



**STUDY & SUGGESTIONS ON IMPROVING DISPATCH AND ORDER
MANAGEMENT PROCESS WITH REFERENCE TO CRI PUMPS COIMBATORE**

A Project Report
Submitted By

GOKUL K
Reg. No 1120400031

Under the guidance of

Ms. A. Priya Dharshini
Assistant Professor

In partial fulfillment of the requirements
for the award of the degree
of

MASTER OF BUSINESS ADMINISTRATION

Kumaraguru College of Technology
(An autonomous institution affiliated to Anna University, Coimbatore)
Coimbatore - 641 047

September, 2012



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BONAFIDE CERTIFICATE

Certified that this project report titled "**Study & Suggestions on Improving Dispatch and Order Management Process with reference to CRI Pumps Coimbatore**" is the Bonafide work of **Mr.Gokul K, Reg.No: 1120400031** who carried out the project under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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Submitted for the Project Viva-Voce examination held on _____

Internal Examiner

External Examiner

DECLARATION

I hereby declare that this project report entitled "STUDY & SUGGESTIONS ON IMPROVING DISPATCH AND ORDER MANAGEMENT PROCESS WITH REFERENCE TO CRI PUMPS COIMBATORE" as has been undertaken for academic purpose submitted to Anna University in partial fulfillment of the requirements for the award of the degree of Master of Business Administration. The project report is the record of the original work done by me under the guidance of **Ms. A. PRIYA DHARSHINI**, Assistant Professor during the academic year 2012-2013.

I, also declare hereby, that the information given in this report is correct to best of my knowledge and belief.

Date:

Place: Coimbatore

Gokul K

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ABSTRACT

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ACKNOWLEDGEMENT

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I wish to express my deep sense of obligation to **Ms.A.Priya Dharshini**, Assistant Professor, guide for her intensive guidance throughout my project.

I like to extent my wish to our director **Dr. Vijila Kennedy** for her support and motivation which helps to go in right way.

I would like to thank **Mr.Shyam Sundar (HR)**, **Mr.Karthikeyan.V (OM & Despatch Dept)** and entire team of **CRI pumps** who helped me out by guiding and supported in finishing project successfully.

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Pumps are the vital elements in an enormous range of fluid handling applications & range from small household pumps to immense units utilized in the water, chemical and energy industries. Pump performance requirements and duties vary considerably in terms of material of construction, wide range of temperature, pressure, viscosity, density etc. Pumps are employed in almost all the industries.

Maintenance is important for production operations and for continuous improvement. Appropriate dispatching of the maintenance workforce to quickly respond to equipment failures and carry out preventive services can improve system productivity. The first-come-first-served policy is typically used in many manufacturing industries.

Here we present a priority-based dispatching policy, a dynamic bottleneck policy, based on the analysis of real-time data. In such a policy, priority is assigned to the bottleneck machine after a fixed time period, and the maintenance worker will service the high-priority machine (i.e. bottleneck machine) first when multiple service requests are received. It is shown by extensive simulation experiments that this policy can lead to a greater improvement in system throughput compared with the first-come-first-served policy.

To implement such a policy, the appropriate time period for data collection and the frequency for carrying out bottleneck analysis are investigated. In addition, a sensitivity study suggests that the results obtained are insensitive to machine downtime, efficiency, and reliability models.

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CHAPTER –1

1.1 OUTLINE OF THE PROJECT:

1.1.1 Industry Profile:

Growth in agriculture and industries is boosting the demand for pumps in India. Exports in the market have been growing steadily owing to the cost effectiveness that the Indian products offer for consumers abroad. Expanding infrastructure and a boosting economy is fueling growth in the overall market.

The applications of pumps are seen across sectors including agriculture, industries and domestic use. In agriculture, they are used for irrigation and supply water to farmlands. In industries, it is used to supply water, water management and desalination. In the domestic sector, pumps are generally used in residential households for supply of water. They have been traditionally present in the market with the centrifugal type dominating the market. Technology orientation and growing need of energy efficient techniques in industries will further fuel growth in the market and will help the players to reap the benefits of increased demand. India is also rapidly becoming a big exporter of pumps with changing technology in its products and the cost effectiveness that it exhibits. Rising urban infrastructure and households is definitely going to boost the overall demand of pumps in India.

The market overview provides market size and growth on the basis of volume. Market segmentation on the basis of types is given. The size and growth of the market on the basis of value has been added along with the product segmentation. The sectorial usage of pumps has been indicated showing the growth of the market of pumps with regards to each sector. Usage of pumps within the industrial sector has also been highlighted. It also includes data regarding import and export.

An analysis of the drivers explains the factors for growth of the industry including expanding infrastructure along with urbanization, growth in important sectors, high replacement market and rising usage of Electric Arc Furnace (EAF) in

steel making. The key challenges include threat from unorganized players, increase in raw material prices and low awareness amongst farmers. Key trends in the market have been analyzed which include large number of fairs and events, technology orientation and foreign companies operating in India.

The competition section provides an overview of the competitive landscape in the industry along with the domestic market and sector market segmentation of organized and unorganized players. It includes a detailed profile of the major players in the market including their financials.

1.1.2 Drivers of pump development

- 1. Industrial Revolution:** Pump industry had been fueled by the massive demands of the industrial revolution that built our modern society.
- 2. Post World War II Expansion:** In order to satisfy the pent-up demand that had gone unfulfilled in war years. Here the emphasis was on large, multistage electric utility boiler feed water pumps & oil-field injection & pipeline pumps.
- 3. Energy Crisis:** Energy crisis all over world led to lot of research & development work for developing energy efficient pumps & systems.
- 4. Environmental Challenges:** Curbing emissions was the paramount concern. This influence has led to better sealing of pumps including seal less, magnetically coupled chemical pumps. The ultimate product in this regard could be 'integral motor pump'.
- 5. Globalization:** The fluid engineering & other technical challenges are assumed to be solvable by the MNC who emphasize quality, productivity & faster delivery of the product in order to battle global market share. The apparently mature pump product has a lot of room for improvement. The technical improvements will continue to be necessary to maintain global competitiveness.

1.1.3 Applications of pumps

Various applications of pumps are listed below:

- **Transportation:** It is a prime function.
- **Circulation:** For homogenizing the temperature and/or composition of fluid.
- **Mixing:** Two or more streams can be connected at the suction of pump & mixing can be achieved.
- **Injecting:** High pressure can be developed by using pump and fluid can be injected in pipe or tank.
- **Metering:** Pumps can be used as metering device.
- **Pressure Reducing Device:** Rotary pumps can be used for reducing the pressure in polymers.
- **Agitator Pump:** Submersible pump keep the solids in suspension & prevent setting.
- **Vacuum Generation:** Liquid ring vacuum pumps are well known. Dry vacuum pumps are also developed.
- **Reactor:** When two liquids are to be reacted with very small residence time then pump can be used.
- **Cavitation Reactor:** When one liquid and another in vapor form are to be reacted, the principle of cavitation can be used.

Indian pump industry at present met the pump requirements of 95% of applications.

1.1.4 Some Recent Developments in Pumps

One supplier has developed dry industrial vacuum pump. They use claw technology with a built in roots mechanism & facilitate high speed evacuation down to an ultimate vacuum of 0.05 mbar. Peak pump capacity is 560 cubic m/hr. Despite high pumping capacity, manufacturer claims less energy consumption.

Another has developed vertical dual-screw dry running vacuum pump. It has an electric drive control integral with pump unit & can also be remotely controlled. It meets the stringent electrical, mechanical & instrumental safety standards of legislation. (Received award in 40th International Mech. Engg. Exhibition at BRNO in Czech Republic).

One foreign supplier has developed ultra-high pressure plunger pumps (Pressure: 2500 bar & flow 15 to 20 lit/min., Temp: 50°C) can be used for

1. Sensitive paint stripping from metal and concrete surfaces.
2. Surface preparation prior to painting & coating.
3. Cutting of metals, concrete, reinforced material.

Computational Fluid Dynamic studies are carried out by Cranfield University for:

- Flow prediction in pumps
- Three dimensional transonic flow simulations using a time marching scheme.
- Erosion studies during cavitation.

"SMART PUMPS": Depending on the changes in suction conditions and /or changes in the discharge requirement the pump should act accordingly by using "SMART SENSORS" which will be based on optical fibers.

High Efficiency Small Circulation Pumps: The conventional efficiency of small pumps is of the order of 5 to 10%. When these pumps are used as part of solar-auxiliary system, the efficiency of pump plays a vital role. The efficiencies of the

pump have improved dramatically (+80%) using permanent magnet motors & hydraulically optimized impellers.

One supplier has developed mechanical seal (for oil service at 660°F & water at 320°F) where cooling is achieved by using extended surfaces (fins), thus cooling water requirement is eliminated. Enterprise Asset Management (EAM) software applications reduce energy consumption & improve pump reliability by automatic monitoring of process pumps. Abroad, favorable experience of variable speed drive for power conservation in high HP equipment has led to development of micro drives.

1.2 OBJECTIVES OF THE STUDY

1.2.1 Primary Objective

- To study on Despatch and Order management process at CRI Pumps.
- To identify where to improve the process for better and efficient usage this helps the company to dispatch the materials to the branches as per the orders required.

1.2.2 Secondary Objective

To check the relative quality of orders and manage the sequence of despatching of orders on ordered date.

1.3 ORGANIZATION PROFILE

Company Name:	C.R.I. PUMPS (PVT) LIMITED
Business Type:	Trading Company
Product/Service:	Pumps
Year Established:	1961
Certifications:	ISO 9000/9001/9004/19011: 2000 ISO 14000/14001

The beginning of C.R.I., back in 1961, was a resolute attempt to produce a few irrigation equipment's using the limited facility of an in-house foundry. Now, after four eventful decades, the founder's dream has become a reality, a multi-winged organization that produces different varieties of pumps and motors that are engineered to perfection. What made the legendary growth possible is the flawlessly maintained value system of the company. The name C.R.I. itself encapsulates the company's ethos: "Commitment, Reliability, Innovation" and it has now become a household name associated with water lifting pumps – be it for agriculture, industry, domestic, mining or civil applications.

