Adaptive Motor Frame Plate Process

Overview
An area of extreme importance in Ford’s global operations are the reliability of conveyor drive motors. When these electric motors fail, Ford must quickly engineer a custom motor mount unless an identical spare motor is available. The impact of production loss at any Ford assembly plant results in thousands of dollars of lost revenue. The Ford Global Team was tasked with identifying processes and tools that will expedite the motor swapping process at Ford’s Ohio Assembly Plant.

Objectives
- Develop a viable process to expedite the swap of a failed conveyance line motor within a Ford assembly plant
- Develop a physical product to accompany the developed process (e.g. adaptive frame plates)
- Develop an intuitive computer program via Microsoft Excel to make the motor swap process seamless and highly effective
- Lastly, perform all of the aforementioned objectives through an international effort with five students at Seoul National University in South Korea.

Approach
- The team began by determining detailed and general customer needs through communication with technical representatives from Ford Motor Company such as Joseph Lee, Robert Brosko, and Mark Garcellano.
- The team utilized an AHP matrix to assign weighted values to the general needs of the customer.
- After identifying the customer needs, the team devised multiple design concepts.
- The list of possible designs were narrowed through on-site visits, initial mechanical analyses, and the ease of implementation of each designs.
- A high-level patent search was performed to eliminate intellectual property infringement.
- The team settled on the Adaptive Motor Frame Plate Process as a final design concept consisting of adaptive frame plates and an accompanying Excel computer program.
- Motor combinations were examined by evaluating motor mounting footprints, motor shaft heights, motor horsepower, motor speed, motor torque, and motor variable drive characteristics.
- CAD models were developed for each adaptive frame plate design.
- One out of the six frame plates was manufactured by the team from 12 x 12 x 0.5 inch cold rolled steel plate.
- Theoretical testing was performed using the Excel computer program and the manufactured frame plate.

Outcomes
- The team was able to develop six adaptive frame plate designs that accommodate 31 of 48 unique motor combinations at Ford’s Ohio Assembly Plant.
- The final product was made seamless by way of an Excel computer program. The Excel computer program contains all possible motor swap information with the accompanying adaptive frame plate.
- Ford Motor Company was greatly satisfied with the Adaptive Motor Frame Plate process and plans to quickly implement the process at the Ohio Assembly Plant.