A Perspective Approach for Effective Scheduling in Reconfigurable Manufacturing System with Java Based Model

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ABSTRACT

The small and medium scale manufacturing companies will have a promising future in the upcoming years. This will lead to rapid market change by global competitions in the coming years. The themes like "Make in India" will help for the upliftment of such small and medium scale companies. By the method of survey various problems have been identified. These problems hinder the performance and output rate of the industry under study. The identified problems are finally pointing out to lack in meeting of the lead-time. As a solution it is found that proper scheduling can conquer the problems of meeting the lead time. Efficient and effective planning can tackle problems of raw materials, machine problems, delay times etc. By developing software we can properly plan the time schedule for various works. Here the software is designed on java platform which has options for entering quantity expiry and total production duration.

1. INTRODUCTION

The increased global competition on today's market generally implies a need for rapid product change, high product variety, and customized products. Production needs of a company's product assortment. The modular approach enables reconfiguration (change, add, and remove modules) in response to market changes. Based on the similarities of RMS and highly customized MC product it is the objective of this paper that RMS can be treated as a MC product and, herby, that MC methods and techniques can be Applied on RMS in order to cover these areas. In an effort to understand current and future needs in manufacturing was conducted by the engineering research center for reconfigurable machining system

The importance of meeting the right time in the delivery of the product will help in conquering the market and it increases the affinity of the product to the market. The mass customization of the product will have the abilities to meet the needs of multiple machines and labour strength. In the case of small and medium scale industries there will be limited number of machines, raw materials and labour force. Multiple product manufacturing and assembly will cause machine delay and labour deficiency in such industries.

Hence the idea of proper scheduling can erase the problems to an higher extend. The software can help in orderly arrangement of the production based on the quantity of the products and lead time. As the multiple and customized products are the market governing factors of any industry, it requires product verity and such verity demands efficient planning and utilization of available resource for better outputs

2. LITRATURE REVIEW

Wang, Ying; Bilberg, Arne; Hadar, Ronen (2012):- has told about, a conceptual model developed to analyze where RMS would be most suitable and have most benefits in The LEGO Group.

Y. Koren (University of Michigan) has advised that companies must possess new types of manufacturing systems that are cost-effective and very responsive to all these market changes..

Henrike E.E. Boer and Poul H.K. Hansen(2013) shows that, so far, the operationalisation of product modularity has been incomplete, and suggests that modularity needs to be operationalised by assessing the level of 1) standardization of a product portfolio's modules (including functional specificity) standardization of module interfaces (including decomposability)

Yoram Koren(2011) explains the rationale for the development of reconfigurable manufacturing systems. The paper defines the core characteristics and design principles of reconfigurable manufacturing systems (RMS)

NICOLAY WORREN, KARL MOORE has formulated an integrative conceptual model encompassing antecedents, contributing factors, and outcomes of modularity. They have then tested this model on data from managers in U.S. and U.K. home appliance companies using structural equations modeling. The results indicate a positive relationship between modular product architectures and performance, with product model variety as a mediating variable

Kun Liao examined the impacts of modularity-based manufacturing practices (MBMP) and manufacturing system integration (MSI) on manufacturing performance (MP) using absorptive capacity as an important enabling factor

Z.M. Bi*, Lihui Wang and Sherman Y.T. Lang provide an effective solution to changes and uncertainties in a competitive manufacturing environment using RMS. A Reconfigurable Assembly System (RAS) is a key component of an RMS. In this paper, our survey on the development of RAS has been summarized

Narayan C. Nayak explained that research designs flexibility in production system in four categories: one-machine-one part, many-machines-one-part, one-machine-many-parts, and many-machines-many-parts. An important component in design and development of flexibility in a production system is the establishment of appropriate flexibility measures

Steffen N. Joergensen, Kjeld Nielsen and Kaj A. Joergensen aimed at such flexibility and responsiveness and is said to be the manufacturing paradigm of tomorrow. RMS is, though, not yet fully developed. A similarity between RMS and modular product families, known from Mass Customization (MC)

2. PROBLEM IDENTIFICATION

From the literature survey and executive survey conducted from the wet grinder manufacturing industries, problems identified are

1. Problems related to production
2. Problems on technology
3. Problems related to labor

Other than wet grinder industries, all these problems can also be part of other small and medium scales .The problems related to production leads out to the lack in quality products produced. Lack of raw materials is the main part of this problem. Improper management of raw materials can lead to this shortage. Wastage of materials and unwanted damages can also lead to this shortage.

