





#### IV. ALIGNMENT ANALYSIS OF GEAR WEAR PARTS AND STANDARD PARTS

Import the digitized model of wear gear got from the previous step and the standard model in a three-dimensional analysis software Geomagic Qualify 11. And use the best fit alignment method to make a alignment registration, alignment effect is shown in Figure 8. The brown one is the standard model of involute straight tooth cylindrical wear gear part which as the reference model. The gray one is the wear gear digital model for the test model. The deviation of approximate location and extent between digital model and the standard model can be observed in the best-fit alignment state.

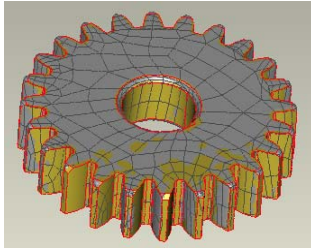


Figure 8. The alignment of the standard model and the digital model registration diagram

After “3D compare” function analysis, we can obtain the chromatography deviation map of two models as shown in the Figure 9, the deviation of most area are in the range of -0.160 to 0.160, it mainly because of spraying the developer to gear before scanning. Tooth chamfering is not the structure to repair in this paper, so the precise size of the chamfer is not considered when drew standard CAD model. It makes a large positive deviation in tooth, it will not be considered. Obviously we can see two tooth surface which be man-made destruction have maximum deviation.

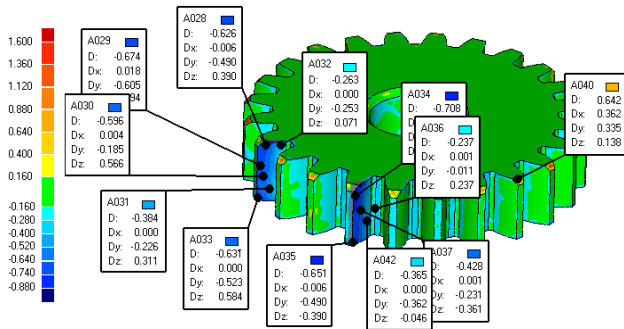


Figure 9. Contrast chromatograms and wear values mark between the standard model and the digital model

Create comments in the badly worn areas can get the Specific deviation marked value in this point. Place where the most serious damage is the addendum, the amount of wear is 0.708mm, the amount of wear gradually decreases from the addendum to the tooth root, the tooth root wear 0.237mm, the data obtained matched with the actual gear wear values , we can determine processes and parameters of laser cladding to repair the wear gear according the wear deviation .

#### V. CONCLUSION

In this paper, use the method of reverse engineering to get the point cloud of wear gear, then obtain the entity CAD model of wear gear after a series of processing. Get wear location coordinates and the data of wear amount after alignment analysis between it and its standard CAD model. And quantitative analysis of the amount of wear is achieved

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