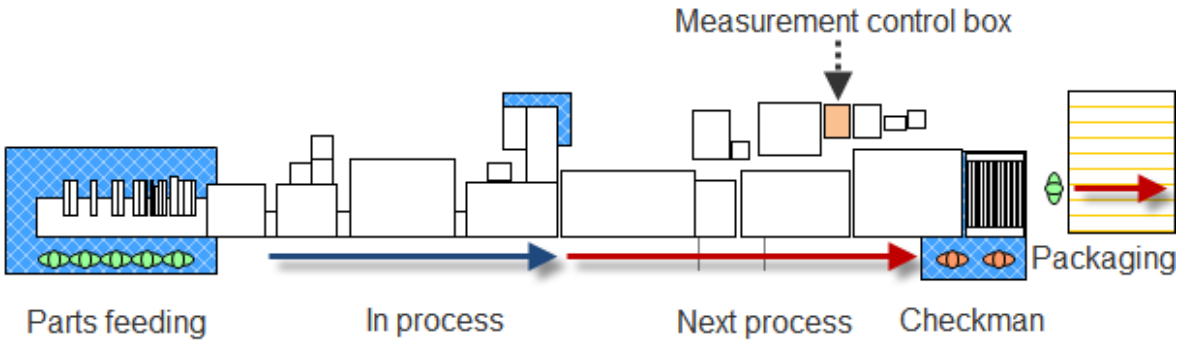


Figure 5 Production line lay out

4.2 System modeling:

To describe better what actually happens to information the current model and the proposed model are described in the next sections.

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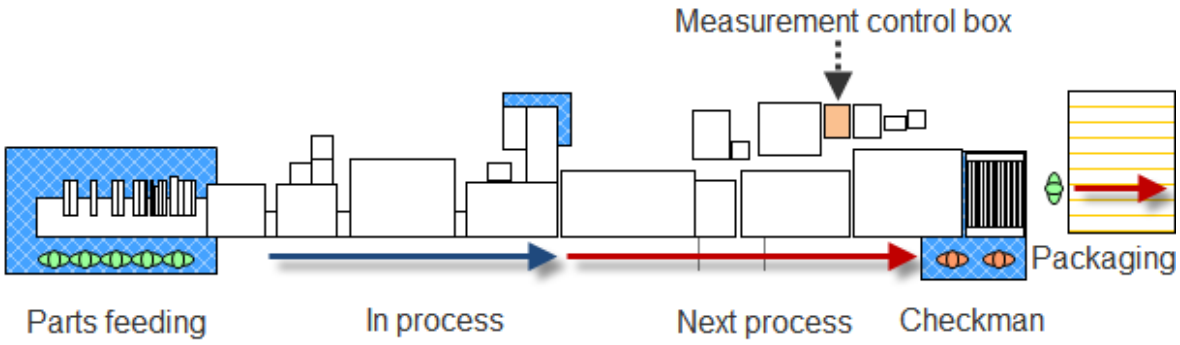

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4.2.1 Current monitoring model

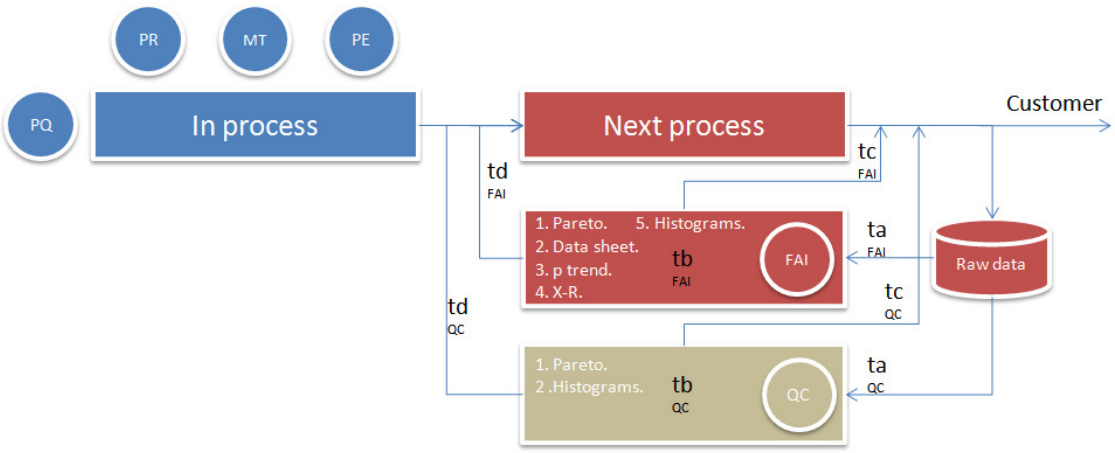


Figure 6 Current monitoring model diagram

Already assembled products coming from in process are inspected in next process. Next process information is saved in separated files (one file per inspection jig) as raw data. Then files are pulled to a controlled USB flash memory from the measurement control box, passed to an off-line computer in order to be sorted and put together into a file prior to be passed to a statistical application and start to generate plots and next reports that tell important information about the actual process. The operations regarding the statistical application depend on what kind of information the engineer will need. As it can be seen in figure 6 there are two departments gathering information from the line. As part of the Atarimae, engineers must accomplish these actions every day.

It can be shown in figure 6 that there are two information streams. Let's say that the author as QC engineer is regarded to plot histograms for today's production, then another engineer from FAI is regarded to do the same, by now engineers are making the

same report, we have an opportunity area of ***Muda*** to reduce, duplication of work.

The times expended in each transition are identified in the model.

The formulas to measure times of the actual monitoring model are shown in equation 1 and equation 2. These times are also related to the PDCA cycle, see figure 7, to this point we are also willing to make the cycle more efficient hence the *DAW*.

$$t_{TFAI}=t_{aFAI}+t_{bFAI}+t_{cFAI}+t_{dFAI}$$

Equation 1 FAI total time

$$t_{TQC}=t_{aQC}+t_{bQC}+t_{cQC}+t_{dQC}$$

Equation 2 QC total time

Where:

t_a: $Time\ to\ get\ information, Time\ to\ order\ information$

t_b: $Time\ to\ analyze$

t_c: $Time\ to\ confirm$

t_d: $Time\ to\ report(Hansei), Time\ to\ take\ action$

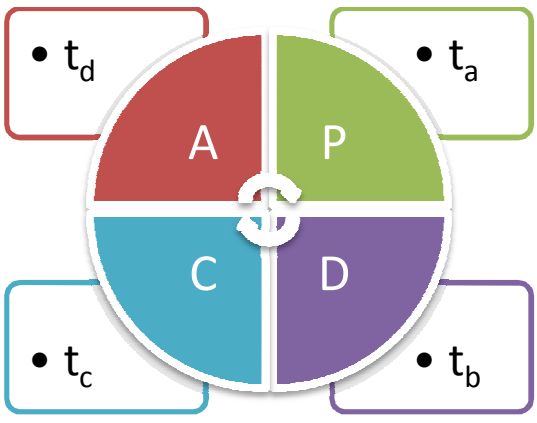
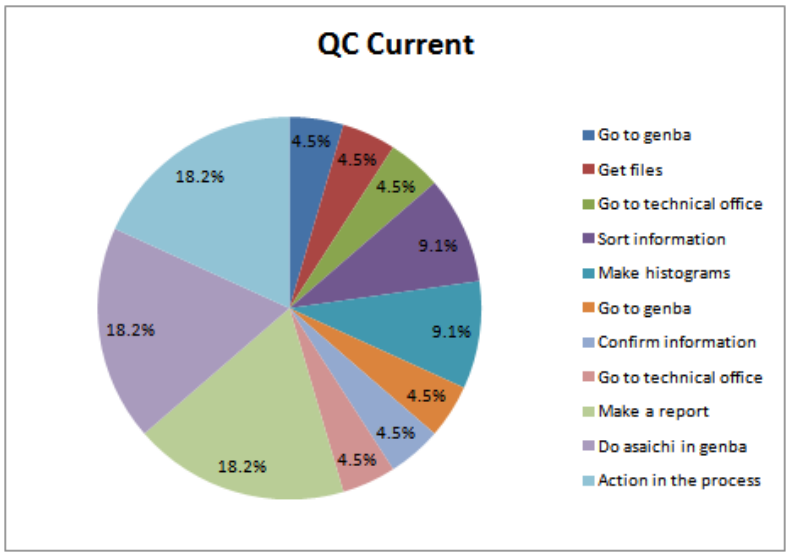


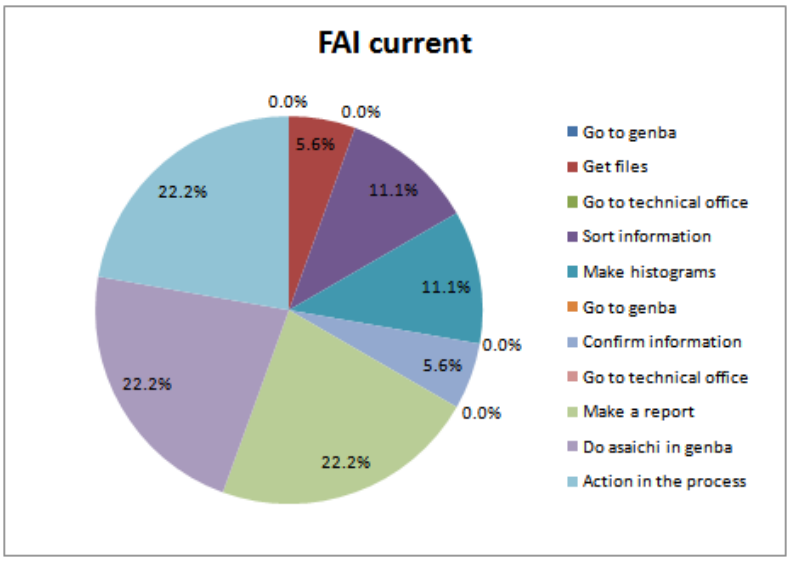
Figure 7 Current time relation to PDCA cycle

Next the ordered steps and times when making monitoring reports are shown according to interviews made to 10 engineers from QC and FAI. Their answers were considering that they are not dedicated the 100% of their daily time in doing this statistical monitoring jobs



$t_{TQC=}$27.5 hrs

Figure 8 QC times consumed



$$t_{TFAI=}22.5 \text{ hrs}$$

Figure 9 FAI times consumed

Times are in minutes, the overall result for QC and FAI respectively is $t_{TQC=}27.5$ and $t_{TFAI=}22.5hrs$ and the contribution of each task is shown in figures 8 and 9. There are some steps considered as 0% as in contrast to QC engineers, FAI engineers are all the day in ***Genba***. It can be appreciated that for both departments dealing with getting and sorting raw data, analyzing and creating reports occupies 60% of the engineer time when doing quality evaluations and investigations, there is a ***Kaizen*** opportunity to eliminate ***Muda***.

In resume the disadvantages of the current model are listed below:

1. ***Muda*** because of duplication of work.
2. ***Muda*** of data handling because of the data base is not friendly to the user
3. ***Muda*** of movement as statistical applications are off-line.
4. Lack of effective communication as there is not link between Next process and In-process.
5. Difficultness to do ***Atarimae***.
6. ***Muda*** of waiting as ***Asaichi*** takes too long to happen.
7. ***Muda*** of waiting as actions takes too long to be executed.

4.2.2 Proposed monitoring model

The proposed monitoring model is shown in figure 10. Some important differences can be appreciated.

1. There is not duplication of work as there is only one stream of information.
2. There is a second database qualified as smart.
3. Times t_a and t_b are assigned to a machine.

4. There is an e-monitor after the second database, this means real time reports.
5. There is a link communication between In process and Next process.

As reports are intended to be done on real time, ***Asaichi*** will happen immediately during the test run and actions can be taken faster also. These two last points will be results of the proposed model.

