

SUMMARY

**DIMENSIONAL STUDY OF THE WEAR AND LIFE OF 3D PRINTED MOLDS
USED TO DEFORM SHEETS THROUGH THERMOFORMING.
USE PROTOCOLS AND DATA PROCESSING METHODOLOGY.**

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In recent years, body scanning and comparison of bodies in order to acknowledge the dimension difference has taken a huge step forward with modern conformation processes such as additive manufacturing and the ease of creating and treating bodies for further scanning and comparison.

This project does consist on exploring the capabilities or limitations of a coordinate machine (CMM) and a 3D scanner, as well as the usage of different software, through the analysis of the wear of 3D printed die of a thermoforming operation, in order to establish usage protocols, methodology recommendations, etc. for the processing of the data taken and, thus, be able to make a comparison between the results obtained. Also, the thermoformed plastic PC and PVC sheets have been also been studied and analysed dimensionally.

Therefore, the results obtained has allowed to study:

- The dimensional accuracy process of thermoforming, via 3D scanning and CMM hardware, and different software,
- Proposition of a valid CMM methodology analysis for the thermoformed DIE, PC and PVC data,
- Propose a valid 3D Scanning methodology analysis for the thermoformed die, PC and PVC data,
- Evaluate and quantify the die wear during the thermoforming process,
- Evaluate and quantify the PC and PVC wear during the thermoforming process,
- Obtain of an optimized methodology for treating CMM and/or 3D scanned data.

After the search of a protocol and data process which could allow processing data from, CMM machine data and 3D scanned data and comparing it as well, a comparison method has been created which does not only allow to compare the dimensional accuracies of two similar bodies, being them scanned or profiled via CMM, but also has been possible to detail a methodology to convert the CMM profiled data into Solidworks and compare it with a whole 360° scanned body, in order to take out the height comparison in an exact detailed section.

Even though there are software limitations which have not allowed obtaining ideal results, the future is bright given the constant and speedy evolution of the software industry with regards to the comparison methods and the industry behind, which is looking for an easier way to compare adopted solutions with regards to the design states of machinery or pieces.