The CRI Pumps Private Ltd is a Multi-winged organization that produces different varieties of pumps and motors that are engineered to perfection. The name C.R.I. itself encapsulates the company's ethos: "Commitment, Reliability, Innovation" and it has now become a household name associated with water lifting pumps.

C.R.I. Pumps operates from 29 branches and more than 3000 dealers that cater to diverse customer profiles including agriculture, domestic users, industrial markets, mining, sewage & waste water and commercial applications. CRI also has

a presence across the globe and have won recognition for the superlative performances of its product categories.

CRI Pumps, part of the CRI group, set up by the late Mr. K Gopal in 1961 in Coimbatore (Tamil Nadu), commenced operations as small production unit manufacturing irrigation equipment. Over the years, the CRI group has expanded its operations and has established a position in the pumps industry by manufacturing pumps for the household and agricultural segments.

The group's main products are submersible and surface pumps, which contribute about 90 per cent to its turnover. The CRI group has 7 manufacturing units in Coimbatore, 32 sales outlets, and a network of about 3000 dealers across India. CRI Pumps has manufacturing capacity of 102,000 pumps per month.

CRI Pumps reported a Profit After Tax of Rs.347.2 million on net sales of Rs.7.24 billion for 2010-11, against a PAT of Rs.499.8 million on net sales of Rs.6.38 billion for 2009-10.

- 5 decades of engineering expertise
- ISO 9001 & 14001 accreditations
- Futuristic R&D wing employing top-of-the line hi-tech tools and software
- 1,50,000 Sq. Meters of covered area equipped with the latest machinery
- Production capacity exceeding one million pumps and motors per annum
- Fully mechanized and automated Foundry with state-of-the-art technology
- More than 1000 varieties of water lifting pumps & Motors to choose from wide range of products
- Wide range of Submersible pumps and motors in 3", 4", 6", 8" & 10" available with different materials of construction
- Products with international quality certifications like ISI, CE, UR & UL
- Winner of many prestigious awards for quality and excellence
- A Government of India recognized Export House

invest with foresight. We were so keen about this fact from our very beginning itself. Reason why our infrastructure can speak volumes on the future as well as the needs of present.

AWARDS AND RECOGNITION

WINNING WAYS

When you have a good thing going it is quite in the fitting of things that recognitions come our way. Several prestigious awards, which decorate our shelf, say it all. These rewards not only acknowledge our position as a leader in the water pump industry but also serve as reminders about what the customer expects from a winner. And we, as ever, have our ears perfectly tuned to customer expectations.

In recognition of its pioneering efforts and contribution to the cause of progress and quality the group has been honored with so many prestigious awards including:

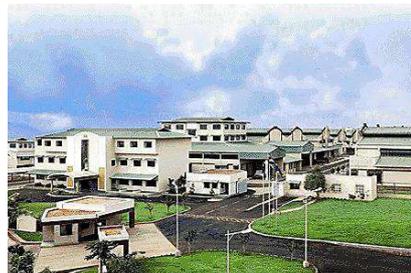
- Export Excellence Award – EEPCC,
- ITID Quality Excellence Award,
- Rajiv Gandhi National Quality Award,
- Vikas Rattan Award,
- Udyog Patra Award,
- Green Foundry Award.



The Company always keeps pace with the changing scenario and seldom fails in coming up with outstanding solutions every time. The unerring teamwork, which goes into the manufacture of every product, has brought in impeccable recognition for the company as well its products – worldwide.

INFRASTRUCTURE

The Infrastructure of C.R.I is pretty comprehensive with state-of-the-art machineries and a high potential R&D wing, all within its own covered area of 110,000 square meters. The production environment is accredited with ISO 9001 & 14001 Certification. The R&D team always stays in tune with the changing scenario and seldom fails in coming up with outstanding solutions every time.



CRI Company Infrastructure

Needless to say, behind this legendary growth lies the untiring, innovative, enthusiastic and dedicated team work. And, of course, a flawlessly maintained value system too. The name C.R.I itself encapsulates the company's ethos: "Commitment, Reliability, Innovation" Huge Investments on equipment's is something inevitable for any industry of our times. And the winners are those who

CORPORATE GOVERNANCE

C.R.I. Pumps bag Eden Gardens contract

- The manufacturer has installed nine hydro-pneumatic systems to meet the water requirement of Eden Gardens right from sanitation to drinking.
- The system will fulfill the minimum demand of 1.4 lakh liter of water per hour at any point of time, said C.R.I
- It also provides for optimum utilization of the pumps, switching them on and off as per needed and thus cutting down energy costs by up to 40 percent, said the company.

1.4 SCOPE OF THE STUDY

This project provides an opportunity to identify the improvements of scanners facilities where as storage and speed of transferring information's to scanner will be improves and also can limits the mismatch of products. And the alerts placing will helps users to identify specific place where and what field have to change.

CHAPTER 2

REVIEW OF LITERATURE

WARREN B. POWELL, ARUN MARAR, JACK GELFAND, STEVE BOWERS¹

Online models for real-time operations planning face a host of implementation issues that do not arise in more strategic arenas. We use the seemingly simple problem of assigning drivers to loads in the truckload motor carrier industry as an instance to study the issues that arise in the process of implementing a real-time dispatch system. Although the project was moderately successful, our focus is not on documenting the benefits, but rather on summarizing the challenges that arose. The most significant theme running through the implementation hurdles we encountered was the lack of information available to the model. Computers are very good at processing vast quantities of information; humans are very good at challenging the information that is in the computer and augmenting computer-provided data with head knowledge. Our study includes a careful comparison of actual decisions with model recommendations, using a six-month database of actual transactions. This comparison is the first we have seen of its kind and provides the most rigorous evaluation of an online dispatch model that we have seen. Although the model was well used, the results demonstrate that significant improvements could have been obtained if the level of model utilization had been even higher.

¹WARREN B. POWELL, ARUN MARAR, JACK GELFAND, STEVE BOWERS: Implementing Real-Time Optimization Models: A Case Application From The E Motor Carrier Industry. Subject classifications: Transportation: model implementation issues. Area of review: Transportation. Vol. 50, No. 4, July–August 2002, pp. 571–58

THOMAS F. GATTIKER, DALE L. GOODHUE³ A model of the organizational impacts of enterprise resource planning (ERP) systems once the system has gone live and the "shake-out". Organizational information processing theory states that performance is influenced by the level of fit between information processing mechanisms and organizational context. Two important elements of this context are interdependence and differentiation among sub-units of the organization. Because ERP systems include data and process integration, the theory suggests that ERP will be a relatively better fit when interdependence is high and differentiation is low. ERP customization and the amount of time since ERP implementation are also included in the model

HAI-YING WANGA, DA-CHENG LIUA*, TAO XINGAB AND LI ZHENG⁴ A three-echelon, dynamic lot-sizing model is presented for computing the parameters of a serial supply chain, which consists of integrated material replenishment, production at a capacity constraint, and outbound dispatching with a periodic delivery policy. The model is applicable in the general context of a three-echelon model with capacity constraint at the middle echelon of the serial supply chain which was not considered in most of the literature. It addresses a number of structural properties of the model and proposes a polynomial-time algorithm for deriving the optimal solution of minimizing the total system costs over the planning horizon.

³THOMAS F. GATTIKER, DALE L. GOODHUE: What Happens After ERP Implementation: Understanding The Impact Of Inter- Dependence And Differentiation On Plant-Level Outcomes. Vol. 29 No. 3, pp. 559-585/September 2005

⁴HAI-YING WANGA, DA-CHENG LIUA*, TAO XINGAB AND LI ZHENG. A Dynamic Model for Serial Supply Chain with Periodic Delivery Policy. Vol. 48, No. 3, 1 February 2010, 821–834.

J.C. CHENy*, C.-W.CHENy, C.-Y.TAlz and J.C.TYAN² A dynamic state-dependent dispatching (DSDD) heuristic for a wafer fabrication plant is presented. The DSDD heuristic dynamically uses different dispatching rules according to the state of a production system. Rather than developing new rules, the DSDD heuristic combines and modifies existing rules. This heuristic first classifies workstations into dynamic bottlenecks and non-dynamic bottlenecks. Dynamic bottleneck workstations apply a revised two-boundary dispatching rule when their queue length exceeds the average obtained from simulation using constant lot-release policy and first-in, first-out dispatching rule. Otherwise, the shortest expected processing time until next visit dispatching rule is used. A revised FGCA (FGCA β) dispatching rule is used for all non-dynamic bottlenecks workstations. Simulation results demonstrate that the DSDD heuristic obtains the best performance among the compared six dispatching rules in terms of average and standard deviation of cycle time and work-in-process.

²J.C. CHENy*, C.-W.CHENy, C.-Y.TAlz and J.C.TYAN, Dynamic state-dependent dispatching for wafer fabrication. Vol. 42, no. 21, 4547–4562

JIPYO KIM* SEOUL NATIONAL UNIVERSITY OF TECHNOLOGY, KOREA.⁵

Although enterprise resource planning (ERP) has been widely adopted since its first appearance in the early 1990s, there is a lack of research regarding ERP investment justification and performance evaluation. In this paper, based on an activity-based costing (ABC) analysis, we propose a framework to quantify the cost savings that the implementation of an ERP system should achieve in order to make the investment justifiable. Exploiting the ability of ABC to trace costs to activities and products, ERP resource costs and activities are identified and the cost structure of products is analyzed. It is also shown that the ABC approach can enhance the visibility of business processes with various activities and cost drivers and provide information about actions to be taken to raise profits by cost savings or increased revenues. Finally, a numerical example is used to demonstrate how an ERP system is utilized on activities and how it affects the cost of products. An extensive analysis follows to address how the results can be used to direct process improvement toward corporate goals.