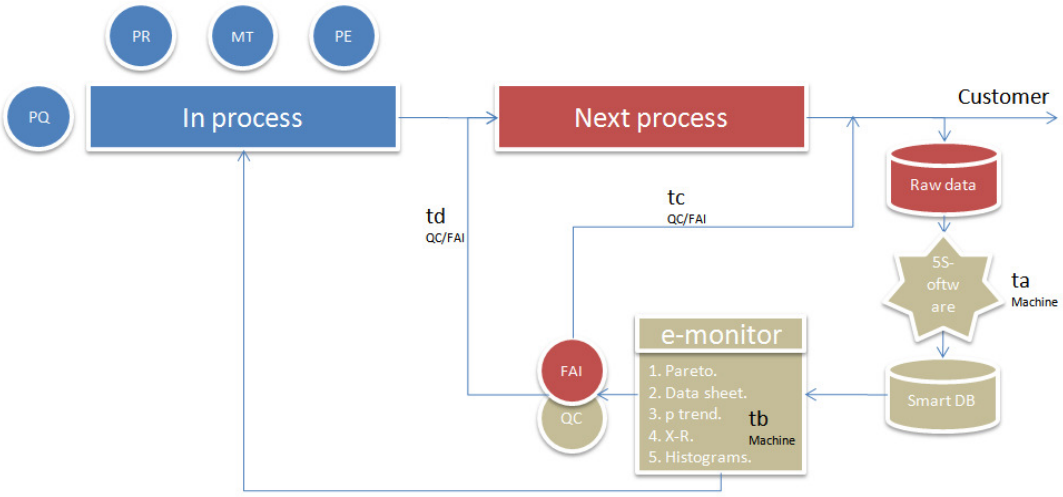


Figure 10 Proposed monitoring model diagram

To measure the time consumed in the proposed model a new formula is proposed, see equation 3 and its impact in PDCA cycle in figure 11.

$$t_{T=}t_{aMachine+}\ t_{bMachine+}t_{c\ QC/FAI+}t_{d\ QC/FAI}$$

Equation 3 Proposed model total time

Where:

t_a: $Time\ to\ get\ information, Time\ to\ order\ information$

t_b: $Time\ to\ analyze$

t_c: $Time\ to\ confirm$

t_d: $Time\ to\ report(Hansei), Time\ to\ take\ actions$

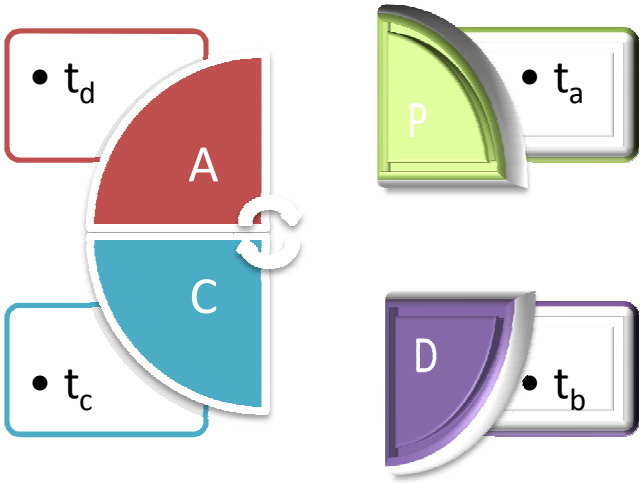


Figure 11 Proposed time relation to PDCA cycle

5. Chapter 5 Software design and development.

5.3 Database design to integrate data into graphic interfaces based on web technologies (Smart DB).

The database was build similar to the ".csv" text files located in the measurement control box, see figure 15.

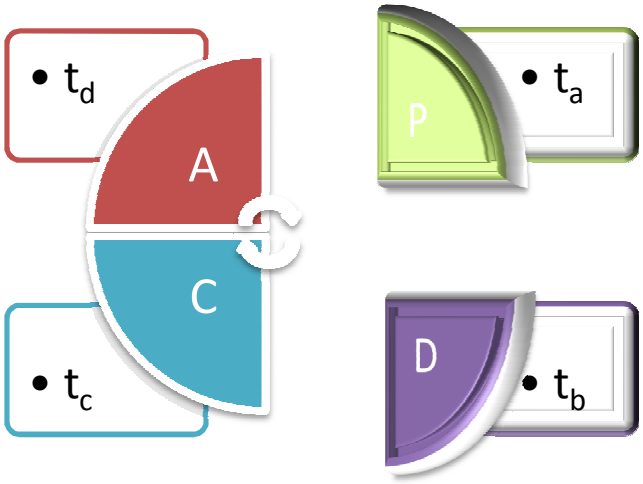
The MysSQL table yyyymdd is dynamic, this means that tables are created anytime there are user requests for data.

	Table	Action	Records [1]	Type	Collation	Size	Overhead
☐	2010117		595	MyISAM	latin1_swedish_ci	63.5 KiB	-
☐	2010118		7,856	MyISAM	latin1_swedish_ci	815.8 KiB	-
☐	perf_models		11	MyISAM	latin1_swedish_ci	2.2 KiB	-

Figure 12 Database structure in MySQL

MySQL Table	Description
yyyymdd	Data from a day of production (Created every day)
perf_models	Part number names

Table 1 Database description



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☐	perf_models		11	MyISAM	latin1_swedish_ci	2.2 KiB	-

Figure 12 Database structure in MySQL

MySQL Table	Description
yyyymdd	Data from a day of production (Created every day)
perf_models	Part number names

Table 1 Database description

The perf_models MySQL table contains the model numbers that are produced on the line, this will allow in a future to implement a feature to easily add models to the system.

Table yyyymdd:

	Field	Type	Collation	Attributes	Null	Default	Extra	Action
☐	prf_ocv_temp_idKey	int(10)			No	None	auto_increment	
☐	prf_ocv_temp_PartNo	text	latin1_swedish_ci		No	None		
☐	prf_ocv_temp_Time	time			No	None		
☐	prf_ocv_temp_STNo	int(11)			No	None		
☐	prf_ocv_temp_Judge	text	latin1_swedish_ci		No	None		
☐	prf_ocv_temp_T1	double			No	None		
☐	prf_ocv_temp_A	double			No	None		
☐	prf_ocv_temp_B	double			No	None		
☐	prf_ocv_temp_C	double			No	None		
☐	prf_ocv_temp_D	double			No	None		
☐	prf_ocv_temp_E	double			No	None		
☐	prf_ocv_temp_F	double			No	None		

Figure 13 yyyymdd table structure in MySQL

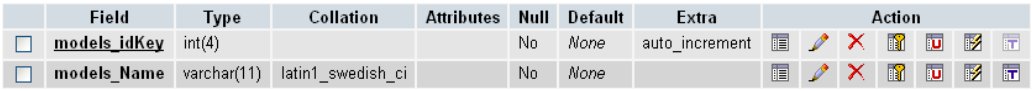
The table MySQL table yyyymdd in table 2 contains fields related to the quality characteristics checked to the product, on this case pressures and currents are measured since it is an electrical valve, because of confidentiality issues characteristics are not described in detailed.

MySQL table field	Description
prf_ocv_temp_idKey	Part unique id
prf_ocv_temp_PartNo	Part number/Part selector
prf_ocv_temp_Time	Time of check
prf_ocv_temp_STNo	Station number
prf_ocv_temp_Judge	Judge
prf_ocv_temp_T1	Response of the valve
prf_ocv_temp_A	Pressure A
prf_ocv_temp_B	Pressure B
prf_ocv_temp_C	Current C

prf_ocv_temp_D	Pressure D
prf_ocv_temp_E	Pressure E
prf_ocv_temp_F	Hysteresis F

Table 2 Table yyyymdd description

Table perf_models:



	Field	Type	Collation	Attributes	Null	Default	Extra	Action
☐	models_idKey	int(4)			No	None	auto_increment	
☐	models_Name	varchar(11)	latin1_swedish_ci		No	None		

Figure 14 perf_models structure in MySQL

MySQL table field	Description
models_idKey	Model id
models_Name	Part Name

Table 3 Table perf_models description

5.2 Running stratification of data in the line.

Data stratification is an important point that had to be addressed firstly to take advantage from the monitoring system.

There are different kinds of data that the manufacturing departments are interested in, this means that information can have different purposes, next this kinds of data are explained:

- Re-inspection data: Data coming from re-inspections of parts because of defects confirmation.

- Events data: Data which sources are mainly special tests to evaluate process changes, engineering changes or new products.

- Normal production data: Normal production data is any data that is not re-inspection data or events data.

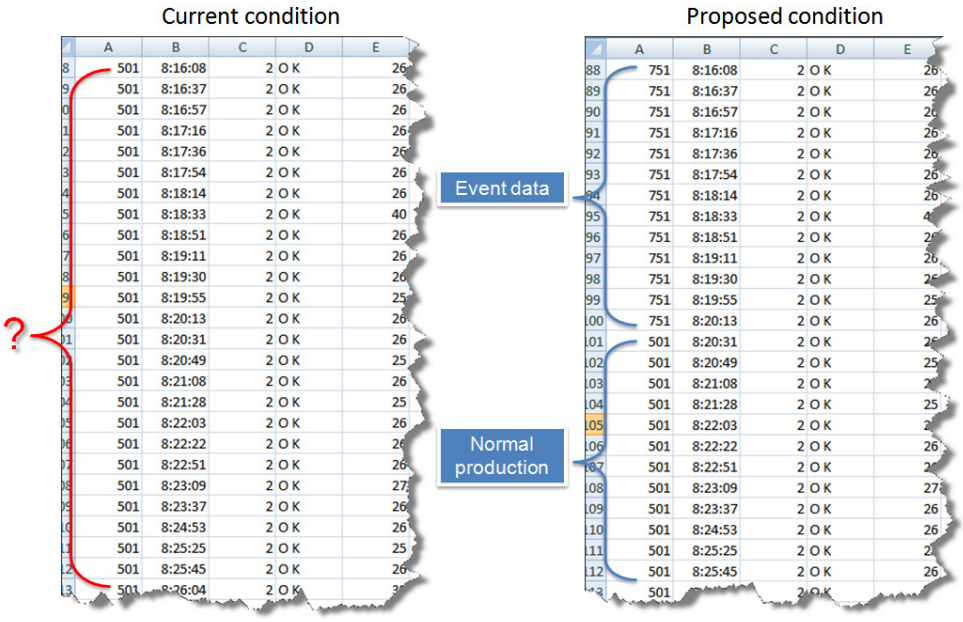


Figure 15 Files stratification

To achieve the purposed situation, because of the product line uses programs to link every processing and inspection station and depend on part models, two copies were done and these lasts were renamed so that every time there is an event or re-inspection, just by selecting the corresponding number to produce, each data unit will be tagged automatically during the run, see table 3. This last information is then pulled out by the monitoring system and analyzed in a time basis manner.

Model	Normal Production	Re-inspections	Event
Model 1	501	651	751
Model 2	502	652	752
Model 3	500	650	750

Table 4 Types of data's codes

5.3 Web based program for the automated copy of stratified information into a data base (5S-oftware).

Automated copy of data files is achieved by an integration of windows schedule task manager running a PHP script. This method is described graphically the figure 16.

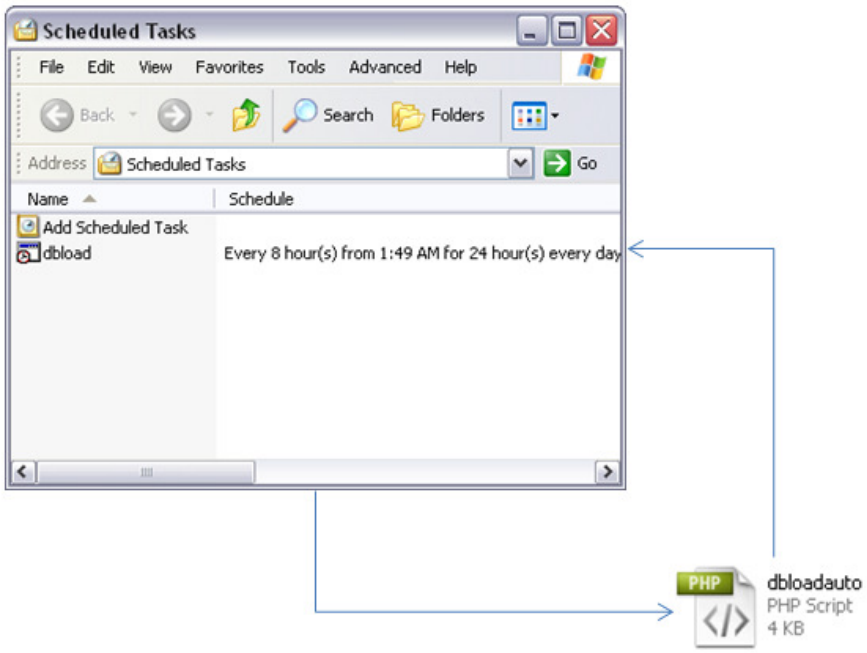


Figure 16 Automatic file loading function

Operations made by the file “dbloadauto.php”:

1. Database connection.
2. Define temporary table.
3. Create temporary table.
4. Load file.
5. Eliminate not needed fields from the table.
6. Eliminate empty response values.
7. Fix values for row numbering.
8. Create key field, number and index the field.
9. Judge formatting.

