

Proceedings of the 2<sup>nd</sup> Annual World Conference  
of the Society for Industrial And Systems Engineering  
Las Vegas, NV, USA  
November 5-7, 2013

## **Improvement of a Thermoforming Process By an Experimental Design**

**R Romero, M Aguilera, MI Rodríguez-Borbon, and A Alvarado-Iniesta**

Department of Industrial and Manufacturing Engineering  
Autonomous University of Ciudad Juarez  
Henry Dunant 4016, Zona Pronaf  
Cd. Juarez Chih. México, C.P. 32310

Corresponding Author's e-mail: [rromero@uacj.mx](mailto:rromero@uacj.mx)

**Abstract.** This research was conducted in a manufacturing plant of thermoformed plastic parts which are used primarily for packaging and product protection. One of the manufactured parts is a clamshell whose specification in the flange thickness has a minimum value of 0.004 inches and no maximum limit. If the flange thickness is below the lower limit of specification, the clamshell will present a quality failure in relation to its functionality. The clamshells are manufactured on a thermoforming machine with eight cavities. An experiment was designed using 32 flange thickness measurements for every one of the cavities obtaining Cpk (process capability index) values lower than 1.33 in six of eight cavities. The proposed objective is to obtain a 1.33 Cpk in all cavities using the methodology of Design of Experiments. The results show an increase in Cpk above of 1.33 in all cavities and with an total average of 1.869.

*Keywords:* Thermoforming process, process capability index, design of experiments