⁵JIPYO KIM* SEOUL NATIONAL UNIVERSITY OF TECHNOLOGY, KOREA, Activity-Based Framework for Cost Savings Through The Implementation Of An ERP System. Vol. 47, No. 7, 1 April 2009, 1913–1929

HYUN JOON SHINA* AND YONG HA KANGB⁶. Development of a scheduling methodology for module processing in thin film transistor liquid crystal display (TFT-LCD) manufacturing. The problem is a parallel machine scheduling problem with rework probabilities, sequence-dependent setup times and due dates. It is assumed that rework probability for each job on a machine can be given through historical data acquisition. The dispatching algorithm named GRPD (greedy rework probability with due-dates) is proposed in this paper focusing on the rework processes. The performance of GRPD is measured by the six diagnostic indicators. A large number of test problems are randomly generated to evaluate the performance of the proposed algorithm.

Rochak Langer, Jingshan Lia*, Stephan Billerb, Qing Changb, Ningjian Huangb and Guoxian Xiaob⁷ Maintenance is important for production operations and for continuous improvement. Appropriate dispatching of the maintenance workforce to quickly respond to equipment failures and carry out preventive services can improve system productivity. The first-come-first-served policy is typically used in many manufacturing industries. A priority-based dispatching policy, a dynamic bottleneck policy, based on the analysis of real-time data. In such a policy, priority is assigned to the bottleneck machine after a fixed time period, and the maintenance worker will service the high-priority machine (i.e. bottleneck machine) first when multiple service requests are received.

⁶HYUN JOON SHINA* AND YONG HA KANGB. A Rework-based dispatching algorithm for module process in TFT-LCD manufacture. Vol. 48, No. 3, 1 February 2010, 915–931

⁷ROCHAK LANGERA, JINGSHAN LIA*, STEPHAN BILLERB, QING CHANGB, NINGJIAN HUANGB AND GUOXIAN XIAOB. Simulation study of a bottleneck-based dispatching policy for a maintenance workforce. Vol. 48, No. 6, 15 March 2010, 1745–1763

AHMED EL-BOURIA* AND SUBRAHMANYA NAIRY⁸ Scheduling in a dynamic flow shop that receives jobs at random and unforeseen points in time has traditionally been done by using dispatching rules. This study compares the performances of leading dispatching rules with a cooperative dispatching approach, for the objective of minimizing mean flow time in a flow shop, in which the buffers that hold in-process jobs between machines have finite capacities. Cooperative dispatching employs a consultative and consensus-seeking methodology for deciding which job to dispatch next on a machine. Computational experiments using randomly generated test problems for three different utilization (congestion) levels are carried out for 5- and 10-machine flow shops, under a wide range of buffer capacities. The results highlight the sensitivity of some of the popular dispatching rules to buffer size. In contrast, cooperative dispatching emerges as a robust method that performs consistently well across the range of buffer sizes and machine utilizations tested. The reductions in mean flow time obtained by cooperative dispatching, in comparison to the other dispatching rules, are particularly large in flow shops that operate with very tight buffer capacities and elevated levels of congestion.

⁸AHMED EL-BOURIA* AND SUBRAHMANYA NAIRY. An Investigation of Cooperative Dispatching For Minimising Mean Flowtime in a Finite-Buffer-Capacity Dynamic Flowshop. Vol. 49, No. 6, 15 March 2011, 1785–1800

Craig Schlenoff, Amy Knutilla, and Steven Ray⁹ A wide range of applications deal with the manipulation and expression of collections of activities. Examples include project management, workflow management, business process reengineering, product realization process modeling, manufacturing process planning, production scheduling, simulation, and Computer Aided Software Engineering, each of which is supported by some combination of graphical programming and control languages, Petri nets, PERT charts or other representation methodology. Each of these applications serves a specific audience and need, and focuses on particular aspects of a process. Nevertheless, much could be gained by sharing information among applications. One of the primary obstacles to such integration is the lack of any common representation of what is really the common underlying concept of process. The objective of the work described here is an investigation of the feasibility of a unifying specification of process which is applicable to all of the above applications, yet powerful and robust enough to meet each set of requirements. This document represents the results of the first phase of the work – that of researching the process representational requirements for design/manufacturing process life-cycle applications. These requirements are categorized into four categories; core, outer core, extensions, and application, which aided in describing the role of the requirements in the overall challenge of process representation.

⁹CRAIG SCHLENOFF, AMY KNUITILLA, STEVEN RAY. Unified Process Specification Language: Requirements for Modeling Process. NISTIR 5910

CHAPTER 3

ABOUT THE STUDY

3D Barcodes (Direct Part Marking or DPM)

In recent years manufacturing companies have been trying to implement a barcoding system similar to the barcodes for purchases and the retail industry. The only problem is that in manufacturing there are high temperatures, extremely solvents being used, as well as a wealth of chemicals and processes that inhibit the use of a label with bars on it. The manufacturers need to identify individual parts and not just the entire batch as it has been done for years. They wished to improve their inventory and tracking system - and have done so through the use of 3D barcodes.



3D Barcode Scanner Device

3D barcodes use the same basic principle as linear and 2D barcodes. An image of some sort is applied to a product and then read by a device to log, categorize, inventory, or track an individual product. As previously stated, the manufacturers need a more permanent solution than a label or sticker. The 3D barcode is engraved or applied to the product itself as a part of the manufacturing process. The bars are not read by variances in reflected light as with linear

barcodes but by determining the height of each line. The time it takes the laser to bounce back and be recorded determines the height as a function of distance and time and the character represented by the code can be interpreted.

The 3D barcodes are embossed on the product and the scanner recognizes new characters in the string by the lower regions of the code. This works in much the same way as the white lines or spaces in linear barcodes. The gap allows the system to record a new height of a line, and thus a new number or alpha character. The 3D barcodes also make it nearly impossible to alter or obstruct the barcode's information and results in fewer inventory mistakes and in turn lowers operating costs of a manufacturing process. The code can be part of the manufacturing process or applied after with a press.

A direct part mark (DPM) barcode reader for 3D barcodes captures the reflected image after passing a laser over it; the same laser technology used in home digital or office scanners for documents and images. Once the data has been recorded it is digitized and a digital processing unit is employed to interpret the image. Since the system works on height variances the addition of color or paint has no effect on the end result, especially since manufacturers are extremely precise with the application of paint in regards to the thickness of the coat which could, but does not, affect the height of the 3D barcode.

The scanners of 3D barcode technology can be found in hand held versions as well as integrated into assembly lines as part of the process. They can be used to track a part on the line to assess efficiency of the production process, or to account for the number of man hours needed to create a single part. This can help reduce underpricing products and save the company on production costs. The 3D barcodes can, of course, still be used as an inventory system and for purchases. The parts in question are each scanned before being placed on a truck or train and can then be verified when delivered. The 3D barcodes will become more prevalent

production process and even to figure out how much time is needed to create parts. 3D barcodes are being used in inventory and for purchases. In time 3D barcodes will drastically boost the savings for manufacturers.



3D Barcode Printer

"Bar code technology saves ... loads of money in the long and short term and provides ... computer data that's both accurate and timely beyond expectations ... [and] a field known as AIDC or "Automated Identification and Data Collection [can] eliminate relatively-ancient forms of data collection like writing on paper (1,000 years old) and keyboarding (100+ years old) and replace them with computerized and automated strategies" (<http://www.aurorabarcodes.com/> Retrieved, Nov 21, 2006).

An item's bar code and corresponding information (price, description, etc.) is stored in the company's computer. When the bar code is scanned the details saved to that bar code are retrieved by the point-of-sale terminal. These details will be condensed and printed on your receipt. The details of the sale are recorded in the computer for accounting, inventory counts and assists with management decision-making with respect to product lines (Williams & Sawyer, p. 267).

All about 3D Barcodes

These are not commonly seen in grocery stores or mall like 1D and 2D barcodes. Many manufacturing companies needed a barcoding system much like the UPC barcodes used in stores to track purchases and store product information.

in manufacturing in the coming years and will drastically affect the costs and savings of industrial manufacturing companies.

3D barcodes are also known as Bumpy Barcodes. 3D barcodes are actually one-dimensional barcodes that are embossed onto a surface, but not like a sticker 2D code. These are perfect for anything that a normal barcode label cannot stick to. They are also great for harsh environments. Like 2D barcodes, 3D barcodes are used for inventory, tracking, and categorization, with the only difference being that 3D barcodes are engraved or applied in some way to the product during manufacturing.



3D Barcode Scanner Device

3D barcodes are read by using the differences in height between the bars and spaces. This is a lot different from normal barcodes that are read by their contrast. 3D barcodes also help to prevent any alterations that may hinder the information within the barcode. This leads to fewer mistakes which will ultimately lower operating costs during manufacturing.

3D barcodes can be painted on and still be read without a problem. 3D barcodes are also useful in preventing mislabeling as they can be permanently fixed to a particular section of a part.

3D barcode scanners can be used during the manufacturing process or in hand held form. The scanners are necessary in order to track the efficiency of the

These manufacturing companies could not just use a regular barcode that is normally printed on paper or a sticker, because of the high temperatures, chemicals, and solvents that would easily destroy a barcode. To solve this problem they discovered a new way to track their parts in the manufacturing system by using 3D barcodes.

As explained earlier in the article on the difference in dimensions, three dimensional objects must have thickness and must be measurable on the x, y, and z-axis. Therefore a 3D barcode is usually engraved on a product or applied on a product so that the barcode has depth and thickness. Check out this picture of a 3D barcode. Unlike 1D and 2D barcodes, the bars in a 3D barcode are read by a scanner that reads the differences in the height of each line. Other types of barcodes are read by the variances in reflected light as the light scans the code. The 3D barcode scanner uses a laser that calculates the height of the barcodes lines based on the distance and time it takes for the laser to read it. As you can see from the different dimensions involved in different type of barcode making and the formula involved in reading 3D barcodes, there is a lot of basic physics knowledge involved in their creation and decoding. Once the scanner scans the 3D barcode the result read by the height of the lines is interpreted.

The labeling of parts with 3D barcodes is called direct part marketing or DPM. A direct part mark barcode reader contains a laser like the ones that are contained in home and office scanners that scan pictures or documents in a computer. DPM readers only read the height variances of the barcode; therefore there is no need to make the barcode black and white as most other barcodes are. Those types of scanners normally read the white space between the barcode lines to decode the barcode.



