CONCLUSIONS

Gear strength was dependent on temperature and less on injection rate. Further, the type of tooth interaction, single or multiple, was more important than the location of the interaction relative to weld lines. Moving the sprue location to the middle of the mold could provide additional failure modes. Simulation of this showed a residual shear stress concentration through the middle of the gear, as well as additional air trap formations.

By applying the formulated equation, tooth strengths can be predicted based on the melt temperature and injection rate. Standard tensile tests can help predict tooth strength. However, there is a large percent difference that must be factored in. Fluctuation within the data was within the expected material properties of plastic. Quality control testing using expert analysis proved inconsistent.

The cooling times currently used were found to be more than sufficient. Decreased cooling times can increase the rate of production without sacrificing strength and quality. The increased productivity translates into a lower cost per gear.