10. Masters encoding
11. Part number encoding
12. Re-inspections encoding.
13. Events encoding.
14. Create table with the corresponding file names.
15. Eliminate temporary table.

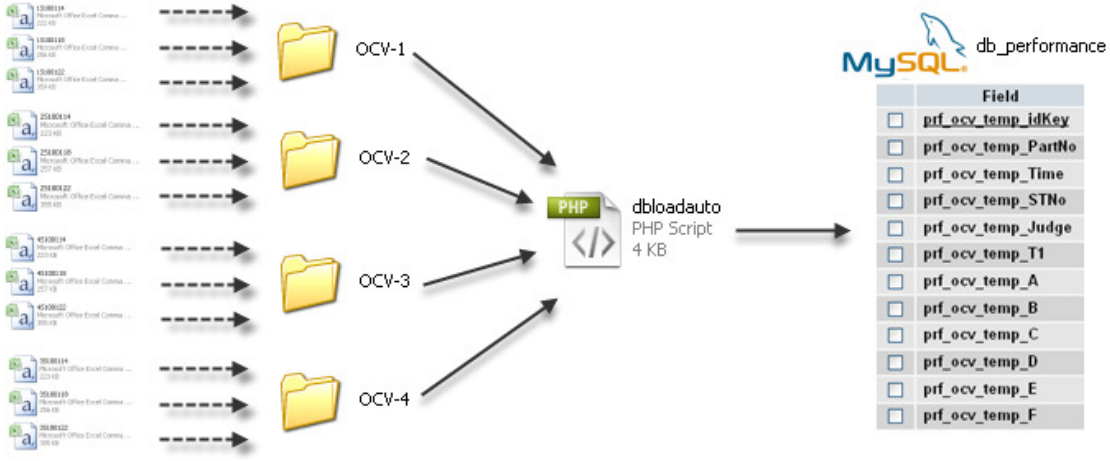


Figure 17 File loaded information flow

As it can be seen in figure 17, each file in every folder is copied into a database table. This last makes the information available to the entire application; to this point ***Muda*** due to data handling and sorting had been reduced considerably since the last flow of information is running automatically.

Windows task schedule is set to pull the files three times a day, considering three shifts of production. Real time data is achieved by a query application than can be executed from the main application every time the user needs even if the line is producing at that time.

5.4 Web based graphic interface to report process capabilities in real time (e-monitor).

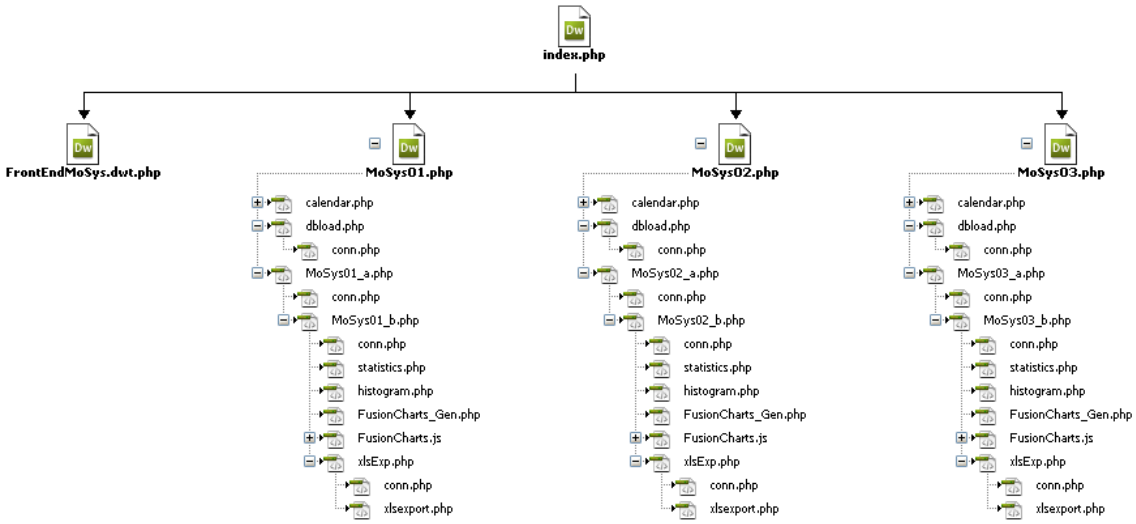


Figure 18 Web site tree diagram

For the user interface application a web page was created, it includes three embedded web pages (MoSys01.php, MoSys02.php, and MoSys03.php), that do the same operations but independently in order to make comparisons between data, its structure can be seen in figure 18.

Functions used on the web site are shown next in table 3:

Function	Description
calendar.php	Calendar for production data Navigation.
histogram.php	Histogram data builder.
statistics.php	Statistics values calculation.
FusionCharts.php	Charts rendering function.
xlsexport.php	MySQL to Microsoft excel exporter.

Table 5 Software function table description

Figures 19 and 20 show the features included on this webpage.

1. Independent calendar: It is a common practice in modern manufacturing plants to compare data every time there is a change in the process to see the effect of it in the quality of product (Variability). This comparison is usually done in a time basis manner, to make this easier a calendar had been added to the graphic interface so that the user chooses the data for comparison.
2. Production data picker: The production data picker is embedded in the calendar and it adds a link if the day contains data, the picker in conjunction with the calendar makes the data available to the user in time basis manner.
3. Model menu. The menu/list helps the user to choose the model from the picked day of production. The data available is:
    a. Models for normal production: Show the normal production data per model.
    b. Models for re-inspection: Show re-inspected production data per model, this are denoted by the suffix R.
    c. Models for events: Show events data which are process changes, engineering changes and special tests per model, this are denoted by the suffix E.
4. Statistics table. The statistic table is calculated per every data group chose in the model menu. The statistics (Montgomery, 2009) used are:
    a. Sample size (n): Sample size of the day of production picked.
    b. Maximum (Max): Maximum value of the sample.
    c. Minimum (Min): Minimum value of the sample.
    d. Average (Mean): Average of the sample.
    e. Standard deviation (Stdev): Standard deviation of the sample.
    f. Process capability (Cp): Process capability of the sample, the specifications are written inside the code but a modification feature for the user will be added in a future.
    g. Process ability (Cpk): Process ability of the sample.

h. Number of defects (deff): Number of defect of the sample.

5. Microsoft Excel feature: This feature allows the user to export the consulted data to a Microsoft Excel sheet for any other special analysis.
6. Histograms. Histograms allows the user to appreciate the data distributions, there is a histogram per quality characteristic.
7. Scroll down histograms: Histograms can be shown in the same page with the help of a scroll down bar, this allows comparisons within quality characteristics.
8. Specification limits. Histograms scales show the upper specification limit and lower specification limit.

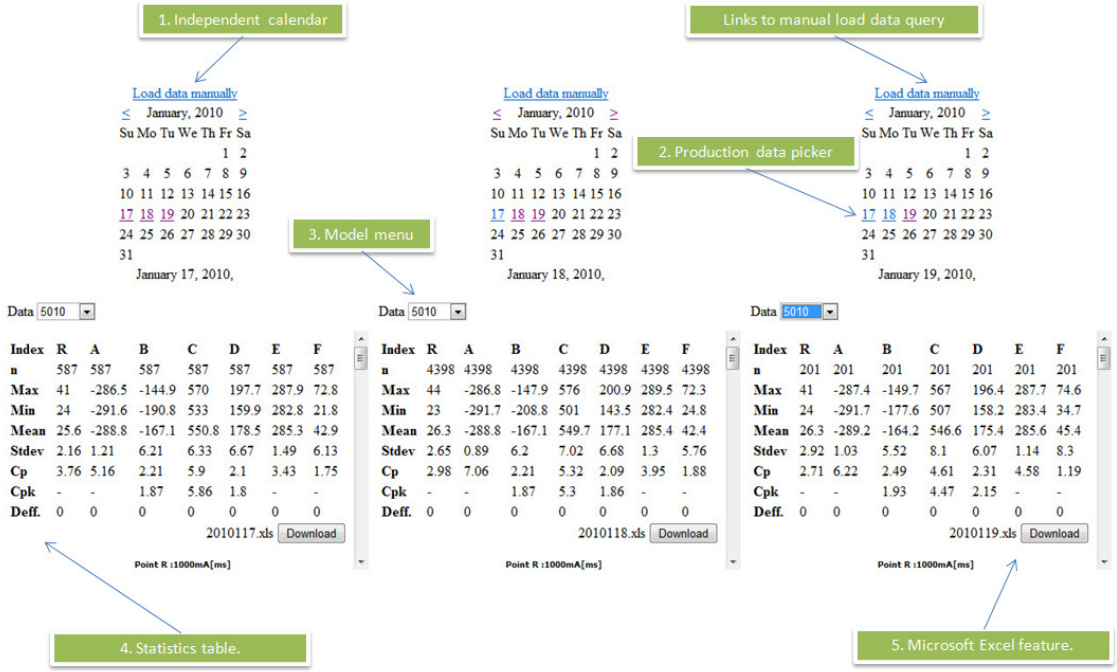


Figure 19 Web site features #1

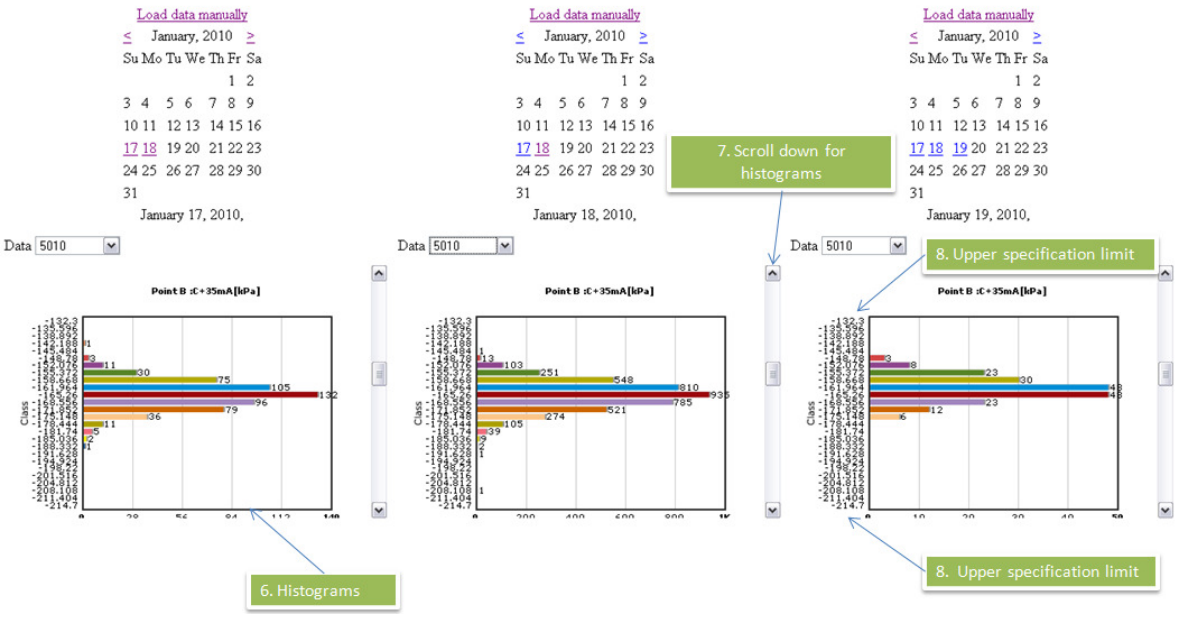


Figure 20 Web site features #2

5.5 Integration of the quality check robot with the web based software and the actual TCP/IP network from the company.

5.5.1 Arquitecture of communications

A client server model was used because of its ease of implementation with the web technologies used on this project, see figure 21.