Sample 3D Bar Code

This is an interesting, but older article on 3D barcode technology being used to identify stolen valuables: <http://www.newscientist.com/article/dn7756-3d-barcode-to-identify-stolen-valuables.html>. It talks about placing microscopic 3D barcodes on valuable works of art, jewels, and other precious items, which can then identify them if they are even stolen.

Electron-beam lithography drills into the plastic face of the microscopic square which will be the future 3D code. The square can then be placed on an item using adhesive or woven onto items such as the canvas of paintings. I didn't find any information on whether or not this technology is currently being used for this purpose (the article was written in 2005), but it's definitely an interesting idea. I'm wondering if people could use 2D barcodes to keep track of certain valuables or even have them printed on their bank checks.

3D barcodes are actually very similar to 2D QR codes, since QR codes were first used to track vehicles in the manufacturing process in Japan. Now they are used in the US for marketing and customization purposes. I doubt 3D barcodes will ever move into the marketing arena, but it's interesting to know how they are used and what they are all about. When I first heard about 3D barcodes, I honestly pictured a QR code that was holographic; I was completely wrong. So while

the shapes are distorted so that when you have the glasses on, you perceive the movie as being in 3D. So how does this relate to barcodes? UPC barcodes are one dimensional since they contain information in one direction, horizontally. A 2D QR code can be read horizontally and vertically making it two dimensional.

probably stuck in the manufacturing industry, 3D barcodes show another way that barcodes have helped make life much easier for people.

Difference between 1D, 2D & 3D QR Code Dimensions

1-Dimensional

1-dimensional items can be most easily related to a line. Picture an x-y axis. The x-axis which is a line is one dimensional. Anything that stays within just the x-axis only has one dimension. If you were to draw one line in any direction on a sheet of paper, that would be a 1 dimensional line.

2-Dimensional

2-dimensional object consist of more than one line that exist on a plane. They have measurable dimensions when placed on an x-y axis. It must have no thickness to it. If you were to draw a rectangle, a circle, a triangle, or any other shape on a sheet of paper, this would be two dimensional.

3-Dimensional

If you've ever taken any type of physics class, you learned that everything your math teacher taught you about there being only an x-y axis is wrong. There is also a z-axis. If you were to draw an x-y axis with the x running horizontally, the y running vertically perpendicular to the x-axis, the z-axis when represented on paper runs through the middle of the intersection of the x-y axis. When drawn on paper, this is a 2D representation of the three dimensions. For example, when you draw a cube on a sheet of paper, this is still 2D, but it is a 3D representation, unlike a drawing of a square. 3D movies are labeled as 3 dimensional, but they are really just a 3D representation of a 2D object. Next time you go to see a 3D movie, take your 3D glasses off, and you can see that the picture on the screen is still 2D, but

Laser Barcode Reader/Scanner

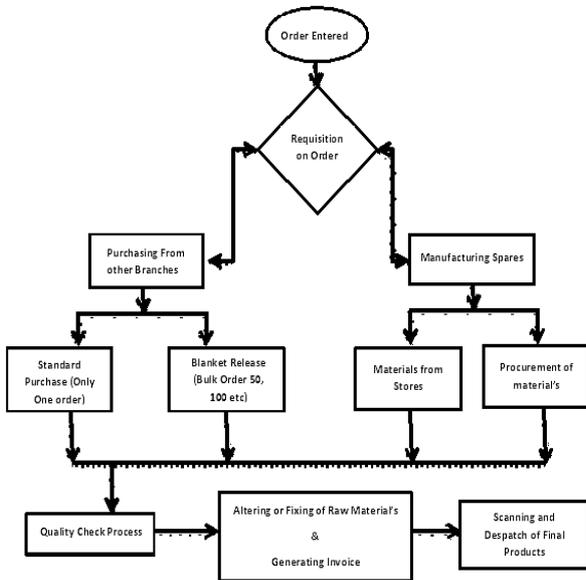
Definition

Laser Barcode Reader/Scanner is the most common type of Barcode Readers/Scanners. A laser Barcode Reader/Scanner need not be in contact with a barcode to read it. A standard range laser Barcode Reader/Scanner can read a barcode from about 6 to 24 inches away, and a long range Barcode Reader/Scanner can read one from perhaps 2 to 8 feet away. Certain extra long-range laser Barcode Readers/Scanners are capable of reading a barcode from up to 30 feet away, depending on the quality of the laser barcode scanners.

We are engaged in offering excellent quality barcode scanner reader offering flawless output. These are handheld barcode reader which can be availed at market leading prices.

**CHAPTER 4
PROCESS FLOW**

4.1 ORGANIZATION CHART



1. Entered → As per order entered materials inside company,
2. Booked as per the plan,
3. Awaiting Shipping Production planning,
4. Closed, Process (i.e.) finished goods,
5. Cancelled.

Planning order can be released as in two ways,

MPO → Monthly Planning Order, Booking in advance for next month,

NPO → Non Planning Order, not have any proper plan.

Before despatching the product invoice should be prepared, with the help of permit number which is get from the owners of vehicles and prepares the invoice form for those products.

Purchase Order:

In Purchase order the orders have to analyze whether it is Standard purchase or Blanket purchase release. The Standard purchase is that only one purchase order that is as per the daily market price and the Blanket release is releasing an agreement in an whole set as contract based like 100,500 sets etc... here the cost of whole set will be same until the orders are been cleared.

Production:

The Production process will be takes place as per the plan or schedule which is released by the OM and the production head. The production will takes place as the job materials that is issued from stores that is called as Job order.

Despatch operation:

The Despatch operation takes a two major process in which to despatch the final product.

**4.2 DIFFERENT PROCESS IN CRI PUMPS
(Get-in Get-out processes)**

There are different processes that are being taking place in CRI pumps for manufacturing different kind of pump sets as per the requirements of customers. The set of different process are,

- Order Management,
- Purchase order,
- Production,
- Despatch operation,
- Stores,
- Quality check department,
- Receiving materials,
- Accounts,
- Finance.

For online processing company using interfaces as Oracle 11i and OLTP for placing and receiving an orders to different branches of CRI.

Order Management (OM):

In Sales order (or) Order management the orders are processing through Online Transaction Processing system (OLTP) in which orders are placed by braches of CRI which is located in different places. As per plan visage the sequence of two processes will takes place inside the company as,

1. Sales order → Considered as Demand → Purchase Order Release → Raw Materials required
2. Bills of Materials (BOM)

As per the orders received from branches the requisition is been placed and finding either raw materials have to procure (or) purchase from other branches else to manufacture inside the company itself. Overall process of OM is,

1. Picking process → Sales order → Status Booked → Ready for Manufacturing.
2. Shipping Process → while orders are shipped the stocks will get minus from the stage locator.

Picking process takes place in 3ways,

- ✓ Rule thru (Selective process as per schedule),
- ✓ Launching (Directly available in stores),
- ✓ Transact move order (As per order procuring raw materials).

Packing Process will be the final process before dispatching the product. While packing checking and maintenance process will be taken place to ensure that products are good in condition. During packing process the serial numbers which is generated while preparing invoice for the product will be pasted in the outer shield of the pack. The serial numbers are scanned using scanner while dispatching the final product to vehicles. Materials get despatch as per First in First Out manner (FIFO). While scanning if some 50orders are to be despatch, if any number is missing there then whole set of order will be cancelled and sends back to checking department.

Stores:

In stores the raw materials are been stored as stocks and if any materials are taken for manufacturing automatically it minus from stocks.

Quality Check Department:

The Quality check department checks for any faults in the raw materials which are procured from other branches or manufactured inside the company. They choose random samples and check for defect if any defect found whole material been cancelled and send back to the braches.

CHAPTER 5

FINDINGS, SUGGESTION AND CONCLUSION

5.1 FINDINGS:

To create the barcode electron-beam lithography drills 90,000 small squares into the plastic coat of each face at five different depths. The position and depth of each square is unique, so data can be encrypted using a key-based code and stored digitally. The cube is scanned line by line using an electron force microscope, which can detect differences in the depth of the squares. This scanning process takes around a minute, says Alexander Cuenat, one of the team of researchers that developed the cube.

The technology has huge potential for storing information securely, says Cuenat. "You could get two copies of the bible, the King James version, on the sharp end of a pin."

However, in practice storing information on the provenance of an object would not require anything like this capacity.

The Nano barcode has three levels of security to protect objects against theft and counterfeit. First, thieves and fences are unlikely to realize that the item is protected. "You cannot see or feel the cube, even if you roll it between your finger and thumb," says Cuenat. Second, most fraudsters are unlikely to have the specialist equipment to read or write the Nano barcode, and so will be unable to duplicate it. And finally the encryption will be practically unbreakable.

speed up server or can change new server which gives much speed for the entire process including transferring of data to one department to another.

5.3 CONCLUSION:

As the result of analysis there is an issue which shows that there is no proper scanning system used in the company, as the suggestion if 3D barcode scanner is changed there should be a huge change happens and result of changing processor speeds eliminates the process time and setting alert messages gives a proper response to the users in the order management and despatch process. A manual updating of data to scanner into the automatic updating, while preparing Invoice the data can send and store in the storage of scanner process so that there is no need of putting data over scanners.

5.2 SUGGESTIONS:

SCANNING METHOD:

In CRI they are using regular Barcode scanner is used while dispatching the final products that orders are correctly sending to the correct branches or not, in that case suggestion in my own prediction is that can go for 3D barcode scanning process which supports large storage of details about products. These manufacturing companies could not just use a regular barcode that is normally printed on paper or a sticker, because of the high temperatures, chemicals, and solvents that would easily destroy a barcode. To solve this problem they discovered a new way to track their parts in the manufacturing system by using 3D barcodes.

And also can change a manual updating of data to scanner into the automatic updating (i.e.) while preparing Invoice itself the data can send and store in the storage of scanner process so that we no need to put data over scanners.

SETTING UP OF ALERTS:

After continuously analyzing the whole process which takes place in Order Management (OM) and Despatch process the suggestion is that to create/keeping alert messages which are to display to the user, so that if the same thing happens then user can identify it easily by seeing that alert. Like that alert identified is that while checking orders which is given by other branches while checking availability of raw materials or spares, if particular raw materials is not available then it shows only stock not available instead we can set and alert that no stocks available we can set from where it is available and where we can procure it (as like list out option).