The problem of technology leads to low production rates. This will limit the industry to develop newer trends and variety products. The constraint of limited variety of product will make the dull market, slower cycle time, low output rates; line stoppages etc are the other major factor affecting production. These factors will also reduce the expectation of new products from customers and will make a shortage of the product in the market

The small-scale sector is predominantly labor-intensive and it provides employment to a large number of people. The role of labor is many sided and varied in the small industrial sector. Therefore, the over-all development of laborers is inevitable for the growth of this sector

All these statements concludes that there is inevitable requirement of a new production system .The existing systems are timed out and should be changed to obtain the required output

3. PERCENTAGE OF CONTRIBUTING FACTORS

The various hindering factors of the manufacturing efficiency are mentioned in the above section .On the basis of the survey, it points down the importance of each factor for improved production.

Table -1: Survey results of major contributing factors

Technology based problems			
Sample Units	Non availability of Skilled force	Non availability of Professional managers	Lack of access to new technologies	Others
10	20%	30%	40%	10%

Production problem		
Sample Units	Shortage in raw materials	Changes in technology	Others
10	30%	40%	30%

Labour related problems			
Sample Units	Problems due to absentees	Work stoppages	High wage rates	Training cost
10	30%	40%	10%	20%

Taking the technology into consideration, various important areas are the skill of the worker, management of the work or allocation of the job and the acceptance of new technology for various processes . The major percentage of the problem points out to the lack of the technology development in the field. Around 40% of the technology problem is due to development in the same . Inefficient management and improper work allocation contributes the 30% of this problem. Skill development for various sections is a must for development and lack of which proves out to be the 20 % of this technology related problem

The other factor to be considered is the problems on the production. Here the material handling and the factor which relates the technology to the productions plays a main role. 30% of the problems are being raised up from the unwanted and improper methods which damage the raw materials for the processes. Other 40 percent denotes the underdeveloped methods followed

Another main hindrance factor is the problems from the side of labour. If we consider this labour factor about 70% of the problems are due to their absenteeism and unwanted work stoppages

4.SOLUTION

All these problems cannot be terminated by changing the processes or methods of production and assembly. Some of these cannot be terminated such as problems faced due to various power related problems which hinder the use of machinery

The major problem faced by the above mentioned problems points out to improper planning and effective scheduling of production. If there is a perfect planning can help to manage most of the problems like amount of raw materials, machinery required, delay times, labour required hence for a better lead time. Therefore it demands a system for proper scheduling of the processes and functions to deliver a better out come.

3.1 System Development

The system is designed using java and being developed as a web application. The software takes in the data pertaining to the various production processes. This includes the amount or number of pieces to be produced, the expiry   date for the different processes
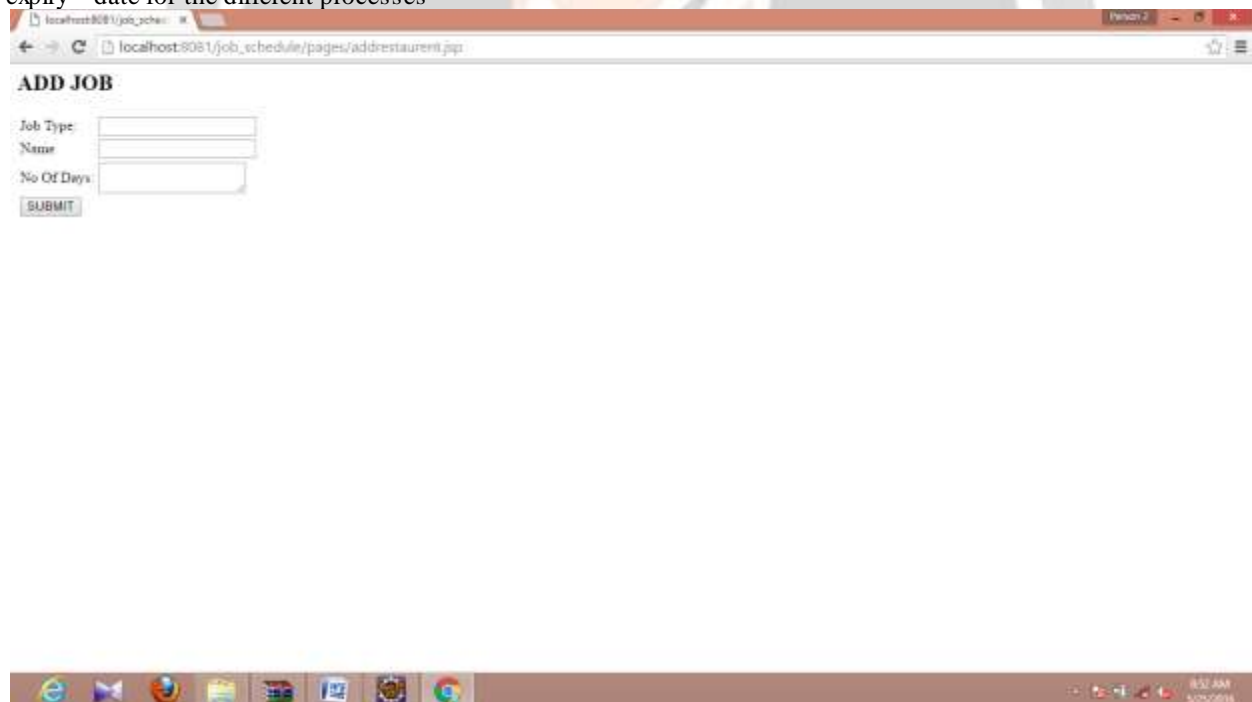

