

Component 1: Acetal Plastic Gear

Function Requirement	Design Parameters	Analysis	Resources	Risk	Countermeasures
Gear must be able to support the stress of door to lift	1.5 inch Pitch Diameter 48 Teeth 20 Degree pressure angle	$F = M \cdot a$ $T = F \cdot r \cdot \sin \theta$ Velocity at pitch = $Rpm \cdot \pi(D) \cdot \frac{1}{12} \text{in}$ Bending Stress formula for gear = $\frac{TD}{FY} \cdot \frac{V}{120000} + \frac{V}{120000}$	Physics Solid Mechanics Gear tooth strength Analysis (sourced in webpage) Engineers Edge Lewis factor Table (Sourced in webpage) McMaster and Carr	Gear could fail Material could break	Sturdy material Gear able to handle stresses Use a sturdy and tested motor

Component 2: Carbon Steel Gear

Function Requirement	Design Parameters	Analysis	Resources	Risk	Countermeasures
Gear must be able to support the stress of door to lift	2 inch Pitch Diameter 20 Teeth 20 Degree Pressure angle	$F = M \cdot a$ $T = F \cdot r \cdot \sin \theta$ Velocity at pitch = $Rpm \cdot \pi(D) \cdot \frac{1}{12} \text{in}$ Bending Stress formula for gear = $\frac{TD}{FY} \cdot \frac{12000 + V}{120000}$	Physics Solid Mechanics Gear tooth strength Analysis (sourced in webpage) Engineers Edge Lewis factor Table (Sourced in webpage) McMaster and Carr	Gear could fail Material could break	Sturdy material Gear able to handle stresses Use a sturdy and tested motor

Component 3: Cast Iron Gear

Function Requirement	Design Parameters	Analysis	Resources	Risk	Countermeasures
Gear must be able to support the stress of door to lift	1.5 Inch Pitch Diameter 18 Teeth 14.5 Degree Pressure angle	$F = M \cdot a$ $T = F \cdot r \cdot \sin \theta$ Velocity at pitch = $Rpm \cdot \pi(D) \cdot \frac{1}{12} \text{in}$ Bending Stress formula for gear = $\frac{TD}{FY} \cdot \frac{V}{120000} + \frac{V}{120000}$	Physics Solid Mechanics Gear tooth strength Analysis (sourced in webpage) Engineers Edge Lewis factor Table (Sourced in webpage) McMaster and Carr	Gear could fail Material could break	Sturdy material Gear able to handle stresses Use a sturdy and tested motor