"Some of the major characteristics are described below (Sommerville, 2007)*:*

1. *Distributed system model which shows how data and processing is distributed across a range of components.*
2. *Set of stand-alone servers which provide specific services such as printing, data management, etc.*
3. *Set of clients which call on these services.*
4. *Network which allows clients to access servers."*

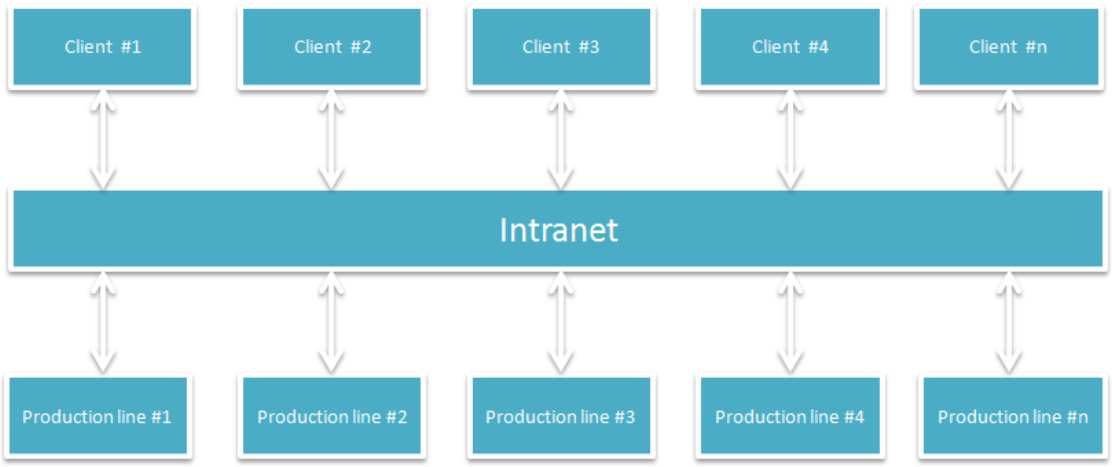


Figure 21 Arquitecture of communications diagram

The integration of the line to the intranet is accomplished by installing a Web and a MySQL server in the production line control box, the control box is then connected to the existing TCP/IP network , then whoever is connected to the intranet can visit the Real Time Monitorig System site by taping the host adress in the web navigator, see figure 22.

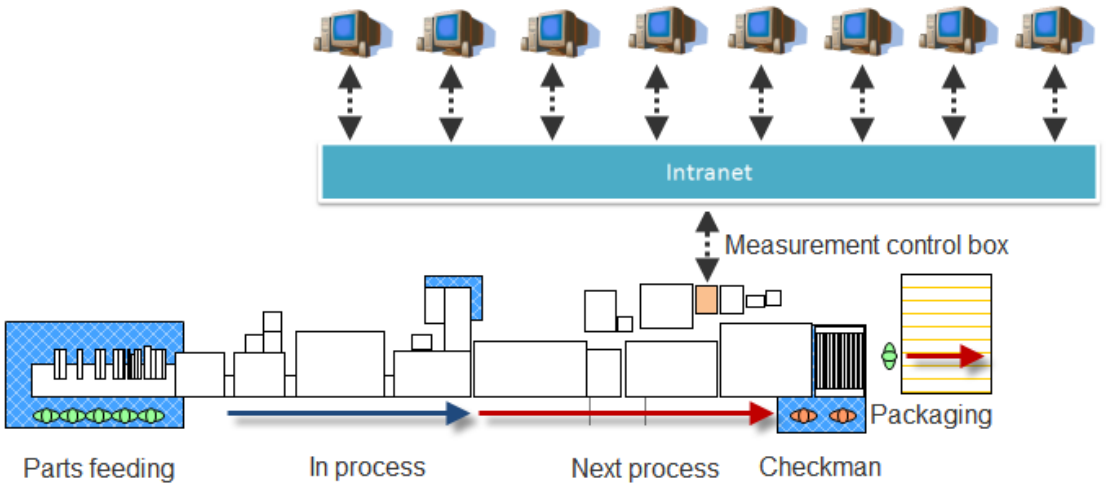


Figure 22 Monitoring system arquitecture diagram

6 Chapter 6 Real time monitoring system.

6.1 The Variable Cam Timing Control System (DENSO, 2010)

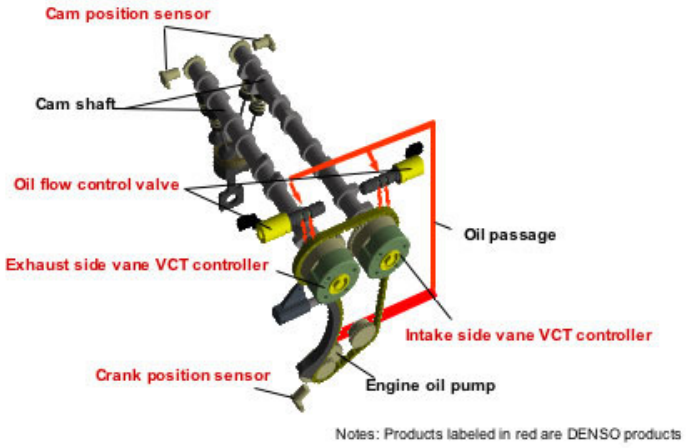


Figure 23 Variable Cam Timing Control System

The variable cam timing (VCT) control system controls the opening/closing timing of the intake valve and exhaust valve in accordance with driving conditions; improving engine output and reducing fuel consumption and emissions. DENSO provides a highly reliable vane VCT control system with a simple structure at low cost.

How the system works:

- The cam position sensor and crank position sensor cooperatively detect the crank shaft rotation during one engine-combustion cycle.
- Based on signals from the cam and crank position sensors, the engine ECU calculates the valve timing.
- The ECU calculates an electrical current amount to manage the oil flow control valve (OCV) to adjust the valve timing.

- In accordance with the electrical current amount, the OCV distributes oil, discharged from the engine oil pump, to two oil chambers of each VCT controller, controlling the oil amounts of the oil chambers.
- Each VCT controller controls the opening/closing timing of the valve in accordance with the oil amounts of the oil chambers.
- DENSO has two types of VCT control systems: an intake side VCT controller and both exhaust side and intake side VCT controllers (as shown in the figure).

6.2 Case study (Diminishing the time to take decisions over the process)

Case study: Integration of the monitoring system into the quality control activities during quality evaluation of and OCV component.

Because of confidentiality issues, processing methods will not be detailed.

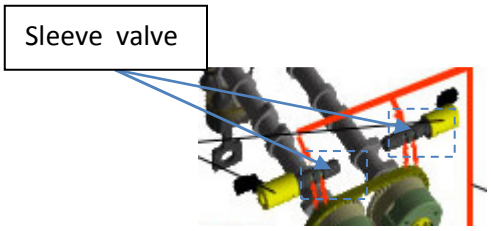


Figure 24 Sleeve Valves

Usually Sleeve Valves, see figure 24, are evaluated continuously as there are process or engineering changes over the time, to achieve this last, components need to be fabricated so that be evaluated functionally in the final assemblies and is necessary to make an evaluation for every process the components pass thru, finally at the end

a functional performance quality check is done on the complete assembly.

Next, the steps done during a process change evaluation in Sleeve Valves are presented.

Nemawashi is done prior to any event, every member of each department must be present when the final assembly is done in case any abnormality occurs, this is ***5Gen*** practice. After the assembly, once the part passed the quality check, the quality result of inspection depend on the quality engineer.

This time there is a changing point on this assembly event. The Real Time Monitorig System is being tested, usually as described in previous chapters, the quality engineer will take some time before handling the final result.

To see the performance report, all members go to the measurement control box located behind the line; the manual data loading is activated so that the last information is updated, see figure 25.

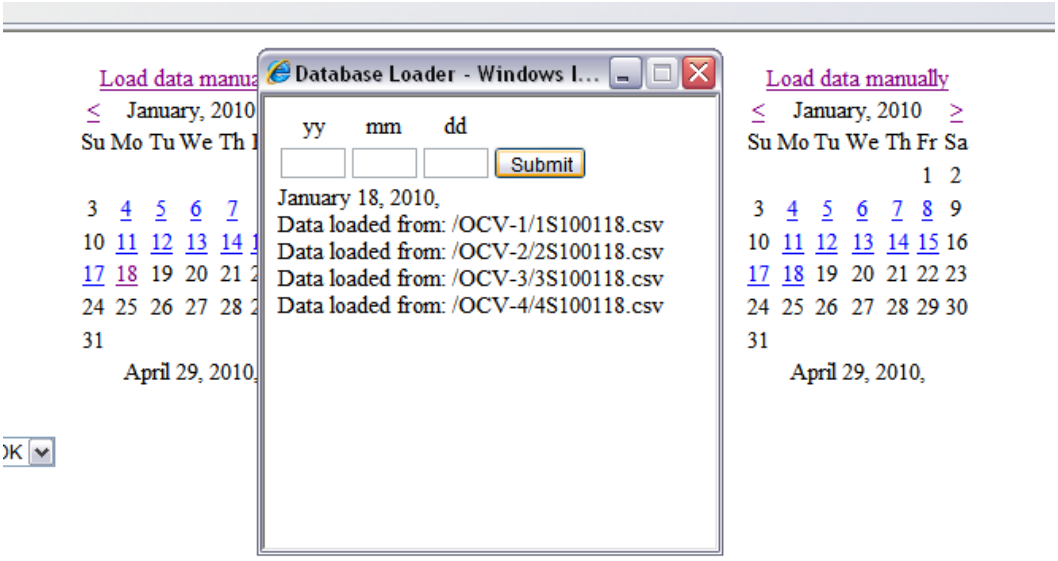


Figure 25 Load the data

As seen in figure 26 the event day had been selected on the calendar and 5010E option had been chosen since is an event of the model 5010. It can be seen that automatic statistics table show good results $Cpk \geq 1.67$, this means 0.57 ppm (parts per million) of out of spec products.

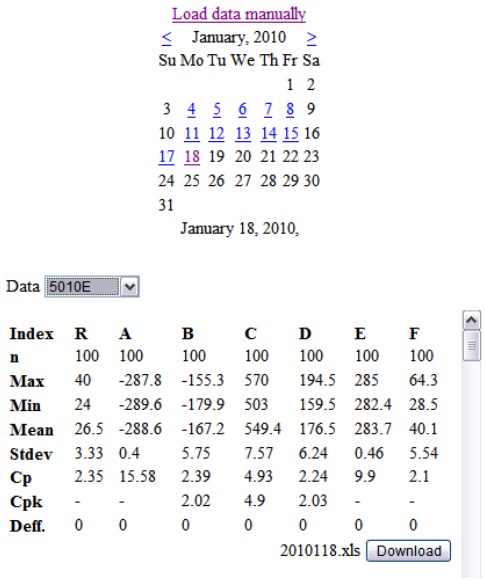


Figure 26 Select the data and see the result

A comparison needed to be made against the current normal production to see any effect on the process sample mean and sample variation that the changing point may have caused, hence the same production day and 5010 option is chosen. It can be appreciated in figure 27 that there is not significant changes, this last means no problem.

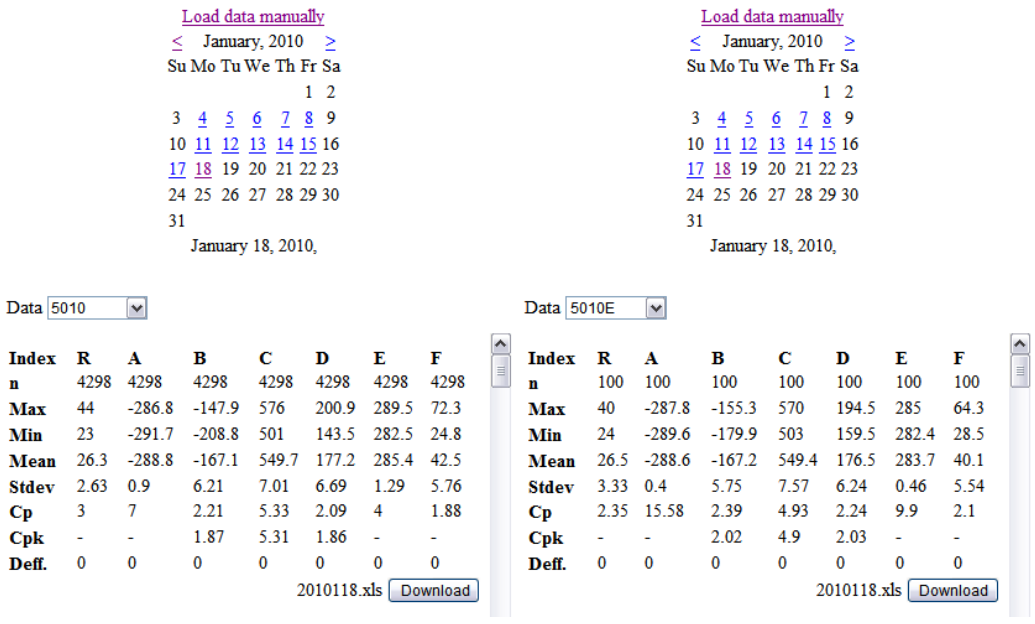


Figure 27 Compare the statistics

Comparisons by histograms assist in taking decisions. The figure 28 shows one characteristic that was compared.