Fig -1: adding of a job type

Various products are being entered in the interface. This includes type of the job being carried out, name of the job in particular and the number of days for its production. Any number of inputs can be accommodated here in this.

Fig -2: Various jobs entered in the database can be displayed here

The entered values and type of products can be seen in this window. The options for editing and deleting the entered values are given in the same window.
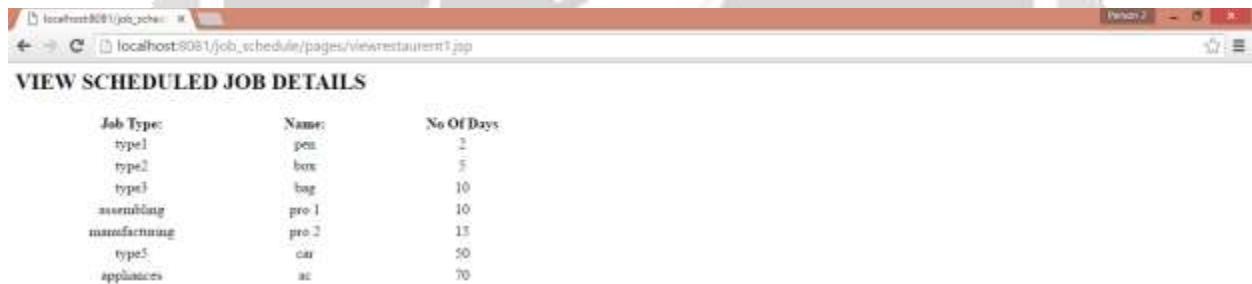

Fig -3: display of the schedule in ascending order

This is the main part where the given works are scheduled in the order of precedence. This helps to identify the product to be put under process at first
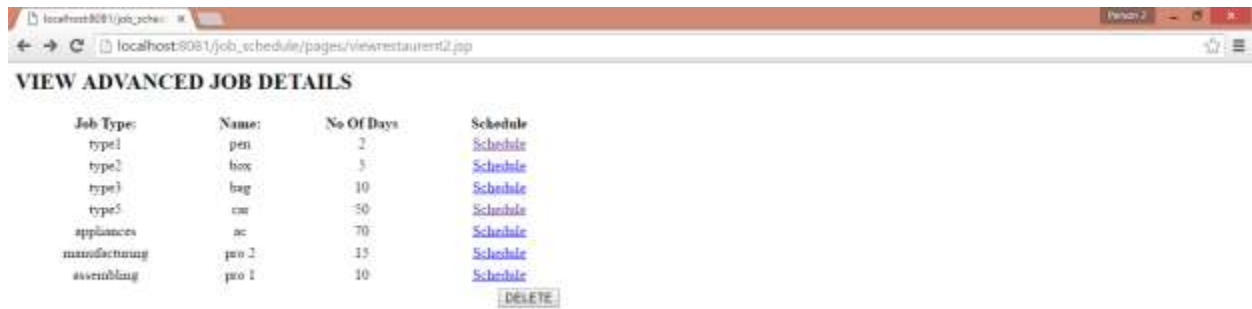
VIEW ADVANCED JOB DETAILS

