Maestría en Ingeniería en Automatización de Procesos Industriales

Title

Building of an experimental platform for monitoring and control system of biaxial rotation

Author

Miguel Vivanco Pizarro

Contributor

E. Catellanos Velasco

J.P. Sánchez Santana

N. Juárez Rodríguez

September-December 2014

Building of an experimental platform for monitoring and control system of biaxial rotation

M. Vivanco-Pizarro[1], E. Castellanos-Velasco[1], J.P. Sánchez-Santana[1], N. Juárez-Rodríguez[2]

Maestría en Ingeniería en Automatización de Procesos Industriales

miguel.vivanco@uppuebla.edu.mx

[1]Tercer Carril del Ejido Serrano S/N, San Mateo Cuanalá, Juan C. Bonilla, Puebla, México

[2]9a Oriente-sur 973, Entre 2a Sur y 3a Sur, Barrio Linda vista, Berriozábal, Chiapas, 29130.

1. Introduction

An area of opportunity in rotational molding is the control over the biaxial rotation, with the aim to generate more complex geometries with higher added value than those that are created today such as containers. This one must be able to cover the inner walls of the mold. Actually, the rotational molding uses all operator experience to design, to create, and to implement the quality of the final product. However, all products are different. For each new geometry a new trial and error process is generated in order to obtain the desired product. Hence, the relevance of studying the system control biaxial rotation to serve an area of opportunity detected in the rotational molding industry in Mexico.

2. Aim

To build a prototype experimental platform of rotational biaxial motion to validate a desired performance that replicate operator experience.

- ✓ Simulate piecewise functions for validation in the system.
- ✓ Build a platform of biaxial rotation for experimentation.
- ✓ Evaluate the system with molds of various geometries to validate the proposed piecewise.

3. Method

In particular considering the methodology shown in Figure 1, whose identification name is DDSM (Design and Development of Mechatronic System) , for denote a viable strategy in the design and building of an mechatronic prototype.

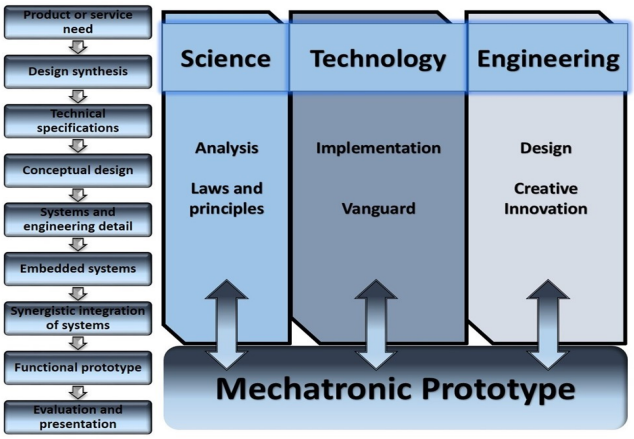


Figure 1. DDSM Methodology.

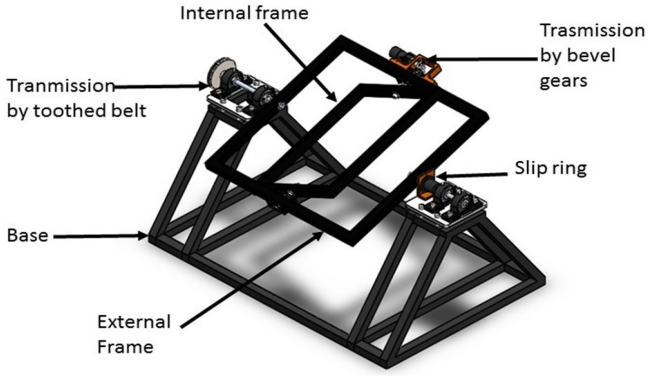


Figure 2. Computer Aided Design (CAD) of prototype.

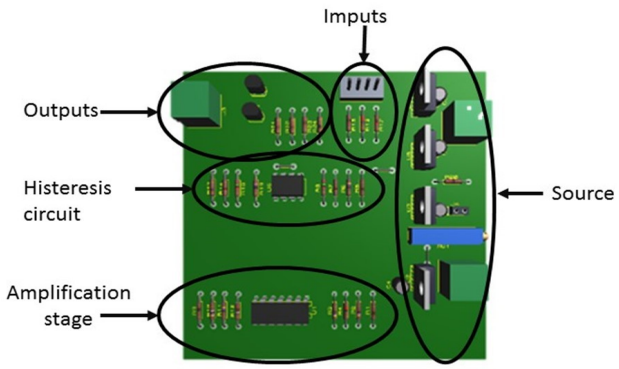


Figure 3. Physical layout of the instrumentation card.