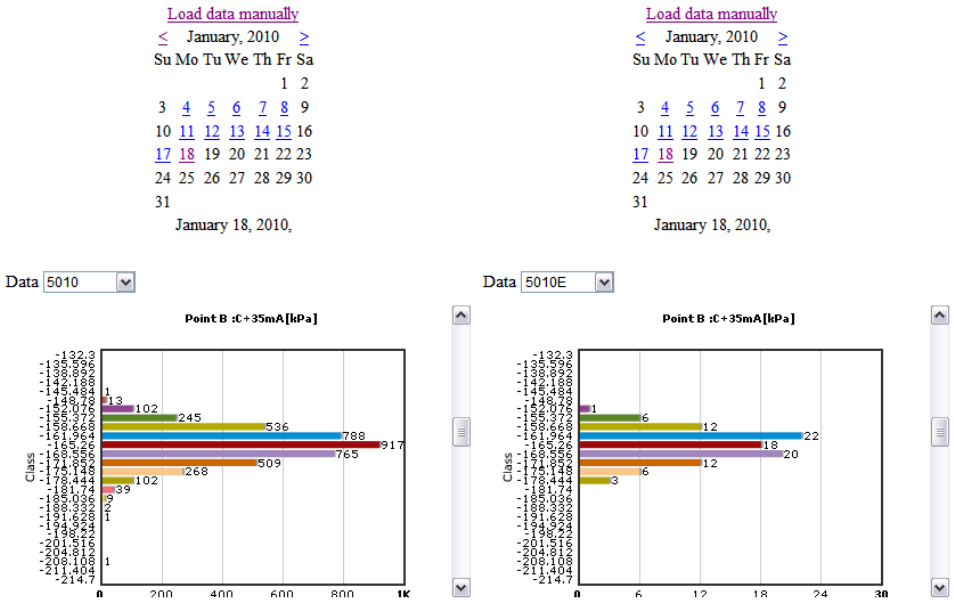


Figure 28 Check the process histograms

One day before had been compared in figure 29, again 5010 option was chosen. The result showed no problem.

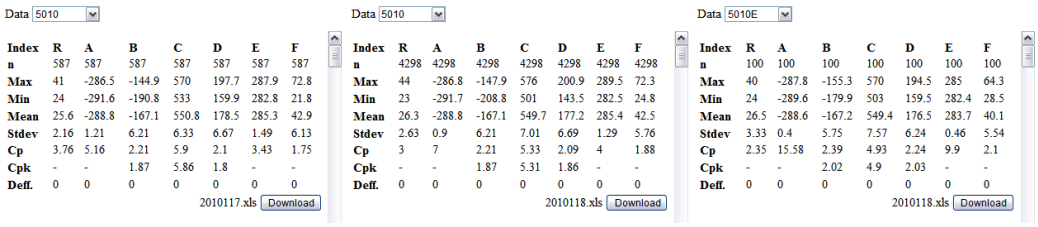


Figure 29 Make other comparisons

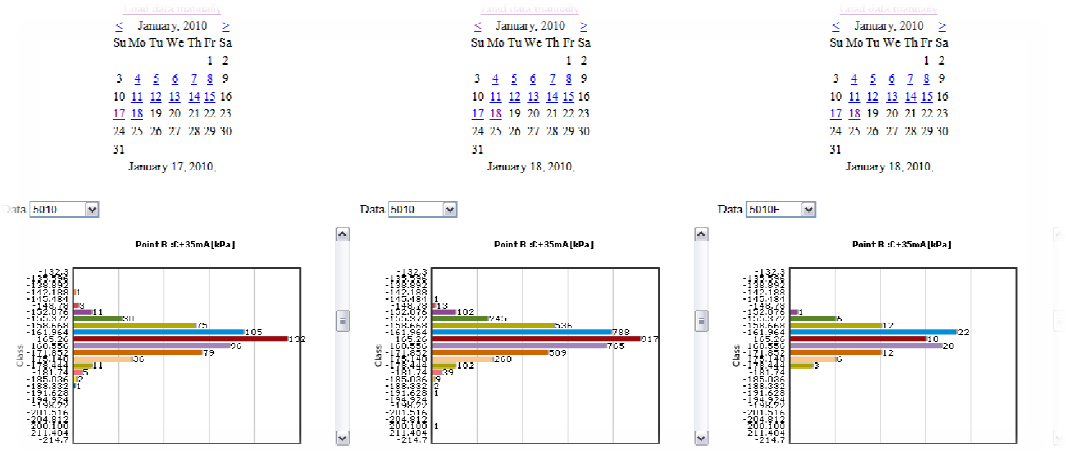


Figure 30 Plot all the histograms

To this point from the quality performance stand point the change can be validated for mass production.

All the last operations had been exhibited to all members that were present on the event.

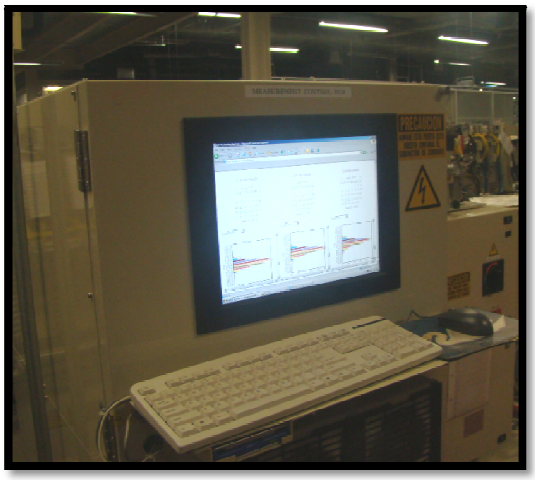


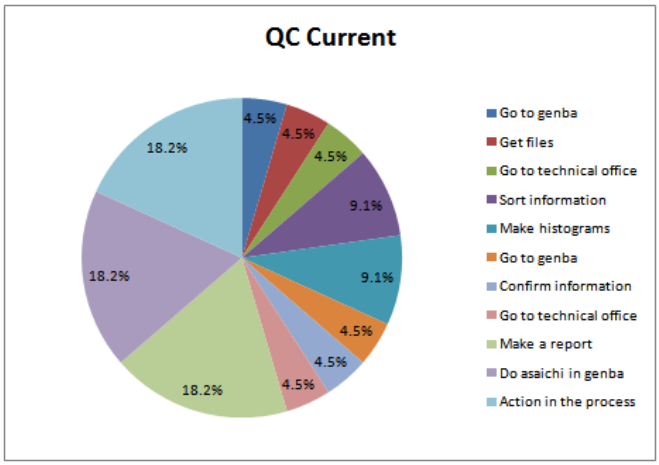
Figure 31 Measurement control box

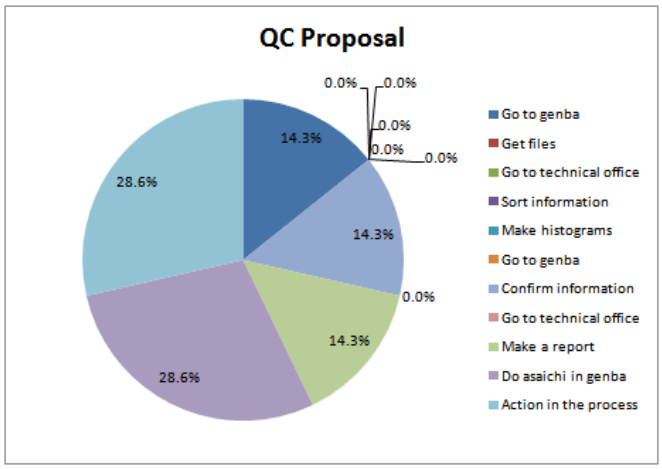
Next action consists on handle the report to the manager so that he/she takes the final decision.

Normally as described in Chapter 3, the time consumption in making a report that evaluates this change is quite high, in the previous

evaluation times decremented considerably as shown bellow, considering the new equation model, see equation 3.

Times had been reduced from $t_{TQC=}27.5$ hrs to $t_{T=}3.7$ hrs.





$t_{TQC=}27.5$ hrs $t_{T=}3.7$ hrs

Figure 32 QC times consumed proposal

It can be seen in Figure 32 that time consuming activities had been eliminated letting only the more important ones, making more efficient the PDCA cycle.

7 Chapter 7 Conclusions.

Web site programming can have a tremendous impact in productivity areas but there is a reluctant use of it.

5Gens is transcendental in finding solutions to complex problems in manufacturing.

The software creation applied to manufacturing processes in a company is a solution for a SME (Small and Medium-sized Enterprise) if what they are looking for is to increase it rapidness to control changes, taking decisions and investigating abnormalities in their processes, apply PDCA cycle.

A great company can hire more personal or put more hands to work to execute certain control and monitoring activities. This last is not commonly the best option for a SME.

An SME can innovate in their manufacturing processes integrating its machines and decision processes with the help of TCP/IP networking and web based open source information technologies and compete with the big companies that easily can pay more manpower in low man power wages countries, that in fact due to the rhythm of change and level of quality that the actual market demand, constantly the companies have some difficulties because the worker suffer from lack interest because of never ending task that add a little value at the end of the day.

The integration of a new way of work brings reluctance to the change and even more when not favorable results had been evident to everyone, more yet in a multicultural ambient where points of view are quite contrasting it is very important to get consensus in order to fully change the current ways of work. Change is also quite slow because all departments standpoints have to be validated, points like

training to the operators, job instructions sheets, check sheets, network security, maintenance plan and detail software documentation, also all this last accomplishing with external and internal audit rules.

The machine designer had its objective clear when building the robot machine, this was to guarantee the product performance measurement accomplishing with the cycle time requirement in addition to other important requirements like cost, reliability, durability, maintainability and machine performance but the most important aspect that made the project feasible was the fact that the product performance information is already available in a computer "Measurement Control Box" in a very common format ".csv" text file. This last approach of design machine standardization makes possible to apply the system to the rest of the production lines.

There is a potential administrative area that can be impacted in all the quality assurance activities by the use of information systems like the one presented on this project, which assist the SQC (Statistical Quality Control). These activities are the administration of process changes, engineering changes, new products, field returns, customer returns and warranties.

All the last activities are extremely important to accomplish the customer requirements but there are also many formats and forms required by the customer that the time to make documentation do not allow to fully accomplishing one the main objectives of the quality engineer which is to get to know the process.

There are two options for the engineer whether to make documentation or assure the quality of the product, ¿Why not both at the same time?. An administration system for all the types of

documents required by the different customers is the first step. Quality, starts by the ***5S***.

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9 Appendix

9.1 Tools

XAMPP : A free and open source cross-platform web server package, consisting mainly of the Apache HTTP Server, MySQL database, and interpreters for scripts written in the PHP and Perl programming languages.

phpMyAdmin: Is a free software tool written in PHP intended to handle the administration of MySQL. Over the World Wide Web, phpMyAdmin supports a wide range of operations with MySQL. The most frequently used operations are supported by the user interface (managing databases, tables, fields, relations, indexes, users, permissions, etc), while you still have the ability to directly execute any SQL statement.

Dreamweaver: Adobe® Dreamweaver® CS5 is software that empowers designers and developers to build standards-based websites with confidence. Design visually or directly in code, develop pages with content management systems, and accurately test browser compatibility.

Fusion Charts PHP class: This class helps to create animated and interactive Flash charts for web and desktop applications. It livens up applications by converting monotonous data into exciting visuals. FusionCharts can be integrated with web technologies like ASP, ASP.NET, PHP, JSP, ColdFusion, Ruby on Rails, Python or even simple HTML pages. It works with all databases including MS SQL, Oracle, MySQL, PostgreSQL, CSV or even legacy data storage.