TIME TAKING WHILE GENERATING INVOICE FOR THE MATERIALS:

After billing for the materials or finished products the Invoice will be generating but it takes much time for creating it, the suggestion for this is that can

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**STUDY & SUGGESTIONS ON IMPROVING DISPATCH AND ORDER
MANAGEMENT PROCESS WITH REFERENCE TO CRI PUMPS COIMBATORE**

A Project Report
Submitted By

GOKUL K
Reg. No 1120400031

Under the guidance of

Ms. A. Priya Dharshini
Assistant Professor

In partial fulfillment of the requirements
for the award of the degree
of

MASTER OF BUSINESS ADMINISTRATION

Kumaraguru College of Technology
(An autonomous institution affiliated to Anna University, Coimbatore)
Coimbatore - 641 047

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BONAFIDE CERTIFICATE

Certified that this project report titled “**Study & Suggestions on Improving Dispatch and Order Management Process with reference to CRI Pumps Coimbatore**” is the Bonafide work of **Mr.Gokul K, Reg.No: 1120400031** who carried out the project under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

Faculty Guide
A. Priya Dharshini
Assistant Professor
KCTBS

Director
Dr.Vijila Kennedy
KCTBS

Submitted for the Project Viva-Voce examination held on _____

Internal Examiner

External Examiner

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DECLARATION

I hereby declare that this project report entitled “**STUDY & SUGGESTIONS ON IMPROVING DISPATCH AND ORDER MANAGEMENT PROCESS WITH REFERENCE TO CRI PUMPS COIMBATORE**” as has been undertaken for academic purpose submitted to Anna University in partial fulfilment of the requirements for the award of the degree of Master of Business Administration. The project report is the record of the original work done by me under the guidance of **Ms. A. PRIYA DHARSHINI**, Assistant Professor during the academic year 2012-2013.

I, also declare hereby, that the information given in this report is correct to best of my knowledge and belief.

Date:

Place: Coimbatore

Gokul K

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ABSTRACT

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Pumps are the vital elements in an enormous range of fluid handling applications & range from small household pumps to immense units utilized in the water, chemical and energy industries. Pump performance requirements and duties vary considerably in terms of material of construction, wide range of temperature, pressure, viscosity, density etc. Pumps are employed in almost all the industries.

Maintenance is important for production operations and for continuous improvement. Appropriate dispatching of the maintenance workforce to quickly respond to equipment failures and carry out preventive services can improve system productivity. The first-come-first-served policy is typically used in many manufacturing industries.

Here we present a priority-based dispatching policy, a dynamic bottleneck policy, based on the analysis of real-time data. In such a policy, priority is assigned to the bottleneck machine after a fixed time period, and the maintenance worker will service the high-priority machine (i.e. bottleneck machine) first when multiple service requests are received. It is shown by extensive simulation experiments that this policy can lead to a greater improvement in system throughput compared with the first-come-first-served policy.

To implement such a policy, the appropriate time period for data collection and the frequency for carrying out bottleneck analysis are investigated. In addition, a sensitivity study suggests that the results obtained are insensitive to machine downtime, efficiency, and reliability models.

CHAPTER –1

1.1 OUTLINE OF THE PROJECT:

1.1.1 Industry Profile:

Growth in agriculture and industries is boosting the demand for pumps in India. Exports in the market have been growing steadily owing to the cost effectiveness that the Indian products offer for consumers abroad. Expanding infrastructure and a boosting economy is fueling growth in the overall market.

The applications of pumps are seen across sectors including agriculture, industries and domestic use. In agriculture, they are used for irrigation and supply water to farmlands. In industries, it is used to supply water, water management and desalination. In the domestic sector, pumps are generally used in residential households for supply of water. They have been traditionally present in the market with the centrifugal type dominating the market. Technology orientation and growing need of energy efficient techniques in industries will further fuel growth in the market and will help the players to reap the benefits of increased demand. India is also rapidly becoming a big exporter of pumps with changing technology in its products and the cost effectiveness that it exhibits. Rising urban infrastructure and households is definitely going to boost the overall demand of pumps in India.

The market overview provides market size and growth on the basis of volume. Market segmentation on the basis of types is given. The size and growth of the market on the basis of value has been added along with the product segmentation. The sectorial usage of pumps has been indicated showing the growth of the market of pumps with regards to each sector. Usage of pumps within the industrial sector has also been highlighted. It also includes data regarding import and export.

An analysis of the drivers explains the factors for growth of the industry including expanding infrastructure along with urbanization, growth in important sectors, high replacement market and rising usage of Electric Arc Furnace (EAF) in

steel making. The key challenges include threat from unorganized players, increase in raw material prices and low awareness amongst farmers. Key trends in the market have been analyzed which include large number of fairs and events, technology orientation and foreign companies operating in India.

The competition section provides an overview of the competitive landscape in the industry along with the domestic market and sector market segmentation of organized and unorganized players. It includes a detailed profile of the major players in the market including their financials.

1.1.2 Drivers of pump development

- Industrial Revolution:** Pump industry had been fueled by the massive demands of the industrial revolution that built our modern society.
- Post World War II Expansion:** In order to satisfy the pent-up demand that had gone unfulfilled in war years. Here the emphasis was on large, multistage electric utility boiler feed water pumps & oil-field injection & pipeline pumps.
- Energy Crisis:** Energy crisis all over world led to lot of research & development work for developing energy efficient pumps & systems.
- Environmental Challenges:** Curbing emissions was the paramount concern. This influence has led to better sealing of pumps including seal less, magnetically coupled chemical pumps. The ultimate product in this regard could be 'integral motor pump'.
- Globalization:** The fluid engineering & other technical challenges are assumed to be solvable by the MNC who emphasize quality, productivity & faster delivery of the product in order to battle global market share. The apparently mature pump product has a lot of room for improvement. The technical improvements will continue to be necessary to maintain global competitiveness.

1.1.3 Applications of pumps

Various applications of pumps are listed below:

- Transportation: It is a prime function.
- Circulation: For homogenizing the temperature and/or composition of fluid.
- Mixing: Two or more streams can be connected at the suction of pump & mixing can be achieved.
- Injecting: High pressure can be developed by using pump and fluid can be injected in pipe or tank.
- Metering: Pumps can be used as metering device.
- Pressure Reducing Device: Rotary pumps can be used for reducing the pressure in polymers.
- Agitator Pump: Submersible pump keep the solids in suspension & prevent setting.
- Vacuum Generation: Liquid ring vacuum pumps are well known. Dry vacuum pumps are also developed.
- Reactor: When two liquids are to be reacted with very small residence time then pump can be used.
- Cavitation Reactor: When one liquid and another in vapor form are to be reacted, the principle of cavitation can be used.

Indian pump industry at present met the pump requirements of 95% of applications.

1.1.4 Some Recent Developments in Pumps

One supplier has developed dry industrial vacuum pump. They use claw technology with a built in roots mechanism & facilitate high speed evacuation down to an ultimate vacuum of 0.05 mbar. Peak pump capacity is 560 cubic m/hr. Despite high pumping capacity, manufacturer claims less energy consumption.

Another has developed vertical dual-screw dry running vacuum pump. It has an electric drive control integral with pump unit & can also be remotely controlled. It meets the stringent electrical, mechanical & instrumentational safety standards of legislation. (Received award in 40th International Mech. Engg. Exhibition at BRNO in Czech Republic).

One foreign supplier has developed ultra-high pressure plunger pumps (Pressure: 2500 bar & flow 15 to 20 lit/min., Temp: 50°C) can be used for

1. Sensitive paint stripping from metal and concrete surfaces.
2. Surface preparation prior to painting & coating.
3. Cutting of metals, concrete, reinforced material.

Computational Fluid Dynamic studies are carried out by Cranfield University for:

- Flow prediction in pumps
- Three dimensional transonic flow simulations using a time marching scheme.
- Erosion studies during cavitation.

"SMART PUMPS": Depending on the changes in suction conditions and /or changes in the discharge requirement the pump should act accordingly by using "SMART SENSORS" which will be based on optical fibers.

High Efficiency Small Circulation Pumps: The conventional efficiency of small pumps is of the order of 5 to 10%. When these pumps are used as part of solar-auxiliary system, the efficiency of pump plays a vital role. The efficiencies of the

pump have improved dramatically (+80%) using permanent magnet motors & hydraulically optimized impellers.

One supplier has developed mechanical seal (for oil service at 660°F & water at 320°F) where cooling is achieved by using extended surfaces (fins), thus cooling water requirement is eliminated. Enterprise Asset Management (EAM) software applications reduce energy consumption & improve pump reliability by automatic monitoring of process pumps. Abroad, favorable experience of variable speed drive for power conservation in high HP equipment has led to development of micro drives.

1.2 OBJECTIVES OF THE STUDY

1.2.1 Primary Objective

- To study on Despatch and Order management process at CRI Pumps.
- To identify where to improve the process for better and efficient usage this helps the company to dispatch the materials to the branches as per the orders required.

1.2.2 Secondary Objective

To check the relative quality of orders and manage the sequence of despatching of orders on ordered date.

1.3 ORGANIZATION PROFILE

Company Name:	C.R.I. PUMPS (PVT) LIMITED
Business Type:	Trading Company
Product/Service:	Pumps
Year Established:	1961
Certifications:	ISO 9000/9001/9004/19011: 2000 ISO 14000/14001

The beginning of C.R.I., back in 1961, was a resolute attempt to produce a few irrigation equipment's using the limited facility of an in-house foundry. Now, after four eventful decades, the founder's dream has become a reality, a multi-winged organization that produces different varieties of pumps and motors that are engineered to perfection. What made the legendary growth possible is the flawlessly maintained value system of the company. The name C.R.I. itself encapsulates the company's ethos: "Commitment, Reliability, Innovation" and it has now become a household name associated with water lifting pumps – be it for agriculture, industry, domestic, mining or civil applications.

