Review on Automation Of Independent Four Arm Bi Axial Machine in Rotational moulding Industry

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***Abstract* - Nowadays, the importance of automation in the process industries has increase dramatically. In the highly modernized and industrialized countries, process automation results to enhance product quality, master the whole range of products, improve process safety and plant availability and efficiently utilize resources. In the rapidly developing countries, mass production is the main motivation for applying process automation. The greatest demand for process automation is in the chemical industry and power generating industry. In this industrial research work, aim is to make raw material feeding process automatic in an independent four arm bi axial roto moulding machine manufactured by Roto-moulding industry.. This is related to a raw material feeding system which is manually performed by worker.**

***Key Words* - Automation, machine, rotomoulding**

I.INTRODUCTION

Man has endeavored to innovate and create projects that make their life on this planet as friendly as possible since the dawn of civilization,. Industries are one such platform through which man achieved the pinnacle of civilization. Control engineering has evolved over time. In the past, humans were the main method for controlling a system. More recently electricity has been used for control and early electrical control was based on relays.

The most cost-effective way, which can pay big dividends in the long run, is flexible automation a planned approach towards integrated control systems. It requires a conscious effort on the part of plant managers to identify areas where automation can result in better deployment /utilization of human resources and savings in man-hours, down time. Automation need not be high ended and too sophisticated, it is the phased, step-by-step effort to automate, employing control systems tailored to one's specific requirements that achieves the most attractive results. That is where Industrial electronics has been a breakthrough in the field of automation and control techniques[1]. With the availability of intelligent, compact solid state electronic devices, it has been possible to provide control systems that can reduce maintenance, down time and improve productivity to a great extent. By installing efficient and user friendly industrial electronics systems for manufacturing machinery or processors, one can obtain a precise, reliable and prolific means for generating quality products.

II.ABOUT THE ROTOMOULDING PLANT

In plastic process, Rotational moulding is a recent technology, which has received worldwide acceptance. With advantages certain to attract both manufacturers and users, roto-moulding has useful applications in conventional and imaginative products lines. Rotational moulding is a cost- effective way to produce large parts those are used widely in industries. The main purpose of rotational moulding is to avoid the human interruption by automation of the all manual material handling processes that leads consistence in wall thickness and density.

Roto moulding is a four-phase process, which comprises loading, heating, cooling, and unloading the mould. There are generally four processes from which raw material have to pass to give a resultant required mould by a rotational moulding process;

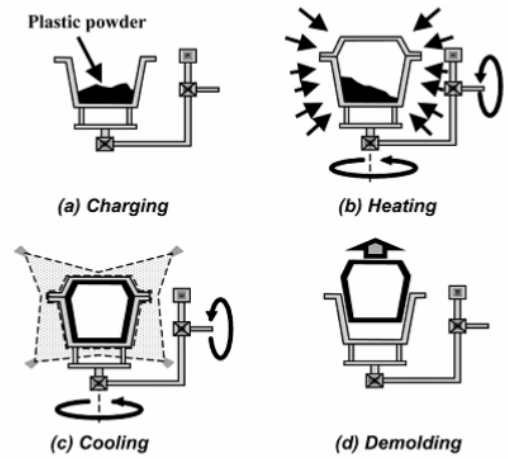

Fig.1 process sequence of rotational moulding [6]

Rotational molding materials

More than 80 % of all the materials used is from the polyethylene family: cross-linked polyethylene (PE), linear low density polyethylene (LLDPE), and high density polyethylene (HDPE). Other compounds are PVC plastisols, nylons, and polypropylene.

III.LITERATURE SURVEY

This chapter comprises international and national experiences of the automation. The literature survey infers the information that emphasize the basic fundamental and domains where further research is required in automation.

Schroeder N.[1] (2003) studied market developments by industries. According to the report by Intechno- Consulting (Basel, Switzerland), the world market for process automation will grow at an average annual rate of 5.1% between 2005 and 2010 to reach 94.2 billion $ (USD) in 2010. The greatest demand for process automation is in the chemical industry, power generating industry, and petrochemical industry; the fastest growing demand for hardware, standard software and services of process automation is in the pharmaceutical industry.

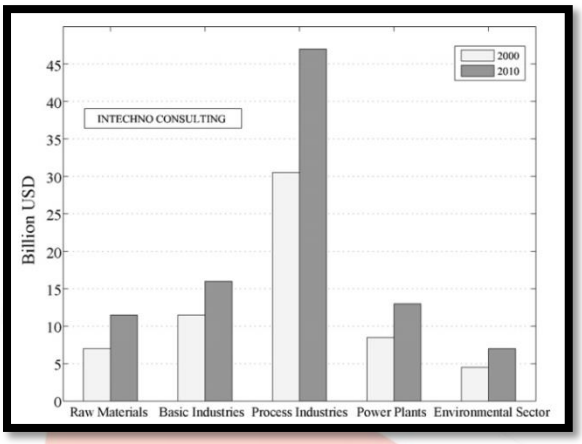

Fig.2 Development of the world market for process automation up until 2010

Sirkka-Liisa[2] (2007) reviewed about automation technology in the process industry. According to her, the latest technologies, which include wireless networks, fieldbus systems and asset management systems, are boosting the efficiency of process systems. Design of very large distributed systems has presented a new challengetocontroltheory.A key issue in control engineering is the application to highly complex systems: the coupling of complicated and large heterogeneous systems in which different disciplines are involved and different types of information are available or have to be uncovered.