10 Attachments

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```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "
http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml"><!-- InstanceBegin
template="/Templates/FrontEndMoSys.dwt.php" codeOutsideHTMLIsLocked="false" -->
<head>
<meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
<!-- InstanceBeginEditable name="doctitle" -->
<title>QA Monitoring System</title>
<!-- InstanceEndEditable -->
<!-- InstanceBeginEditable name="head" -->
<!-- InstanceEndEditable -->
</head>

<body>
<table width="100%" border="0">
  <tr>
    <td width="33.3%"><div align="center"><!-- InstanceBeginEditable name="Region01" -->
    <iframe name="calendar01" src="MoSys01.php" width=100% height=250 frameborder=0 scrolling=no
></iframe>
    <iframe name="calendar01_a" src="" width=100% height=40 frameborder=0 scrolling=auto
></iframe>
    <iframe name="calendar01_b" src="" width=100% height=270 frameborder=0 scrolling=auto
></iframe>
    <!-- InstanceEndEditable --></div></td>

    <td width="33.3%"><div align="center"><!-- InstanceBeginEditable name="Region02" -->
    <iframe name="calendar02" src="MoSys02.php" width=100% height=250 frameborder=0 scrolling=no
></iframe>
    <iframe name="calendar02_a" src="" width=100% height=40 frameborder=0 scrolling=auto
></iframe>
    <iframe name="calendar02_b" src="" width=100% height=270 frameborder=0 scrolling=auto
></iframe>
    <!-- InstanceEndEditable --></div></td>

    <td width="33.3%"><div align="center"><!-- InstanceBeginEditable name="Region03" -->
    <iframe name="calendar03" src="MoSys03.php" width=100% height=250 frameborder=0 scrolling=no
></iframe>
    <iframe name="calendar03_a" src="" width=100% height=40 frameborder=0 scrolling=auto
></iframe>
    <iframe name="calendar03_b" src="" width=100% height=270 frameborder=0 scrolling=auto
></iframe>
    <!-- InstanceEndEditable --></div></td>
  </tr>
</table>

</body>
<!-- InstanceEnd --></html>
```

```
<?php require_once('Functions/calendar.php'); ?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "
http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
<title>Untitled Document</title>
</head>

<body>

<table width="100%" border="0">
  <tr>
    <td><div align="center"><a href="dbload.php" target="_blank" onclick=
"window.open(this.href,'','height=300,width=300');return false;">Load data manually</a>
    </div>
      <form id="form1" name="form1" method="get" action="MoSys01_a.php" target="calendar01_a">
      <div align="center">
        <?php
        echo build_calendar($month,$year,$day,"MoSys01.php");
        if (isset($_GET['m2']) && isset($_GET['y2']) && isset($_GET['d2']))
                {
                    $month = $_GET['m2'];
                    $year = $_GET['y2'];
                    $day = $_GET['d2'];

                    $tabName=$year.$month.$day;
                    $forDate = mktime(0,0,0,$month,$day,$year);
                    echo date("F j, Y,", $forDate);
                }

            else
                {
                    $tabName=date("Ynj");
                    $year=date("Y");
                    $month=date("n");
                    $day=date("j");
                    $forDate = mktime(0,0,0,$month,$day,$year);
                    echo date("F j, Y,", $forDate);
                } ?>
        <input name="d2" type="hidden" id="hiddenField" value="<?php echo $day; ?>" />
        <input name="m2" type="hidden" id="hiddenField2" value="<?php echo $month; ?>" />
        <input name="y2" type="hidden" id="hiddenField3" value="<?php echo $year; ?>" />
        </div>
    </form>
    <script language="javascript">
    document.form1.submit()
    </script>
    <div align="center"></div></td>
  </tr>
</table>
</body>
</html>
```

```
<?php require_once('Connections/conn.php'); ?>

<?php
if (isset($_GET['m2']) && isset($_GET['y2']) && isset($_GET['d2']))
                {
                    $month = $_GET['m2'];
                    $year = $_GET['y2'];
                    $day = $_GET['d2'];

                    $tabName=$year.$month.$day;
                }
?>
<?php
mysql_select_db($database_conn, $conn);
$query_rsMenu = "SELECT * FROM perf_models";
$rsMenu = mysql_query($query_rsMenu, $conn) or die(mysql_error());
$row_rsMenu = mysql_fetch_assoc($rsMenu);
$totalRows_rsMenu = mysql_num_rows($rsMenu);
?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "
http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
<title>Untitled Document</title>
</head>
<body>
<form id="form1" name="form1" method="" action="MoSys01_b.php" target="calendar01_b" >
  <label>Data
  <select name="Menu01" id="Menu01" onchange="submit(this.form)">
    <?php
do {
?>
    <option value="<?php echo $row_rsMenu['models_idKey']?>"<?php if (!(strcmp($row_rsMenu[
'models_idKey'], $row_rsMenu[''']))) {echo "selected=\"selected\"";} ?>><?php echo $row_rsMenu[
'models_Name']?></option>
    <?php
} while ($row_rsMenu = mysql_fetch_assoc($rsMenu));
  $rows = mysql_num_rows($rsMenu);
  if($rows > 0) {
      mysql_data_seek($rsMenu, 0);
      $row_rsMenu = mysql_fetch_assoc($rsMenu);
  }
?>
  </select>
  </label>
  <input name="m2" type="hidden" id="hiddenField" value="<?php echo $month; ?>" />
  <input name="y2" type="hidden" id="hiddenField2" value="<?php echo $year; ?>" />
  <input name="d2" type="hidden" id="hiddenField3" value="<?php echo $day; ?>" />
</form>
</body>
</html>
<?php
mysql_free_result($rsMenu);?>
```

```php
<?php require_once('Connections/conn.php');
      require_once('Functions/statistics.php');
      require_once('Functions/histogram.php');
      include('Class/FusionCharts_Gen.php');?>
<?php
if (isset($_GET['m2']) && isset($_GET['y2']) && isset($_GET['d2'])&& isset($_GET['Menu01']))
                {
                    $month = $_GET['m2'];
                    $year = $_GET['y2'];
                    $day = $_GET['d2'];
                    $colname_rsData = $_GET['Menu01'];

                    $tabName=$year.$month.$day;
                }
?>
<?php
mysql_select_db("db_performance", $conn);
$rsData = mysql_query("SELECT * FROM `$tabName` WHERE prf_ocv_temp_PartNo = '$colname_rsData'
ORDER BY prf_ocv_temp_idKey ASC", $conn);

$query_result = "SELECT prf_ocv_temp_T1, prf_ocv_temp_A, prf_ocv_temp_B, prf_ocv_temp_C,
prf_ocv_temp_D, prf_ocv_temp_E, prf_ocv_temp_F FROM `$tabName` WHERE prf_ocv_temp_PartNo = '
$colname_rsData'";
$result = mysql_query($query_result,$conn) or die ("No data available");
$row_result = mysql_fetch_assoc($result);

if (isset($_GET['totalRows_row_result'])) {
  $totalRows_row_result = $_GET['totalRows_row_result'];
} else {
  $all_row_result = mysql_query($query_result);
  $totalRows_row_result = mysql_num_rows($all_row_result);
}

                do
                        {
                        $R_data[]=$row_result['prf_ocv_temp_T1'];
                        $A_data[]=$row_result['prf_ocv_temp_A'];
                        $B_data[]=$row_result['prf_ocv_temp_B'];
                        $C_data[]=$row_result['prf_ocv_temp_C'];
                        $D_data[]=$row_result['prf_ocv_temp_D'];
                        $E_data[]=$row_result['prf_ocv_temp_E'];
                        $F_data[]=$row_result['prf_ocv_temp_F'];
                        }
                while($row_result = mysql_fetch_array($result));

//Specifications:
$R_USL=50; $R_LSL="";
$A_USL=-270; $A_LSL="";
$B_USL=-132.3; $B_LSL=-214.7;
$C_USL=662; $C_LSL=438;
$D_USL=214.5; $D_LSL=130.5;
$E_USL=""; $E_LSL=270;
$F_USL=75; $F_LSL="";
```

```
?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "
http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
<title>Untitled Document</title>
<script language='javascript' src='FusionCharts/FusionCharts.js'></script>
</head>
<body>

<?php /*Statistics table*/ if ($totalRows_row_result > 0) { // Show if recordset not empty ?>
<table width="100%" border="0">

                  <tr>
                 <td><strong> Index</strong></td>
                 <td><strong> R</strong></td>
                 <td><strong> A </strong></td>
                 <td><strong> B </strong></td>
                 <td><strong> C </strong></td>
                 <td><strong> D </strong></td>
                 <td><strong> E </strong></td>
                 <td><strong> F </strong></td>
                </tr>

                <td><strong>n</strong></td>
                <td><?php echo count($R_data);?> </td>
                <td><?php echo count($A_data);?> </td>
                <td><?php echo count($B_data);?> </td>
                <td><?php echo count($C_data);?> </td>
                <td><?php echo count($D_data);?> </td>
                <td><?php echo count($E_data);?> </td>
                <td><?php echo count($F_data);?> </td>
                </tr>

                 <tr>
                <td><strong>Max</strong></td>
                <td><?php echo round(max($R_data),3);?> </td>
                <td><?php echo round(max($A_data),3);?> </td>
                <td><?php echo round(max($B_data),3);?> </td>
                <td><?php echo round(max($C_data),3);?> </td>
                <td><?php echo round(max($D_data),3);?> </td>
                <td><?php echo round(max($E_data),3);?> </td>
                <td><?php echo round(max($F_data),3);?> </td>
                </tr>

                 <tr>
                <td><strong>Min</strong></td>
                <td><?php echo round(min($R_data),3);?> </td>
                <td><?php echo round(min($A_data),3);?> </td>
                <td><?php echo round(min($B_data),3);?> </td>
                <td><?php echo round(min($C_data),3);?> </td>
                <td><?php echo round(min($D_data),3);?> </td>
```

```
<td><?php echo round(min($E_data),3);?> </td>
<td><?php echo round(min($F_data),3);?> </td>
 </tr>

  <tr>
 <td><strong>Mean</strong></td>
 <td><?php echo round(mean($R_data),1);?> </td>
 <td><?php echo round(mean($A_data),1);?> </td>
 <td><?php echo round(mean($B_data),1);?> </td>
 <td><?php echo round(mean($C_data),1);?> </td>
 <td><?php echo round(mean($D_data),1);?> </td>
 <td><?php echo round(mean($E_data),1);?> </td>
 <td><?php echo round(mean($F_data),1);?> </td>
</tr>

 <tr>
<td><strong>Stdev</strong></td>
<td><?php echo  round(stdev($R_data),2);?> </td>
<td><?php echo  round(stdev($A_data),2);?> </td>
<td><?php echo  round(stdev($B_data),2);?> </td>
<td><?php echo  round(stdev($C_data),2);?> </td>
<td><?php echo  round(stdev($D_data),2);?> </td>
<td><?php echo  round(stdev($E_data),2);?> </td>
<td><?php echo  round(stdev($F_data),2);?> </td>
</tr>

 <tr>
<td><strong>Cp</strong></td>
<td><?php echo round(cp($R_data,$R_USL,$R_LSL),2);?> </td>
<td><?php echo round(cp($A_data,$A_USL,$A_LSL),2);?> </td>
<td><?php echo round(cp($B_data,$B_USL,$B_LSL),2);?> </td>
<td><?php echo round(cp($C_data,$C_USL,$C_LSL),2);?> </td>
<td><?php echo round(cp($D_data,$D_USL,$D_LSL),2);?> </td>
<td><?php echo round(cp($E_data,$E_USL,$E_LSL),2);?> </td>
<td><?php echo round(cp($F_data,$F_USL,$F_LSL),2);?> </td>
 </tr>

 <tr>
<td><strong>Cpk</strong></td>
<td><?php echo cpk($R_data,$R_USL,$R_LSL);?> </td>
<td><?php echo cpk($A_data,$A_USL,$A_LSL);?> </td>
<td><?php echo round(cpk($B_data,$B_USL,$B_LSL),2);?> </td>
<td><?php echo round(cpk($C_data,$C_USL,$C_LSL),2);?> </td>
<td><?php echo round(cpk($D_data,$D_USL,$D_LSL),2);?> </td>
<td><?php echo cpk($E_data,$E_USL,$E_LSL);?> </td>
<td><?php echo cpk($F_data,$F_USL,$F_LSL);?> </td>
</tr>

<tr>
<td><strong>Deff.</strong></td>
<td><?php echo p_defect($R_data,$R_USL,$R_LSL);?> </td>
<td><?php echo p_defect($A_data,$A_USL,$A_LSL);?> </td>
<td><?php echo p_defect($B_data,$B_USL,$B_LSL);?> </td>
<td><?php echo p_defect($C_data,$C_USL,$C_LSL);?> </td>
```

```
                <td><?php echo p_defect($D_data,$D_USL,$D_LSL);?> </td>
                <td><?php echo p_defect($E_data,$E_USL,$E_LSL);?> </td>
                <td><?php echo p_defect($F_data,$F_USL,$F_LSL);?> </td>
                </tr>
</table>

<?php $arrData_R = histoArray($R_data,25,"R",$R_USL,$R_LSL);
$arrData_A = histoArray($A_data,25,"A",$A_USL,$A_USL*(1.15));
$arrData_B=  histoArray($B_data,25,"B",$B_USL,$B_LSL);
$arrData_C = HistoArray($C_data,25,"C",$C_USL,$C_LSL);
$arrData_D=  histoArray($D_data,25,"D",$D_USL,$D_LSL);
$arrData_E=  histoArray($E_data,25,"E",$E_LSL*(1.15),$E_LSL);
$arrData_F=  histoArray($F_data,25,"F",$F_USL,$F_LSL);