The C.R.I. Pumps Private Ltd is a Multi-winged organization that produces different varieties of pumps and motors that are engineered to perfection. The name C.R.I. itself encapsulates the company's ethos: "Commitment, Reliability, Innovation" and it has now become a household name associated with water lifting pumps.

C.R.I. Pumps operates from 29 branches and more than 3000 dealers that cater to diverse customer profiles including agriculture, domestic users, industrial markets, mining, sewage & waste water and commercial applications. CRI also has

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The Company always keeps pace with the changing scenario and seldom fails in coming up with outstanding solutions every time. The unerring teamwork, which goes into the manufacture of every product, has brought in impeccable recognition for the company as well its products – worldwide.

INFRASTRUCTURE

The Infrastructure of C.R.I. is pretty comprehensive with state-of-the-art machineries and a high potential R&D wing, all within its own covered area of 110,000 square meters. The production environment is accredited with ISO 9001 & 14001 Certification. The R&D team always stays in tune with the changing scenario and seldom fails in coming up with outstanding solutions every time.



CRI Company Infrastructure

Needless to say, behind this legendary growth lies the untiring, innovative, enthusiastic and dedicated team work. And, of course, a flawlessly maintained value system too. The name C.R.I. itself encapsulates the company's ethos: "Commitment, Reliability, Innovation" Huge Investments on equipment's is something inevitable for any industry of our times. And the winners are those who

a presence across the globe and have won recognition for the superlative performances of its product categories.

CRI Pumps, part of the CRI group, set up by the late Mr. K Gopal in 1961 in Coimbatore (Tamil Nadu), commenced operations as small production unit manufacturing irrigation equipment. Over the years, the CRI group has expanded its operations and has established a position in the pumps industry by manufacturing pumps for the household and agricultural segments.

The group's main products are submersible and surface pumps, which contribute about 90 per cent to its turnover. The CRI group has 7 manufacturing units in Coimbatore, 32 sales outlets, and a network of about 3000 dealers across India. CRI Pumps has manufacturing capacity of 102,000 pumps per month.

CRI Pumps reported a Profit After Tax of Rs.347.2 million on net sales of Rs.7.24 billion for 2010-11, against a PAT of Rs.499.8 million on net sales of Rs.6.38 billion for 2009-10.

- 5 decades of engineering expertise
- ISO 9001& 14001 accreditations
- Futuristic R&D wing employing top-of-the line hi-tech tools and software
- 1,50,000 Sq. Meters of covered area equipped with the latest machinery
- Production capacity exceeding one million pumps and motors per annum
- Fully mechanized and automated Foundry with state-of-the-art technology
- More than 1000 varieties of water lifting pumps & Motors to choose from wide range of products
- Wide range of Submersible pumps and motors in 3", 4", 6", 8" & 10" available with different materials of construction
- Products with international quality certifications like ISI, CE, UR & UL
- Winner of many prestigious awards for quality and excellence
- A Government of India recognized Export House

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invest with foresight. We were so keen about this fact from our very beginning itself. Reason why our infrastructure can speak volumes on the future as well as the needs of present.

AWARDS AND RECOGNITION

WINNING WAYS

When you have a good thing going it is quite in the fitting of things that recognitions come our way. Several prestigious awards, which decorate our shelf, say it all. These rewards not only acknowledge our position as a leader in the water pump industry but also serve as reminders about what the customer expects from a winner. And we, as ever, have our ears perfectly tuned to customer expectations.

In recognition of its pioneering efforts and contribution to the cause of progress and quality the group has been honored with so many prestigious awards including:

- Export Excellence Award – EEPCC,
- ITID Quality Excellence Award,
- Rajiv Gandhi National Quality Award,
- Vikas Rattan Award,
- Udyog Patra Award,
- Green Foundry Award.



CORPORATE GOVERNANCE

C.R.I. Pumps bag Eden Gardens contract

- The manufacturer has installed nine hydro-pneumatic systems to meet the water requirement of Eden Gardens right from sanitation to drinking.
- The system will fulfill the minimum demand of 1.4 lakh liter of water per hour at any point of time, said C.R.I
- It also provides for optimum utilization of the pumps, switching them on and off as per needed and thus cutting down energy costs by up to 40 percent, said the company.

1.4 SCOPE OF THE STUDY

This project provides an opportunity to identify the improvements of scanners facilities where as storage and speed of transferring information's to scanner will be improves and also can limits the mismatch of products. And the alerts placing will helps users to identify specific place where and what field have to change.

J.C. CHENy¹, C.-W.CHENy, C.-Y.TAlz and J.C.TYAN² A dynamic state-dependent dispatching (DSDD) heuristic for a wafer fabrication plant is presented. The DSDD heuristic dynamically uses different dispatching rules according to the state of a production system. Rather than developing new rules, the DSDD heuristic combines and modifies existing rules. This heuristic first classifies workstations into dynamic bottlenecks and non-dynamic bottlenecks. Dynamic bottleneck workstations apply a revised two-boundary dispatching rule when their queue length exceeds the average obtained from simulation using constant lot-release policy and first-in, first-out dispatching rule. Otherwise, the shortest expected processing time until next visit dispatching rule is used. A revised FGCA (FGCA_p) dispatching rule is used for all non-dynamic bottlenecks workstations. Simulation results demonstrate that the DSDD heuristic obtains the best performance among the compared six dispatching rules in terms of average and standard deviation of cycle time and work-in-process.

¹J.C. CHENy¹, C.-W.CHENy, C.-Y.TAlz and J.C.TYAN, Dynamic state-dependent dispatching for wafer fabrication. Vol. 42, no. 21, 4547–4562

CHAPTER 2

REVIEW OF LITERATURE

WARREN B. POWELL, ARUN MARAR, JACK GELFAND, STEVE BOWERS¹

Online models for real-time operations planning face a host of implementation issues that do not arise in more strategic arenas. We use the seemingly simple problem of assigning drivers to loads in the truckload motor carrier industry as an instance to study the issues that arise in the process of implementing a real-time dispatch system. Although the project was moderately successful, our focus is not on documenting the benefits, but rather on summarizing the challenges that arose. The most significant theme running through the implementation hurdles we encountered was the lack of information available to the model. Computers are very good at processing vast quantities of information; humans are very good at challenging the information that is in the computer and augmenting computer-provided data with head knowledge. Our study includes a careful comparison of actual decisions with model recommendations, using a six-month database of actual transactions. This comparison is the first we have seen of its kind and provides the most rigorous evaluation of an online dispatch model that we have seen. Although the model was well used, the results demonstrate that significant improvements could have been obtained if the level of model utilization had been even higher.

¹WARREN B. POWELL, ARUN MARAR, JACK GELFAND, STEVE BOWERS: Implementing Real-Time Optimization Models: A Case Application From The E Motor Carrier Industry. Subject classifications: Transportation: model implementation issues. Area of review: Transportation. Vol. 50, No. 4, July–August 2002, pp. 571–58

THOMAS F. GATTIKER, DALE L. GOODHUE³ A model of the organizational impacts of enterprise resource planning (ERP) systems once the system has gone live and the "shake-out". Organizational information processing theory states that performance is influenced by the level of fit between information processing mechanisms and organizational con-text. Two important elements of this context are interdependence and differentiation among sub-units of the organization. Because ERP systems include data and process integration, the theory suggests that ERP will be a relatively better fit when interdependence is high and differentiation is low. ERP customization and the amount of time since ERP implementation are also included in the model

HAI-YING WANGA, DA-CHENG LIUA*, TAO XINGAB AND LI ZHENG⁴ A three-echelon, dynamic lot-sizing model is presented for computing the parameters of a serial supply chain, which consists of integrated material replenishment, production at a capacity constraint, and outbound dispatching with a periodic delivery policy. The model is applicable in the general context of a three-echelon model with capacity constraint at the middle echelon of the serial supply chain which was not considered in most of the literature. It addresses a number of structural properties of the model and proposes a polynomial-time algorithm for deriving the optimal solution of minimizing the total system costs over the planning horizon.

³THOMAS F. GATTIKER, DALE L. GOODHUE. What Happens After ERP Implementation: Understanding The Impact Of Inter- Dependence And Differentiation On Plant-Level Outcomes. Vol. 29 No. 3, pp. 559-585/September 2005

⁴HAI-YING WANGA, DA-CHENG LIUA*, TAO XINGAB AND LI ZHENG. A Dynamic Model for Serial Supply Chain with Periodic Delivery Policy. Vol. 48, No. 3, 1 February 2010, 821–834.

JIPYO KIM* SEOUL NATIONAL UNIVERSITY OF TECHNOLOGY, KOREA.⁵

Although enterprise resource planning (ERP) has been widely adopted since its first appearance in the early 1990s, there is a lack of research regarding ERP investment justification and performance evaluation. In this paper, based on an activity-based costing (ABC) analysis, we propose a framework to quantify the cost savings that the implementation of an ERP system should achieve in order to make the investment justifiable. Exploiting the ability of ABC to trace costs to activities and products, ERP resource costs and activities are identified and the cost structure of products is analyzed. It is also shown that the ABC approach can enhance the visibility of business processes with various activities and cost drivers and provide information about actions to be taken to raise profits by cost savings or increased revenues. Finally, a numerical example is used to demonstrate how an ERP system is utilized on activities and how it affects the cost of products. An extensive analysis follows to address how the results can be used to direct process improvement toward corporate goals.

⁵JIPYO KIM* SEOUL NATIONAL UNIVERSITY OF TECHNOLOGY, KOREA, Activity-Based Framework for Cost Savings Through The Implementation Of An ERP System. Vol. 47, No. 7, 1 April 2009, 1913–1929

HYUN JOON SHINA* AND YONG HA KANGB⁶. Development of a scheduling methodology for module processing in thin film transistor liquid crystal display (TFT-LCD) manufacturing. The problem is a parallel machine scheduling problem with rework probabilities, sequence-dependent setup times and due dates. It is assumed that rework probability for each job on a machine can be given through historical data acquisition. The dispatching algorithm named GRPD (greedy rework probability with due-dates) is proposed in this paper focusing on the rework processes. The performance of GRPD is measured by the six diagnostic indicators. A large number of test problems are randomly generated to evaluate the performance of the proposed algorithm.