Engr. Bushra Naz[3] (2012) researched about an automized control system. This system offers safety, security mobility, and precautions in the alarming situations for the industrial plant also it will decrease the machine downtime, labor cost and increase the productivity of the industrial plant. He focused on the concept of industrial automation using PLC and computer flexibility, both in the broad and specific domains. For the overall features like level sensors, flow controllable valves & temperature control and were implemented as SCADA software, and ran on selected records.

He observed below outputs:

- Early fault detection and correction,
- No more rejects from over or under curing or sticking in mould due to shrinkage,
- Control end product shrinkage for better quality product
- Less down time from moulds off machine due to problems
- Product recipes include alarm settings, material requirements and machine allocation
- Analyze man, machine and product performance
- Control machine operation with interface option

K. Madhanamohan[4] (2013) discussed how the present automation system comes in to existence through its various stages. He described the control schemes for industrial automation and system monitoring to improve system operation, system reliability, asset management, etc. The goals of automation are Integration of various aspects of manufacturing operations to reduce labor cost. The fundamental constituents of any automated process are (1) a power source, (2) a feedback control mechanism, and (3) a programmable.

The basic Automation Tools are:

1. Relays and contactor logic
2. Programming logic controllers
3. Supervisory control and data acquisition
4. Distributed control system

This paper mainly describes the control schemes for industrial automation and system monitoring to improve system operation, system reliability, asset management, etc. Various types of automation system such as relays, contactor logic, Programming logic controllers, Supervisory control and data acquisition and Distributed control system has been described and they concluded that the new Distributed control system, Supervisory control and data acquisition and communication systems make it possible to integrate protection, control and monitoring together to its maximum benefits. The innovative development of automatic switching will yield

more benefits to distribution utilities. Truly, distribution automation and system monitoring are the logical choice for the utilities to improve system performance, and to achieve customers and shareholders satisfactions.

Rajat Kumar Panigrahy[5] (2011) focused on automation process in Integrated material management system (IMMS), Electronic Procurement system (EPS), Product Planning and Control System (PPCS) are discussed and possibility of implementation of ERP and GPS based transportation system is discussed for automation)

The automation is a very important factor in steel industries. Automation can be done in Drives (AC/DC) & through programmable logic controller. By automation the industry can achieve Reduction in hard ware required, Very fast fault detection, Easy maintenance, High level of efficiency, Energy conservation and other benefits.

Table 1 The level of automation can be discussed under four levels. [1]

SL NO.	TYPE	LIMITATION
1	LEVEL-1	Only one station,No networking control of indivisual machine
2	LEVEL-2	Networking possible, Data loging, MMI. Communication through Only one control room.
3	LEVEL-3	Data logging to user, Remote operation I/C can view all the data, Multiclint operation, clint server technology, ERP implimentation is possible in production,planning &control by the package .Maintenance ,analysis of data is possible.It is atotal integration automation system
4	LEVEL-4	Like level 3 ,Control by satellite from a remote area is possible.

IV.SUMMARY/ CONCLUSION

This research mainly focused on the concept of industrial automation. To fulfill the requirement of automation it needs to design a screw feeder and a slider door. For the overall features like level sensors, flow controllable valves & temperature control and most importantly software based Alarms Monitor interface can be integrated that will be controlled using the PLC or DCS an can be implemented to avoid human interruption in material handling .

REFERENCES

[1] Schroeder, N. (2003). "Process automation markets in 2010". Report Intechno Consulting.

[2] Sirkka-Liisa Ja ¨msa ¨-Jounela , "Future trends in process automation, Annual Reviews in Control" 31 (2007) 211–220

[3] Engr. Bushra Naz, Engr. Naveed Ahmed Jaffari, Engr. Faisal Kaim Khani, "*Automation of ROTOMOULDING PLANT (RP) Using PLC"*, International Journal of Science & Emerging Technologies, IJSET, E-ISSN: 2048 – 8688, Vol-4 No. 4 October 2012

[4] K. Madhanamohan, R.K. Praveen, T.R. Nirmalraja, H. Goutham, R. Sabarinathan and A. Logeesan "*Industrial Automation System"* International Journal of Mechanical Engineering and Research. ISSN No. 2249-0019, Volume 3, Number 5 (2013), pp. 543-552 © Research India Publications

[5] Rajat Kumar Panigrahy , Ashok Kumar Panda, Srikanta Patnaik *"Rourkela steel plant automation: A case study*" International Journal of Instrumentation, Control & Automation (IJICA), Volume 1, Issue 1, 2011

[6] Peter BÚTORA, Antonín NÁPLAVA, Martin RIDZOŇ, *"Particle Filled Polyethylene Composites Used In the Technology Of Rotational Moulding",* Institute of Materials Science, Faculty of Materials Science and Technology in Trnava, Slovak University of Technology Bratis