  # Create Column3D chart Object
  $FC_R = new FusionCharts("Bar2D","380","290");
  $FC_A = new FusionCharts("Bar2D","380","290");
  $FC_B = new FusionCharts("Bar2D","380","290");
  $FC_C = new FusionCharts("Bar2D","380","290");
  $FC_D = new FusionCharts("Bar2D","380","290");
  $FC_E = new FusionCharts("Bar2D","380","290");
  $FC_F = new FusionCharts("Bar2D","380","290");

  # set the relative path of the swf file
  $FC_R->setSWFPath("FusionCharts/");
  $FC_A->setSWFPath("FusionCharts/");
  $FC_B->setSWFPath("FusionCharts/");
  $FC_C->setSWFPath("FusionCharts/");
  $FC_D->setSWFPath("FusionCharts/");
  $FC_E->setSWFPath("FusionCharts/");
  $FC_F->setSWFPath("FusionCharts/");

  # Set chart attributes
  $strParamR="caption=Point R
:1000mA[ms];xAxisName=Group;xAxisName=Class;decimalPrecision=0;formatNumberScale=1";
  $strParamA="caption=Point A
:0.1mA[kPa];xAxisName=Group;xAxisName=Class;decimalPrecision=0;formatNumberScale=1";
  $strParamB="caption=Point B
:C+35mA[kPa];xAxisName=Group;xAxisName=Class;decimalPrecision=0;formatNumberScale=1";
  $strParamC="caption=Point C
:P2-P3=0[mA];xAxisName=Group;xAxisName=Class;decimalPrecision=0;formatNumberScale=1";
  $strParamD="caption=Point D
:C-35mA[kPa];xAxisName=Group;xAxisName=Class;decimalPrecision=0;formatNumberScale=1";
  $strParamE="caption=Point E
:1000mA[kPa];xAxisName=Group;xAxisName=Class;decimalPrecision=0;formatNumberScale=1";
  $strParamF="caption=Point F
:hysteresis[kPa];xAxisName=Group;xAxisName=Class;decimalPrecision=0;formatNumberScale=1";

  $FC_R->setChartParams($strParamR);
  $FC_A->setChartParams($strParamA);
  $FC_B->setChartParams($strParamB);
  $FC_C->setChartParams($strParamC);
  $FC_D->setChartParams($strParamD);
  $FC_E->setChartParams($strParamE);
```

```
  $FC_F->setChartParams($strParamF);

  # add chart values and category names
  $FC_R->addChartDataFromArray($arrData_R);
  $FC_A->addChartDataFromArray($arrData_A);
  $FC_B->addChartDataFromArray($arrData_B);
  $FC_C->addChartDataFromArray($arrData_C);
  $FC_D->addChartDataFromArray($arrData_D);
  $FC_E->addChartDataFromArray($arrData_E);
  $FC_F->addChartDataFromArray($arrData_F);


?>

<form action="xlsExp.php" method="get" name="form2" target="_self" id="form2">
  <div align="right">
      <input name="m2" type="hidden" id="hiddenField4" value="<?php echo $month; ?>" />
      <input name="y2" type="hidden" id="hiddenField5" value="<?php echo $year; ?>" />
      <input name="d2" type="hidden" id="hiddenField6" value="<?php echo $day; ?>" />
      <input name="Menu01" type="hidden" id="hiddenField7" value="<?php echo $colname_rsData?>"
/>
      <?php /* Excel data export */ echo $tabName.".xls" ?>
      <input type="submit" name="Button02" id="Button02" value="Download" />
  </div>
</form>

  <?php
    # Render Chart
    $FC_R->renderChart();
    $FC_A->renderChart();
    $FC_B->renderChart();
    $FC_C->renderChart();
    $FC_D->renderChart();
    $FC_E->renderChart();
    $FC_F->renderChart();
  ?>

<?php }  else {// Show if recordset not empty
                echo "No data available";
} // Show message ?>


</body>
</html>
```

```php
<?php require_once('Connections/conn.php');

mysql_select_db("db_performance", $conn);

            function build_calendar($month,$year,$day,$cal_mon)
{
                /* Declaring the variables */
                $daysOfWeek = array('Su','Mo','Tu','We','Th','Fr','Sa');
                $firstDayOfMonth = mktime(0,0,0,$month,1,$year);
                $noDays = date('t',$firstDayOfMonth);
                $dateComponents = getdate($firstDayOfMonth);
                $dayOfWeek = $dateComponents['wday'];
                $monthName = date('F',mktime(0,0,0,$month,1,$year));
                global $_GET;

                $showtablequery_result  = mysql_query("SHOW TABLES FROM db_performance");

                while($showtablerow = mysql_fetch_array($showtablequery_result))
                        {
                        //echo $showtablerow[0]."<br />";
                        $dates[]=date($showtablerow[0]);
                        }

                        /*for ($i=0; $i<=count($dates)-1; $i++)
                         {
                        echo "The dates is ".$dates[$i]."<br />";
                        }*/

                /* Computing the previous month. */
                if($month == 1)
                    {
                    $mn=12;
                    $yn=$year-1;
                    }
                    else
                    {
                        $mn=$month-1;
                        $yn=$year;
                    }

                /* Computing the next month. */
                if($month == 12)
                    {
                        $mn2=1;
                        $yn2=$year+1;
                    }
                    else
                    {
                        $mn2=$month+1;
                        $yn2=$year;
                    }

                /* Calendar header: next and previous month links */
                $calendar = "<table>";
```

```
                $calendar .= "<tr><td><a href=$cal_mon?m=$mn&y=$yn&d=$day>&lt;</a></td>";
                $calendar .="<td colspan=5 align=center>$monthName, $year</td>";
                $calendar .="<td><a href=$cal_mon?m=$mn2&y=$yn2&d=$day>&gt;</a></td></tr>";
                $calendar .="<tr>";

                /* Calendar header: Display the days of the week */
                foreach($daysOfWeek as $day)
                        {
                            $calendar .= "<td>$day</td>";
                        }
                            $calendar .= "</tr>";
                            $calendar .= "<tr>";

            $currentDay = 1;


            /* Fill in the beginning of the calendar  body */
            if ($dayOfWeek > 0)
                  {
                      $calendar .= "<td  colspan='$dayOfWeek'> </td>";
                  }

            /* Generate the calendar body */
            while ($currentDay <= $noDays)
                  {
                      if ($dayOfWeek == 7)
                          {
                              $dayOfWeek = 0;
                              $calendar .= "</tr><tr>";
                          }

                      $date = $year.$month.$currentDay;
                      if (in_array($date,$dates))
                          {
                              $calendar .= "<td><a href='$cal_mon?m=$month&y=$year&d=
$currentDay
                              &m2=$month&y2=$year&d2=$currentDay'>$currentDay</a></td>";
                          }
                      else
                          {
                              $calendar .= "<td>$currentDay</td>";
                          }
                    $currentDay++;
                    $dayOfWeek++;
                     }

           /* Filling in the end of the calendar body */
           if ($dayOfWeek != 7)
                  {
                      $remainingDays = 7 - $dayOfWeek;
                      $calendar .= "<td colspan='$remainingDays'> </td>";
                  }

           $calendar .= "</table>";
```

```
            return $calendar;
}

            if (isset($_GET['m']) && isset($_GET['y']) && isset($_GET['d']))
                {
                    $month = $_GET['m'];
                    $year = $_GET['y'];
                    $day = $_GET['d'];
                }

            else
                {
                    $dateComponents = getdate();
                    $month = $dateComponents['mon'];
                    $year = $dateComponents['year'];
                    $day = $dateComponents['mday'];
                }
?>
```

```php
<?php
//DB conection
require('Connections/conn.php');
mysql_select_db("db_performance",$conn);

?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "
http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml" xmlns:wdg="http://ns.adobe.com/addt">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
<title>Database Loader</title>
</head>

<body>

<form id="form1" name="form1" method="get" action="dbload.php">
  <label></label>
  <table width="12%" border="0">
    <tr>
      <td><div align="center">yy</div></td>
      <td><div align="center">mm</div></td>
      <td><div align="center">dd</div></td>
      <td> </td>
    </tr>
    <tr>
      <td><input name="y3" type="text" id="y3" size="2" maxlength="2" /></td>
      <td><input name="m3" type="text" id="m3"" size="2" maxlength="2" /></td>
      <td><input name="d3" type="text" id="d3" size="2" maxlength="2" /></td>
      <td><input type="submit" name="Populate" id="Populate" value="Submit" /></td>
    </tr>
  </table>
  <?php

if (isset($_GET['m3']) && isset($_GET['y3']) && isset($_GET['d3']))

                {
                    $month = $_GET['m3'];
                    $year = $_GET['y3'];
                    $day = $_GET['d3'];

                            $forDate = mktime(0,0,0,$month,$day,$year);
                            $cDate=date("Ynj", $forDate);
                            $fDate=date("ymd", $forDate);
                            echo date("F j, Y,", $forDate)."<br />";
                }

                else

                {
                            $cDate=date("Ynj");//Date format for calendar.
                            $fDate=date("ymd");//Date format for file.
                            echo date("F j, Y,")."<br />";
                }
```

```
        for ($St=1; $St<=4; $St++)
          {
        //To define temporary table.
        $sql_table_temp = "CREATE TEMPORARY TABLE IF NOT EXISTS prf_ocv_temp (
          prf_ocv_temp_PartNo text NOT NULL,
          prf_ocv_temp_Time time NOT NULL,
          prf_ocv_temp_STNo int(11) NOT NULL,
          prf_ocv_temp_Judge text NOT NULL,
          prf_ocv_temp_T1 double NOT NULL,
          prf_ocv_temp_T2 double NOT NULL,
          prf_ocv_temp_A double NOT NULL,
          prf_ocv_temp_B double NOT NULL,
          prf_ocv_temp_C double NOT NULL,
          prf_ocv_temp_D double NOT NULL,
          prf_ocv_temp_E double NOT NULL,
          prf_ocv_temp_F double NOT NULL
        )ENGINE = MyISAM";

        //To create temporary table.
        mysql_query($sql_table_temp,$conn) or die("No data available");

        $fName=$St."S".$fDate;//File name.
        $fLoc="/OCV-".$St."/".$fName.".csv";//File location.

        //Load file (Only needed fields)
        mysql_query("LOAD DATA INFILE '$fLoc' INTO TABLE prf_ocv_temp  FIELDS TERMINATED BY ','"
,$conn) or die("Data could not be located");

        echo "Data loaded from: ".$fLoc."<br />";

        //Eliminate not neede field from the table.
        mysql_query("DELETE FROM prf_ocv_temp WHERE prf_ocv_temp_PartNo = 'PartNo'",$conn);

        //To eliminate empty response values.
        mysql_query("ALTER TABLE prf_ocv_temp DROP prf_ocv_temp_T2",$conn);

        //To fix values for row numbering.
        mysql_query("SET @@auto_increment_increment=4",$conn);
        mysql_query("SET @@auto_increment_offset=$St",$conn);

        //To create key field, numer and index the field.
        mysql_query("ALTER TABLE prf_ocv_temp ADD prf_ocv_temp_idKey INT( 10 ) NOT NULL
AUTO_INCREMENT FIRST,
        ADD PRIMARY KEY ( prf_ocv_temp_idKey ) ,
        ADD INDEX ( prf_ocv_temp_idKey ) ",$conn);

        //Judge formating
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_Judge='OK' WHERE
prf_ocv_temp_Judge='O K'",$conn);
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_Judge='NG' WHERE
prf_ocv_temp_Judge='N G'",$conn);

        //Masters encoding.
```

```
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_PartNo='1' WHERE
prf_ocv_temp_PartNo='777'",$conn);
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_PartNo='2' WHERE
prf_ocv_temp_PartNo='778'",$conn);

        //Part number encoding.
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_PartNo='3' WHERE
prf_ocv_temp_PartNo='501'",$conn);
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_PartNo='4' WHERE
prf_ocv_temp_PartNo='502'",$conn);
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_PartNo='5' WHERE
prf_ocv_temp_PartNo='500'",$conn);

        //Reinspections encoding.
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_PartNo='6' WHERE
prf_ocv_temp_PartNo='651'",$conn);
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_PartNo='7' WHERE
prf_ocv_temp_PartNo='652'",$conn);
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_PartNo='8' WHERE
prf_ocv_temp_PartNo='650'",$conn);

