

*Student: Patrick Byrnes, Bachelor of Engineering (Honours) in Mechanical Engineering  
College : Cork Institute Of Technology*

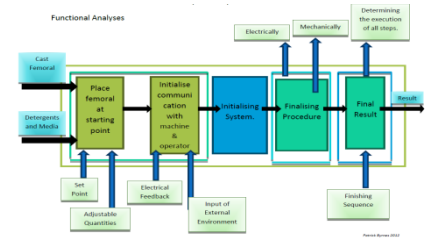
Implementation of automation technology into any modern manufacturing process poses many serious challenges and opportunities. Key factors such as timing and scheduling, financial planning, technical support acquisition and provision, quality control and cost saving all illuminate themselves as a threat – additional challenges include strict medical body regulation and the highest quality standards. Medical device companies, who do take the plunge into the automation world, often face enormous corporate investments and suffer large lead times of implementation, all in the interest of stream lining production and lowering product cost.



Femoral Orthopaedic Implant

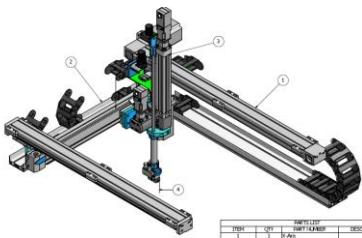


Current Process Manufacturing Route

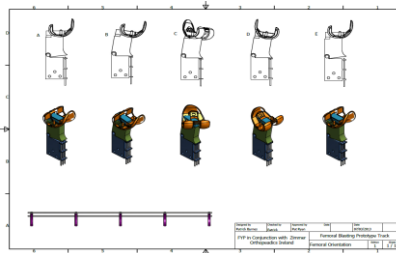


Extensive Systematic Design

The achievement of a yellow belt in Six-Sigma and the valuable experience gained on work placement at Zimmer Orthopaedics, Ireland, enabled the author, through independent scrutinisation and analysis of existing manufacturing practices and the development of streamlined ergonomic techniques, to identify, formulate and progress this real world manufacturing project. Initial analyses identified existing ultrasonic cleaning and blast processing lead times as severe and sustained ‘bottle neck’ locations. Rigorous time studies, capability studies and gauge repeatability and reproducibility studies are carried out in order to fully characterise and simulate the current process. Various modes of systematic and experimental process design are undertaken by the author to raise the project classification / approval to that of ‘budget venture’. Breaking the manual mould, while simultaneously incorporating technology at minimal cost, is key to project feasibility and recognition. Design concept development, assessment, progression and optimisation are undertaken. Prototype manufacture, commissioning, testing and optimisation is achieved. The critical integration of FDA and ISO quality standards into final design is central to the project ethic and success. The developed process solution is to be integrated into Zimmer’s current manufacturing process.



CAD Concept Generations



Part Orientation Plotting



Prototype Development

Ireland hosts over 250 medical device technology companies - many of which contribute to the orthopaedic implant manufacturing industry. The innovation incorporated into this developing budget product has already attracted significant third party interest. The application to smaller outsource manufacturing companies is under progression. The devised process solution significantly demonstrates further applications in the manufacture of other medical device products.