Rochak Langer, Jingshan Lia*, Stephan Billerb, Qing Changb, Ningjian Huangb and Guoxian Xiaob⁷ Maintenance is important for production operations and for continuous improvement. Appropriate dispatching of the maintenance workforce to quickly respond to equipment failures and carry out preventive services can improve system productivity. The first-come-first-served policy is typically used in many manufacturing industries. A priority-based dispatching policy, a dynamic bottleneck policy, based on the analysis of real-time data. In such a policy, priority is assigned to the bottleneck machine after a fixed time period, and the maintenance worker will service the high-priority machine (i.e. bottleneck machine) first when multiple service requests are received.

⁶HYUN JOON SHINA* AND YONG HA KANGB. A Rework-based dispatching algorithm for module process in TFT-LCD manufacture. Vol. 48, No. 3, 1 February 2010, 915–931

⁷ROCHAK LANGERA, JINGSHAN LIA*, STEPHAN BILLERB, QING CHANGB, NINGJIAN HUANGB AND GUOXIAN XIAOB. Simulation study of a bottleneck-based dispatching policy for a maintenance workforce. Vol. 48, No. 6, 15 March 2010, 1745–1763

AHMED EL-BOURIA* AND SUBRAHMANYA NAIRY⁸ Scheduling in a dynamic flow shop that receives jobs at random and unforeseen points in time has traditionally been done by using dispatching rules. This study compares the performances of leading dispatching rules with a cooperative dispatching approach, for the objective of minimizing mean flow time in a flow shop, in which the buffers that hold in-process jobs between machines have finite capacities. Cooperative dispatching employs a consultative and consensus-seeking methodology for deciding which job to dispatch next on a machine. Computational experiments using randomly generated test problems for three different utilization (congestion) levels are carried out for 5- and 10-machine flow shops, under a wide range of buffer capacities. The results highlight the sensitivity of some of the popular dispatching rules to buffer size. In contrast, cooperative dispatching emerges as a robust method that performs consistently well across the range of buffer sizes and machine utilizations tested. The reductions in mean flow time obtained by cooperative dispatching, in comparison to the other dispatching rules, are particularly large in flow shops that operate with very tight buffer capacities and elevated levels of congestion.

⁸AHMED EL-BOURIA* AND SUBRAHMANYA NAIRY. An Investigation of Cooperative Dispatching For Minimising Mean Flowtime in a Finite-Buffer-Capacity Dynamic Flowshop. Vol. 49, No. 6, 15 March 2011, 1785–1800

Craig Schlenoff, Amy Knutilla, and Steven Ray⁹ A wide range of applications deal with the manipulation and expression of collections of activities. Examples include project management, workflow management, business process reengineering, product realization process modeling, manufacturing process planning, production scheduling, simulation, and Computer Aided Software Engineering, each of which is supported by some combination of graphical programming and control languages, Petri nets, PERT charts or other representation methodology. Each of these applications serves a specific audience and need, and focuses on particular aspects of a process. Nevertheless, much could be gained by sharing information among applications. One of the primary obstacles to such integration is the lack of any common representation of what is really the common underlying concept of process. The objective of the work described here is an investigation of the feasibility of a unifying specification of process which is applicable to all of the above applications, yet powerful and robust enough to meet each set of requirements. This document represents the results of the first phase of the work – that of researching the process representational requirements for design/manufacturing process life-cycle applications. These requirements are categorized into four categories; core, outer core, extensions, and application, which aided in describing the role of the requirements in the overall challenge of process representation.

⁹CRAIG SCHLENOFF, AMY KNUTILLA, STEVEN RAY. Unified Process Specification Language: Requirements for Modeling Process. NISTIR 5910

CHAPTER 3

ABOUT THE STUDY

3D Barcodes (Direct Part Marking or DPM)

In recent years manufacturing companies have been trying to implement a barcoding system similar to the barcodes for purchases and the retail industry. The only problem is that in manufacturing there are high temperatures, extremely solvents being used, as well as a wealth of chemicals and processes that inhibit the use of a label with bars on it. The manufacturers need to identify individual parts and not just the entire batch as it has been done for years. They wished to improve their inventory and tracking system - and have done so through the use of 3D barcodes.



3D Barcode Scanner Device

3D barcodes use the same basic principle as linear and 2D barcodes. An image of some sort is applied to a product and then read by a device to log, categorize, inventory, or track an individual product. As previously stated, the manufacturers need a more permanent solution than a label or sticker. The 3D barcode is engraved or applied to the product itself as a part of the manufacturing process. The bars are not read by variances in reflected light as with linear

in manufacturing in the coming years and will drastically affect the costs and savings of industrial manufacturing companies.

3D barcodes are also known as Bumpy Barcodes. 3D barcodes are actually one-dimensional barcodes that are embossed onto a surface, but not like a sticker 2D code. These are perfect for anything that a normal barcode label cannot stick to. They are also great for harsh environments. Like 2D barcodes, 3D barcodes are used for inventory, tracking, and categorization, with the only difference being that 3D barcodes are engraved or applied in some way to the product during manufacturing.



3D Barcode Scanner Device

3D barcodes are read by using the differences in height between the bars and spaces. This is a lot different from normal barcodes that are read by their contrast. 3D barcodes also help to prevent any alterations that may hinder the information within the barcode. This leads to fewer mistakes which will ultimately lower operating costs during manufacturing.

3D barcodes can be painted on and still be read without a problem. 3D barcodes are also useful in preventing mislabeling as they can be permanently fixed to a particular section of a part.

3D barcode scanners can be used during the manufacturing process or in hand held form. The scanners are necessary in order to track the efficiency of the

barcodes but by determining the height of each line. The time it takes the laser to bounce back and be recorded determines the height as a function of distance and time and the character represented by the code can be interpreted.

The 3D barcodes are embossed on the product and the scanner recognizes new characters in the string by the lower regions of the code. This works in much the same way as the white lines or spaces in linear barcodes. The gap allows the system to record a new height of a line, and thus a new number or alpha character. The 3D barcodes also make it nearly impossible to alter or obstruct the barcode's information and results in fewer inventory mistakes and in turn lowers operating costs of a manufacturing process. The code can be part of the manufacturing process or applied after with a press.

A direct part mark (DPM) barcode reader for 3D barcodes captures the reflected image after passing a laser over it; the same laser technology used in home digital or office scanners for documents and images. Once the data has been recorded it is digitized and a digital processing unit is employed to interpret the image. Since the system works on height variances the addition of color or paint has no effect on the end result, especially since manufacturers are extremely precise with the application of paint in regards to the thickness of the coat which could, but does not, affect the height of the 3D barcode.

The scanners of 3D barcode technology can be found in hand held versions as well as integrated into assembly lines as part of the process. They can be used to track a part on the line to assess efficiency of the production process, or to account for the number of man hours needed to create a single part. This can help reduce underpricing products and save the company on production costs. The 3D barcodes can, of course, still be used as an inventory system and for purchases. The parts in question are each scanned before being placed on a truck or train and can then be verified when delivered. The 3D barcodes will become more prevalent

production process and even to figure out how much time is needed to create parts. 3D barcodes are being used in inventory and for purchases. In time 3D barcodes will drastically boost the savings for manufacturers.



3D Barcode Printer

"Bar code technology saves ... loads of money in the long and short term and provides ... computer data that's both accurate and timely beyond expectations ... [and] a field known as AIDC or "Automated Identification and Data Collection [can] eliminate relatively-ancient forms of data collection like writing on paper (1,000 years old) and keyboarding (100+ years old) and replace them with computerized and automated strategies" (<http://www.aurorabarcode.com/> Retrieved, Nov 21, 2006).

An item's bar code and corresponding information (price, description, etc.) is stored in the company's computer. When the bar code is scanned the details saved to that bar code are retrieved by the point-of-sale terminal. These details will be condensed and printed on your receipt. The details of the sale are recorded in the computer for accounting, inventory counts and assists with management decision-making with respect to product lines (Williams & Sawyer, p. 267).

All about 3D Barcodes

These are not commonly seen in grocery stores or mall like 1D and 2D barcodes. Many manufacturing companies needed a barcoding system much like the UPC barcodes used in stores to track purchases and store product information.

These manufacturing companies could not just use a regular barcode that is normally printed on paper or a sticker, because of the high temperatures, chemicals, and solvents that would easily destroy a barcode. To solve this problem they discovered a new way to track their parts in the manufacturing system by using 3D barcodes.

As explained earlier in the article on the difference in dimensions, three dimensional objects must have thickness and must be measurable on the x, y, and z-axis. Therefore a 3D barcode is usually engraved on a product or applied on a product so that the barcode has depth and thickness. Check out this picture of a 3D barcode. Unlike 1D and 2D barcodes, the bars in a 3D barcode are read by a scanner that reads the differences in the height of each line. Other types of barcodes are read by the variances in reflected light as the light scans the code. The 3D barcode scanner uses a laser that calculates the height of the barcodes lines based on the distance and time it takes for the laser to read it. As you can see from the different dimensions involved in different type of barcode making and the formula involved in reading 3D barcodes, there is a lot of basic physics knowledge involved in their creation and decoding. Once the scanner scans the 3D barcode the result read by the height of the lines is interpreted.

The labeling of parts with 3D barcodes is called direct part marketing or DPM. A direct part mark barcode reader contains a laser like the ones that are contained in home and office scanners that scan pictures or documents in a computer. DPM readers only read the height variances of the barcode; therefore there is no need to make the barcode black and white as most other barcodes are. Those types of scanners normally read the white space between the barcode lines to decode the barcode.



Sample 3D Bar Code

This is an interesting, but older article on 3D barcode technology being used to identify stolen valuables: <http://www.newscientist.com/article/dn7756-3d-barcode-to-identify-stolen-valuables.html>. It talks about placing microscopic 3D barcodes on valuable works of art, jewels, and other precious items, which can then identify them if they are even stolen.