        //Events encoding.
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_PartNo='9' WHERE
prf_ocv_temp_PartNo='751'",$conn);
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_PartNo='10' WHERE
prf_ocv_temp_PartNo='752'",$conn);
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_PartNo='11' WHERE
prf_ocv_temp_PartNo='750'",$conn);

        //Create table with the correspondig archive name
        mysql_query("CREATE TABLE IF NOT EXISTS `$cDate` LIKE prf_ocv_temp",$conn);
        mysql_query("REPLACE `$cDate` SELECT * FROM prf_ocv_temp",$conn);


        //Eliminate temporal table
        mysql_query("DROP TABLE prf_ocv_temp",$conn);

          }
mysql_close($conn);
?>
</form>
</body>
</html>
```

```php
<?php
//DB conection
require('Connections/conn.php');
mysql_select_db("db_performance",$conn);

?>

  <?php

                            $cDate=date("Ynj");//Date format for calendar.
                            $fDate=date("ymd");//Date format for file.
                            echo date("F j, Y,")."<br />";

        for ($St=1; $St<=4; $St++)
          {
        //To define temporary table.
        $sql_table_temp = "CREATE TEMPORARY TABLE IF NOT EXISTS prf_ocv_temp (
          prf_ocv_temp_PartNo text NOT NULL,
          prf_ocv_temp_Time time NOT NULL,
          prf_ocv_temp_STNo int(11) NOT NULL,
          prf_ocv_temp_Judge text NOT NULL,
          prf_ocv_temp_T1 double NOT NULL,
          prf_ocv_temp_T2 double NOT NULL,
          prf_ocv_temp_A double NOT NULL,
          prf_ocv_temp_B double NOT NULL,
          prf_ocv_temp_C double NOT NULL,
          prf_ocv_temp_D double NOT NULL,
          prf_ocv_temp_E double NOT NULL,
          prf_ocv_temp_F double NOT NULL
        )ENGINE = MyISAM";

        //To create temporary table.
        mysql_query($sql_table_temp,$conn) or die("No data available");

        $fName=$St."S".$fDate;//File name.
        $fLoc="/OCV-".$St."/".$fName.".csv";//File location.

        //Load file (Only needed fields)
        mysql_query("LOAD DATA INFILE '$fLoc' INTO TABLE prf_ocv_temp  FIELDS TERMINATED BY ','"
,$conn) or die("Data could not be located");

        echo "Data loaded from: ".$fLoc."<br />";

        //Eliminate not neede field from the table.
        mysql_query("DELETE FROM prf_ocv_temp WHERE prf_ocv_temp_PartNo = 'PartNo'",$conn);

        //To eliminate empty response values.
        mysql_query("ALTER TABLE prf_ocv_temp DROP prf_ocv_temp_T2",$conn);

        //To fix values for row numbering.
        mysql_query("SET @@auto_increment_increment=4",$conn);
        mysql_query("SET @@auto_increment_offset=$St",$conn);

        //To create key field, numer and index the field.
```

```
        mysql_query("ALTER TABLE prf_ocv_temp ADD prf_ocv_temp_idKey INT( 10 ) NOT NULL
AUTO_INCREMENT FIRST,
        ADD PRIMARY KEY ( prf_ocv_temp_idKey ) ,
        ADD INDEX ( prf_ocv_temp_idKey ) ",$conn);

        //Judge formating.
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_Judge='OK' WHERE
prf_ocv_temp_Judge='O K'",$conn);
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_Judge='NG' WHERE
prf_ocv_temp_Judge='N G'",$conn);

        //Masters encoding.
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_PartNo='1' WHERE
prf_ocv_temp_PartNo='777'",$conn);
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_PartNo='2' WHERE
prf_ocv_temp_PartNo='778'",$conn);

        //Part number encoding.
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_PartNo='3' WHERE
prf_ocv_temp_PartNo='501'",$conn);
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_PartNo='4' WHERE
prf_ocv_temp_PartNo='502'",$conn);
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_PartNo='5' WHERE
prf_ocv_temp_PartNo='500'",$conn);

        //Reinspections encoding.
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_PartNo='6' WHERE
prf_ocv_temp_PartNo='651'",$conn);
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_PartNo='7' WHERE
prf_ocv_temp_PartNo='652'",$conn);
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_PartNo='8' WHERE
prf_ocv_temp_PartNo='650'",$conn);

        //Events encoding.
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_PartNo='9' WHERE
prf_ocv_temp_PartNo='751'",$conn);
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_PartNo='10' WHERE
prf_ocv_temp_PartNo='752'",$conn);
        mysql_query("UPDATE prf_ocv_temp SET prf_ocv_temp_PartNo='11' WHERE
prf_ocv_temp_PartNo='750'",$conn);

        //Create table with the correspondig archive name.
        mysql_query("CREATE TABLE IF NOT EXISTS `$cDate` LIKE prf_ocv_temp",$conn);
        mysql_query("REPLACE `$cDate` SELECT * FROM prf_ocv_temp",$conn);


        //Eliminate temporal table.
        mysql_query("DROP TABLE prf_ocv_temp",$conn);

          }
mysql_close($conn);
?>

<script type="text/javascript">self.close(); //To close window</script>
```

```php
<?php
function histoArray($values,$nbins,$title,$usl,$lsl)

{
        $n = count($values);
        $max = max($usl,$lsl);
        $min = min($usl,$lsl);

        $width = ($max- $min)/$nbins;
            //Calculating classes
                for ($i=0; $i < $nbins +1; $i++)
                {
            $plot_vals[$i][0] = ($max - $width * $i);
                }

            //Counting values
        sort($values);
        $tmp = ($nbins - 1);
        for ($i = 0; $i < $n; $i++) {
            for ($j = $tmp; $j >= 0; $j--) {
                if ($values[$i] <= $plot_vals[$j][0]) {
                    $plot_vals[$j][1]++;
                    break;
                }
            }
        }


                return $plot_vals;
}
```

```php
<?php
// Page: FusionCharts.php
// Author: InfoSoft Global (P) Ltd.
// This page contains functions that can be used to render FusionCharts.


// encodeDataURL function encodes the dataURL before it's served to FusionCharts.
// If you've parameters in your dataURL, you necessarily need to encode it.
// Param: $strDataURL - dataURL to be fed to chart
// Param: $addNoCacheStr - Whether to add aditional string to URL to disable caching of data
function encodeDataURL($strDataURL, $addNoCacheStr=false) {
    //Add the no-cache string if required
    if ($addNoCacheStr==true) {
        // We add ?FCCurrTime=xxyyzz
        // If the dataURL already contains a ?, we add &FCCurrTime=xxyyzz
        // We replace : with _, as FusionCharts cannot handle : in URLs
        if (strpos(strDataURL,"?")<>0)
            $strDataURL .= "&FCCurrTime=" . Date("H_i_s");
        else
            $strDataURL .= "?FCCurrTime=" . Date("H_i_s");
    }
    // URL Encode it
    return urlencode($strDataURL);
}


// datePart function converts MySQL database based on requested mask
// Param: $mask - what part of the date to return "m' for month,"d" for day, and "y" for year
// Param: $dateTimeStr - MySQL date/time format (yyyy-mm-dd HH:ii:ss)
function datePart($mask, $dateTimeStr) {
    @list($datePt, $timePt) = explode(" ", $dateTimeStr);
    $arDatePt = explode("-", $datePt);
    $dataStr = "";
    // Ensure we have 3 parameters for the date
    if (count($arDatePt) == 3) {
        list($year, $month, $day) = $arDatePt;
        // determine the request
        switch ($mask) {
        case "m": return (int)$month;
        case "d": return (int)$day;
        case "y": return (int)$year;
        }
        // default to mm/dd/yyyy
        return (trim($month . "/" . $day . "/" . $year));
    }
    return $dataStr;
}


// renderChart renders the JavaScript + HTML code required to embed a chart.
// This function assumes that you've already included the FusionCharts JavaScript class
// in your page.

// $chartSWF - SWF File Name (and Path) of the chart which you intend to plot
```

```
// $strURL - If you intend to use dataURL method for this chart, pass the URL as this
parameter. Else, set it to "" (in case of dataXML method)
// $strXML - If you intend to use dataXML method for this chart, pass the XML data as this
parameter. Else, set it to "" (in case of dataURL method)
// $chartId - Id for the chart, using which it will be recognized in the HTML page. Each chart
on the page needs to have a unique Id.
// $chartWidth - Intended width for the chart (in pixels)
// $chartHeight - Intended height for the chart (in pixels)
function renderChart($chartSWF, $strURL, $strXML, $chartId, $chartWidth, $chartHeight) {
    //First we create a new DIV for each chart. We specify the name of DIV as
"chartId"Div.
    //DIV names are case-sensitive.

    // The Steps in the script block below are:
    //
    //  1)In the DIV the text "Chart" is shown to users before the chart has started loading
    //    (if there is a lag in relaying SWF from server). This text is also shown to users
    //    who do not have Flash Player installed. You can configure it as per your needs.
    //
    //  2) The chart is rendered using FusionCharts Class. Each chart's instance (JavaScript) Id
    //     is named as chart_"chartId".
    //
    //  3) Check whether we've to provide data using dataXML method or dataURL method
    //     save the data for usage below
    if ($strXML=="")
        $tempData = "//Set the dataURL of the chart\n\t\tchart_$chartId.setDataURL(\"$strURL\")";
    else
        $tempData = "//Provide entire XML data using dataXML method\n\t\tchart_$chartId
.setDataXML(\"$strXML\")";

    // Set up necessary variables for the RENDERCAHRT
    $chartIdDiv = $chartId . "Div";

    // create a string for outputting by the caller
    $render_chart = <<<RENDERCHART
    <!-- START Script Block for Chart $chartId -->
    <div id="$chartIdDiv" align="center">
        Chart.
    </div>
    <script type="text/javascript">
        //Instantiate the Chart
        var chart_$chartId = new FusionCharts("$chartSWF", "$chartId", "$chartWidth", "
$chartHeight");
        $tempData
        //Finally, render the chart.
        chart_$chartId.render("$chartIdDiv");
    </script>
    <!-- END Script Block for Chart $chartId -->
RENDERCHART;

  return $render_chart;
}
```

```
//renderChartHTML function renders the HTML code for the JavaScript. This
//method does NOT embed the chart using JavaScript class. Instead, it uses
//direct HTML embedding. So, if you see the charts on IE 6 (or above), you'll
//see the "Click to activate..." message on the chart.
// $chartSWF - SWF File Name (and Path) of the chart which you intend to plot
// $strURL - If you intend to use dataURL method for this chart, pass the URL as this
parameter. Else, set it to "" (in case of dataXML method)
// $strXML - If you intend to use dataXML method for this chart, pass the XML data as this
parameter. Else, set it to "" (in case of dataURL method)
// $chartId - Id for the chart, using which it will be recognized in the HTML page. Each chart
on the page needs to have a unique Id.
// $chartWidth - Intended width for the chart (in pixels)
// $chartHeight - Intended height for the chart (in pixels)
function renderChartHTML($chartSWF, $strURL, $strXML, $chartId, $chartWidth, $chartHeight) {
    // Generate the FlashVars string based on whether dataURL has been provided
    // or dataXML.
    $strFlashVars = "&chartWidth=" . $chartWidth . "&chartHeight=" . $chartHeight ;
    if ($strXML=="")
        // DataURL Mode
        $strFlashVars .= "&dataURL=" . $strURL;
    else
        //DataXML Mode
        $strFlashVars .= "&dataXML=" . $strXML;

$HTML_chart = <<<HTMLCHART
    <!-- START Code Block for Chart $chartId -->
    <OBJECT classid="clsid:D27CDB6E-AE6D-11cf-96B8-444553540000"
codebase=http://download.macromedia.com/pub/shockwave/cabs/flash/swflash.cab#version=6,0,0,0"
width="$chartWidth" height="$chartHeight" id="$chartId">
        <param name="allowScriptAccess" value="always" />
        <param name="movie" value="$chartSWF"/>
        <param name="FlashVars" value="$strFlashVars" />
        <param name="quality" value="high" />
        <embed src="$chartSWF" FlashVars="$strFlashVars" quality="high" width="$chartWidth"
height="$chartHeight" name="$chartId" allowScriptAccess="always"
type="application/x-shockwave-flash" pluginspage="http://www.macromedia.com/go/getflashplayer" />
    </object>
    <!-- END Code Block for Chart $chartId -->
HTMLCHART;

  return $HTML_chart;
}

// boolToNum function converts boolean values to numeric (1/0)
function boolToNum($bVal) {
    return (($bVal==true) ? 1 : 0);
}

?>
```