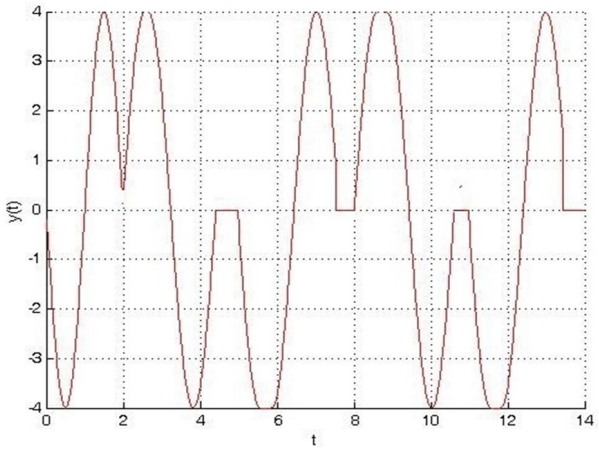


Figure 4 . Piecewise functions.

4. Results

The synergetic integration of mechatronic system. Is resumed as follows.

Prototype:

- Internal framework system
- external framework system

Other results

- Simulation of piecewise functions
- Control panel

Control panel that houses the electronic boards of control, power and instrumentation as well as a buttons of emergency stop, boot, start and stop.

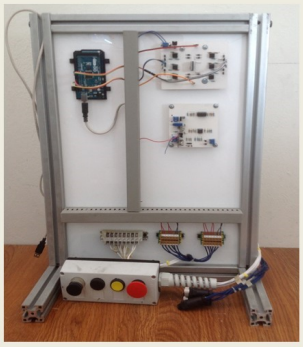
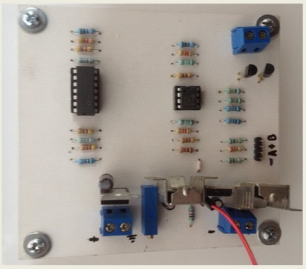


Figure 5. Control panel.



Were designed and armed three boards, two of instrumentation and an power in the Figure 6. is shown, the instrumentation card.

Figure 6. PCB of instrumentation circuit.

The prototype is shown in Figure 7.

Datasheet

Measures: length 90cm, width 60cm, height 90cm.

Velocity: Internal frame 0-20 RPM.

External frame 0-10 RPM.

Workspace: 30cm^3(maximum size of mold).

Maximum load: 3kg.

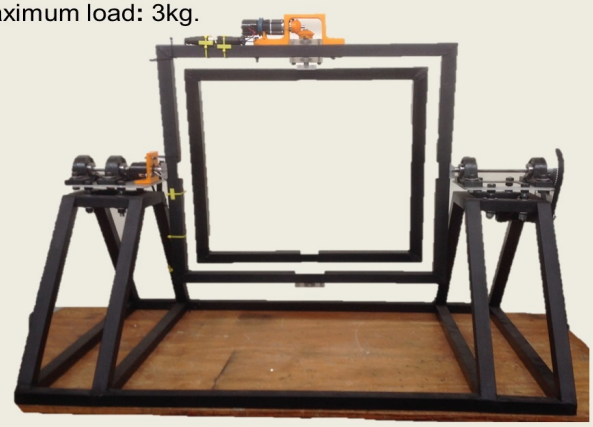


Figure 7. Prototype of experimental platform od biaxial rotation.

5. Conclusion

The use of DDSM methodology, allows design and development of a functional prototype , considering the prototype as a whole and not in classic form that is split.

The instrumentation is based in an article published in the congress SOMI instrumentation XXIX wherein said process is documented.

Acknowledgements

These project is supported by CONACyT with bourse grant Master of Engineering for first author, and grants with CONACyT project 132461, and PRODEP project /103.5/13/6709. Also PHD. Nicholas Rodriguez Juarez that has done possible a stay in his laboratory of rototational molding located in Berriozábal , Chiapas.

2014