Electron-beam lithography drills into the plastic face of the microscopic square which will be the future 3D code. The square can then be placed on an item using adhesive or woven onto items such as the canvas of paintings. I didn't find any information on whether or not this technology is currently being used for this purpose (the article was written in 2005), but it's definitely an interesting idea. I'm wondering if people could use 2D barcodes to keep track of certain valuables or even have them printed on their bank checks.

3D barcodes are actually very similar to 2D QR codes, since QR codes were first used to track vehicles in the manufacturing process in Japan. Now they are used in the US for marketing and customization purposes. I doubt 3D barcodes will ever move into the marketing arena, but it's interesting to know how they are used and what they are all about. When I first heard about 3D barcodes, I honestly pictured a QR code that was holographic; I was completely wrong. So while

probably stuck in the manufacturing industry, 3D barcodes show another way that barcodes have helped makes life much easier for people.

Difference between 1D, 2D & 3D QR Code Dimensions

1-Dimensional

1-dimensional items can be most easily related to a line. Picture an x-y axis. The x-axis which is a line is one dimensional. Anything that stays within just the x-axis only has one dimension. If you were to draw one line in any direction on a sheet of paper, that would be a 1 dimensional line.

2-Dimensional

2-dimensional object consist of more than one line that exist on a plane. They have measurable dimensions when placed on an x-y axis. It must have no thickness to it. If you were to draw a rectangle, a circle, a triangle, or any other shape on a sheet of paper, this would be two dimensional.

3-Dimensional

If you've ever taken any type of physics class, you learned that everything your math teacher taught you about there being only and x-y axis is wrong. There is also a z-axis. If you were to draw an x-y axis with the x running horizontally, the y running vertically perpendicular to the x-axis, the z-axis when represented on paper runs through the middle of the intersection of the x-y axis. When drawn on paper, this is a 2D representation of the three dimensions. For example, when you draw a cube on a sheet of paper, this is still 2D, but it is a 3D representation, unlike a drawing of a square. 3D movies are labeled as 3 dimensional, but they are really just a 3D representation of a 2D object. Next time you go to see a 3D movie, take your 3D glasses off, and you can see that the picture on the screen is still 2D, but

the shapes are distorted so that when you have the glasses on, you perceive the movie as being in 3D. So how does this relate to barcodes? UPC barcodes are one dimensional since they contain information in one direction, horizontally. A 2D QR code can be read horizontally and vertically making it two dimensional.

Laser Barcode Reader/Scanner

Definition

Laser Barcode Reader/Scanner is the most common type of Barcode Readers/Scanners. A laser Barcode Reader/Scanner need not be in contact with a barcode to read it. A standard range laser Barcode Reader/Scanner can read a barcode from about 6 to 24 inches away, and a long range Barcode Reader/Scanner can read one from perhaps 2 to 8 feet away. Certain extra long-range laser Barcode Readers/Scanners are capable of reading a barcode from up to 30 feet away, depending on the quality of the laser barcode scanners.

We are engaged in offering excellent quality barcode scanner reader offering flawless output. These are handheld barcode reader which can be availed at market leading prices.

4.2 DIFFERENT PROCESS IN CRI PUMPS (Get-in Get-out processes)

There are different processes that are being taking place in CRI pumps for manufacturing different kind of pump sets as per the requirements of customers. The set of different process are,

- Order Management,
- Purchase order,
- Production,
- Despatch operation,
- Stores,
- Quality check department,
- Receiving materials,
- Accounts,
- Finance.

For online processing company using interfaces as Oracle 11i and OLTP for placing and receiving an orders to different branches of CRI.

Order Management (OM):

In Sales order (or) Order management the orders are processing through Online Transaction Processing system (OLTP) in which orders are placed by braches of CRI which is located in different places. As per plan visage the sequence of two processes will takes place inside the company as,

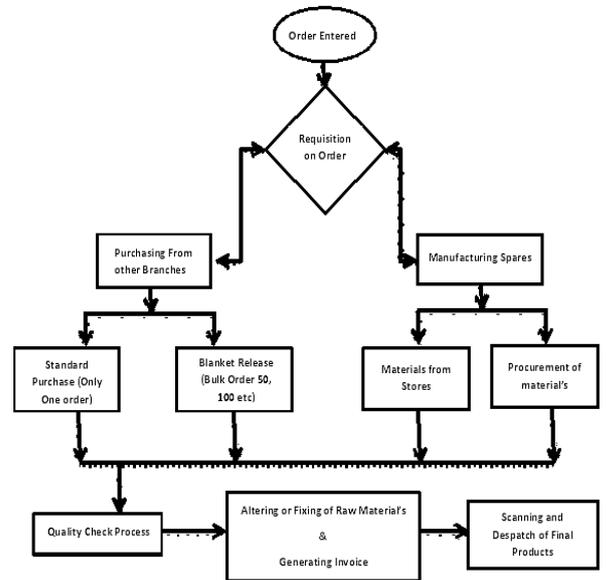
1. Sales order → Considered as Demand → Purchase Order Release → Raw Materials required
2. Bills of Materials (BOM)

As per the orders received from branches the requisition is been placed and finding either raw materials have to procure (or) purchase from other branches else to manufacture inside the company itself. Overall process of OM is,

CHAPTER 4

PROCESS FLOW

4.1 ORGANIZATION CHART



1. Entered → As per order entered materials inside company,
2. Booked as per the plan,
3. Awaiting Shipping Production planning,
4. Closed, Process (i.e.) finished goods,
5. Cancelled.

Planning order can be released as in two ways,

MPO → Monthly Planning Order, Booking in advance for next month,

NPO → Non Planning Order, not have any proper plan.

Before despatching the product invoice should be prepared, with the help of permit number which is get from the owners of vehicles and prepares the invoice form for those products.

Purchase Order:

In Purchase order the orders have to analyze whether it is Standard purchase or Blanket purchase release. The Standard purchase is that only one purchase order that is as per the daily market price and the Blanket release is releasing an agreement in an whole set as contract based like 100,500 sets etc... here the cost of whole set will be same until the orders are been cleared.

Production:

The Production process will be takes place as per the plan or schedule which is released by the OM and the production head. The production will takes place as the job materials that is issued from stores that is called as Job order.

Despatch operation:

The Despatch operation takes a two major process in which to despatch the final product.

1. Picking process → Sales order → Status Booked → Ready for Manufacturing.
2. Shipping Process → while orders are shipped the stocks will get minus from the stage locator.

Picking process takes place in 3ways,

- ✓ Rule thru (Selective process as per schedule),
- ✓ Launching (Directly available in stores),
- ✓ Transact move order (As per order procuring raw materials).

Packing Process will be the final process before dispatching the product. While packing checking and maintenance process will be taken place to ensure that products are good in condition. During packing process the serial numbers which is generated while preparing invoice for the product will be pasted in the outer shield of the pack. The serial numbers are scanned using scanner while dispatching the final product to vehicles. Materials get despatch as per First in First Out manner (FIFO). While scanning if some 50orders are to be despatch, if any number is missing there then whole set of order will be cancelled and sends back to checking department.

Stores:

In stores the raw materials are been stored as stocks and if any materials are taken for manufacturing automatically it minus from stocks.

Quality Check Department:

The Quality check department checks for any faults in the raw materials which are procured from other branches or manufactured inside the company. They choose random samples and check for defect if any defect found whole material been cancelled and send back to the braches.

5.2 SUGGESTIONS:

SCANNING METHOD:

In CRI they are using regular Barcode scanner is used while dispatching the final products that orders are correctly sending to the correct branches or not, in that case suggestion in my own prediction is that can go for 3D barcode scanning process which supports large storage of details about products. These manufacturing companies could not just use a regular barcode that is normally printed on paper or a sticker, because of the high temperatures, chemicals, and solvents that would easily destroy a barcode. To solve this problem they discovered a new way to track their parts in the manufacturing system by using 3D barcodes.

And also can change a manual updating of data to scanner into the automatic updating (i.e.) while preparing Invoice itself the data can send and store in the storage of scanner process so that we no need to put data over scanners.

SETTING UP OF ALERTS:

After continuously analyzing the whole process which takes place in Order Management (OM) and Despatch process the suggestion is that to create/keeping alert messages which are to display to the user, so that if the same thing happens then user can identify it easily by seeing that alert. Like that alert identified is that while checking orders which is given by other branches while checking availability of raw materials or spares, if particular raw materials is not available then it shows only stock not available instead we can set and alert that no stocks available we can set from where it is available and where we can procure it (as like list out option).

TIME TAKING WHILE GENERATING INVOICE FOR THE MATERIALS:

After billing for the materials or finished products the Invoice will be generating but it takes much time for creating it, the suggestion for this is that can

CHAPTER 5

FINDINGS, SUGGESTION AND CONCLUSION

5.1 FINDINGS:

To create the barcode electron-beam lithography drills 90,000 small squares into the plastic coat of each face at five different depths. The position and depth of each square is unique, so data can be encrypted using a key-based code and stored digitally. The cube is scanned line by line using an electron force microscope, which can detect differences in the depth of the squares. This scanning process takes around a minute, says Alexander Cuenat, one of the team of researchers that developed the cube.

The technology has huge potential for storing information securely, says Cuenat. "You could get two copies of the bible, the King James version, on the sharp end of a pin."

However, in practice storing information on the provenance of an object would not require anything like this capacity.

The Nano barcode has three levels of security to protect objects against theft and counterfeit. First, thieves and fences are unlikely to realize that the item is protected. "You cannot see or feel the cube, even if you roll it between your finger and thumb," says Cuenat. Second, most fraudsters are unlikely to have the specialist equipment to read or write the Nano barcode, and so will be unable to duplicate it. And finally the encryption will be practically unbreakable.

speed up server or can change new server which gives much speed for the entire process including transferring of data to one department to another.

5.3 CONCLUSION:

As the result of analysis there is an issue which shows that there is no proper scanning system used in the company, as the suggestion if 3D barcode scanner is changed there should be a huge change happens and result of changing processor speeds eliminates the process time and setting alter messages gives a proper response to the users in the order management and despatch process. A manual updating of data to scanner into the automatic updating, while preparing Invoice the data can send and store in the storage of scanner process so that there is no need of putting data over scanners.

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