UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE & ENGINEERING

Triumph Group, Inc.

Triumph Group – Executive Summary
Improving the Manufacturing Cycle time in the Product of Jet Engine Shafts

In the Manufacturing cycle of a large voluminous part like a turbine shaft or a helicopter rotor, there are usually large number of steps, typically around 70. These processes include Milling, Drilling, Boring, Grinding and Straightening, among others. Some of these processes are critical depending on their final application. Triumph Gear Systems deals with such products as turbines and shafts for major corporations such as Pratt and Whitney, General Electric and Honeywell.

Our project deals with the study of the entire processes of two parts, one for General Electric and one for Honeywell, and determine redundancies and inefficiencies, if any, in the lines of these products. The current method followed by Triumph has an average of 71 steps for each part. We began our study by reviewing the information given by Triumph, The main processes include Grinding, Drilling and Straightening. We carefully analysed the information provided by Triumph and created a process flow diagram of our own for each product. The new diagram contained fewer steps than the current process employed. Because of the reduction in the number of steps, the time saved translated into higher efficiency for the two products. The GE shaft current process employed 60 production steps was improved to 33 steps and the Honeywell shaft improved from current 82 steps to 48 steps. This leads to an overall yearly savings of $331,200 based on two assumptions: machine cost at $120/hour, and a production demand of 200 pieces per year for each.

A study of this magnitude and part criticality requires several more validation steps and incorporation of data such as material properties, machine limitations, and quality checks. The produced pieces require finest manufacturing practices, have miniscule tolerances, and undergo immense speeds stresses during their lifetime. As both of these parts are fundamental machine components for helicopters and turbines, a minor error can both endanger human lives and cost a lot for the organization manufacturing the parts. Therefore, with increased time and resources, this study should be validated. However, assuming a conservative savings of even 10%, leads to a savings of $33,120 which is substantial.