Job Type:	Name:	No Of Days	Schedule
type1	pen	2	Schedule
type2	box	5	Schedule
type3	bag	10	Schedule
type5	car	50	Schedule
appliances	ac	70	Schedule
manufacturing	pro 2	15	Schedule
assembling	pro 1	10	Schedule

Fig -4: advanced job details are displayed here

FINAL SCHEDULED LIST

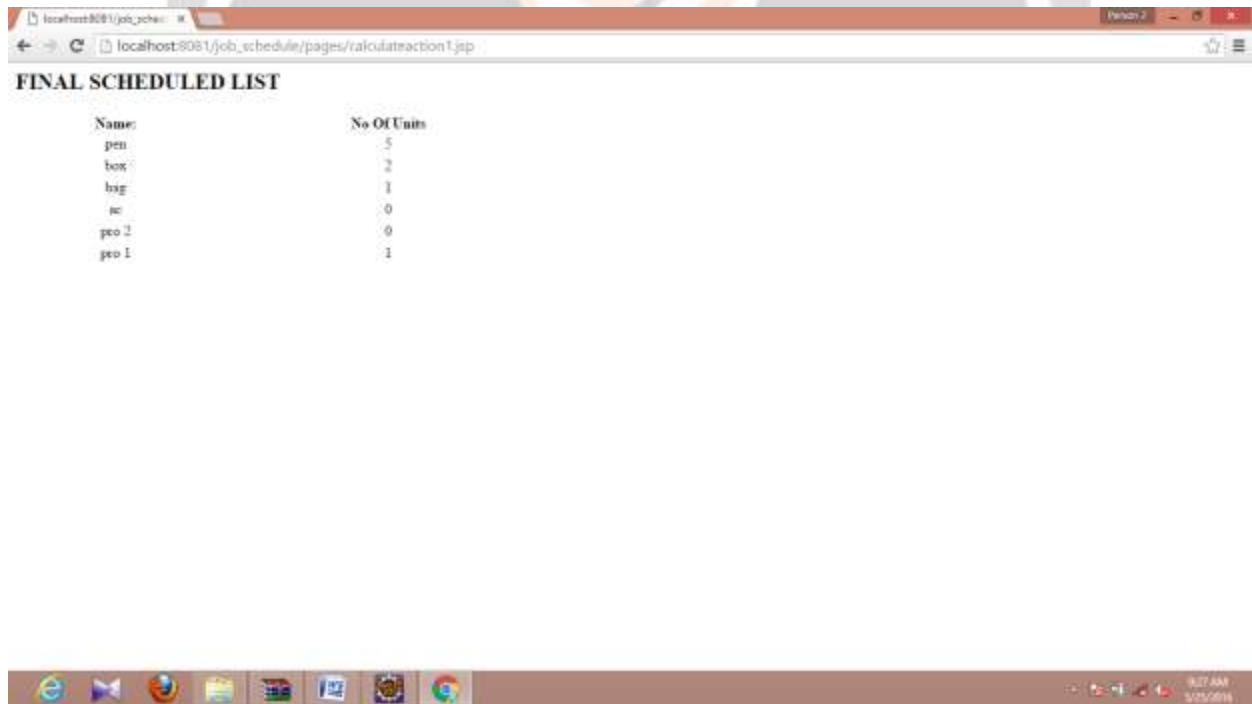| Name:	No Of Units
pen	5
box	2
bag	1
ac	0
pro 2	0
pro 1	1

Fig -5: final scheduled list is generated

On the given input of the various products rescheduling is done on the basis of entered finite values and number of products to be produced. On generation of the final scheduled list we will get the number of products which could be produced parallel with the preceding product under process

4. CONCLUSIONS

The project helps to identify the most dominant product to be produced at the top of the chart. This also helps to determine which of the other product to be produced in parallel with the production of the dominant one. The project shows number of the product to be put under process other than the preceding product in the remaining duration of the total expiry of the process.

As we get the idea of which product to be manufactured first, how many products must be produced within the defined time, we can easily arrange the various depending factors in the production like Machines under use, amount of raw materials required, quantity of work force, shifts required, etc.

Hence the effective planning in the process can be done and helps to reduce the factors hindering the production and delays the lead-time. The available resources can be managed in an effective and efficient way.

5. ACKNOWLEDGEMENT

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