

## IPRO 321

### Abstract

Paper shredders protect privacy by destroying confidential material. Unfortunately, the paper shredders of today are noisy, unreliable, and expensive. Our sponsor, the Manhattan Group, is a company in the multi-million dollar business distributing paper shredders under the “Royal” brand name around the world

To improve upon their paper shredder, the Manhattan Group requested the team to conduct research on how to design a better paper shredder, to look into what components would be best for reliability, noise, and the amount of paper shredded at one time. To accomplish this, the team would have to conduct research on the shredder head, motor, and the gear train, and to test these components for torque, horsepower, and noise output.

The team divided into 3 groups based on fields of study and personal interests. The mechanical team tested the shredder head to determine the noise output made by the teeth, and the torque output, depending on the number of sheets being shredded, as well as the type of cut the shredder head made. The electrical team tested the noise output of the motor made while running, and the horsepower output of the motor, to determine the amount of torque it would put into the gears and to run the shredder head depending on the amount paper being shredded. One part of the mechanical worked on developing new designs, to try to implement innovations that the sponsor would like to see. They looked into adding a feeder system as well as into new shredding methods and shredding systems

The research on the shredder head and motor determines a gear train ratio, and the needs of torque and horsepower are also implemented into the gear train, which will reduce the noise as well, optimizing the gear train. With this research, the Manhattan Group has an edge on the competition with potentially more reliable and less noisy paper shredders at lower prices.