

High-Torque Integrated Woodchipper

Company Background

Automated Biomass System manufactures integrated firewood processing and timber handling equipment. ABS offers residential and commercial log splitters, firewood processors, and hydraulic conveyors at affordable prices built to last many years of trouble-free service for loggers, farmers or full-time firewood operators.

Project Description

Design a woodchipper to be used in conjunction with the TW-2 log splitter. The woodchipper will be utilized to chip excess wood that is unable to be split for usable firewood, starting at approximately 6in diameter cross sections to promote sustainable forestry. Identify through calculation and analysis the type of chipper, drive system, roller feeder, and chipper knife with the goal of ensuring effective and reliable operation. The chipper will be powered hydraulically, using the cylinder from the TW-2, and connected via quick-connects.



Early Design Concept

Selected Device: Drum Chipper

Current Required Specifications:

Roller Diameter = 6-10in

Revolutions per Minute = 2530 RPM

Horsepower = 14 HP

Material = Solid Round Cold Process Steel

Two Cutting Edges

Less torque required to cut through wood

Lower material removal rate at same angular velocities

Increased drum momentum

Lower machining complexity

Four Cutting Edges

Increased torque opposing cutting due to more cutting edges

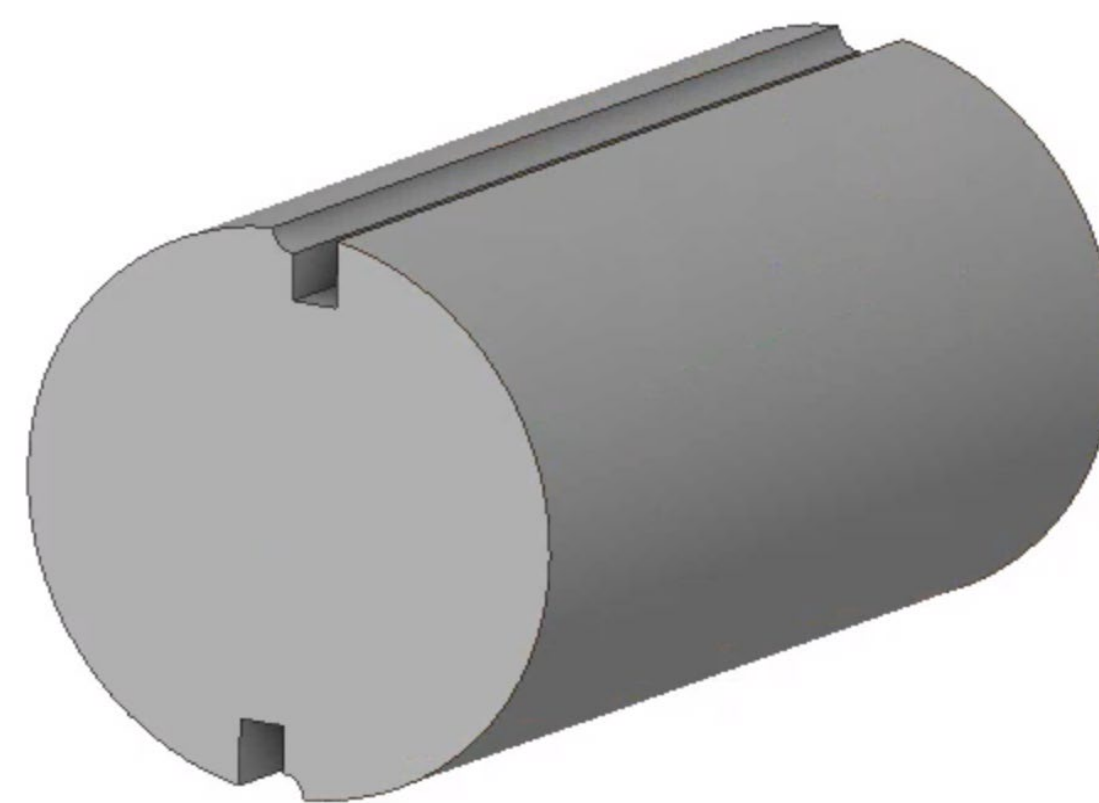
Higher material removal rate

Decreased drum mass- easier to get to speed

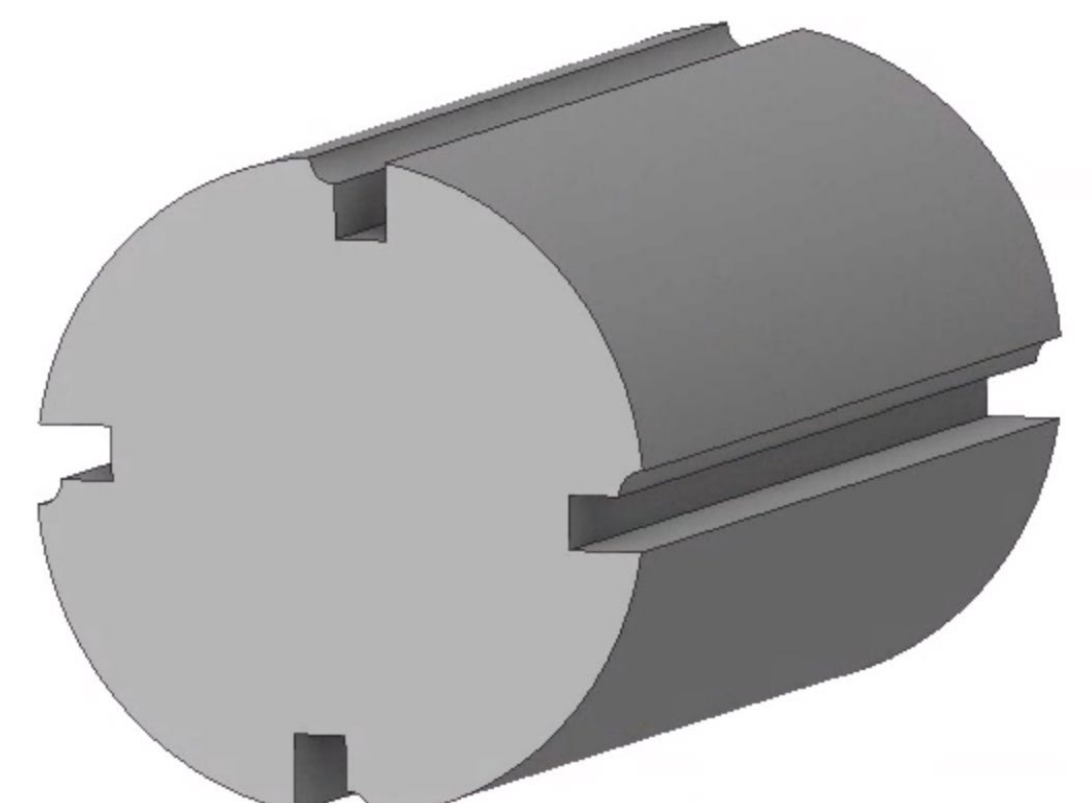
Increase waste from machining

Future Design Considerations

- Method of failing wood: Tensile v. Shear failure
- Number of cutting edges on drum
- Knife edge dimensions
- Knife material and lifespan prior to replacement
- Transmission ratio of power from hydraulic to mechanical drive
- Machine guarding for safe operation of chipper



Potential Two-Blade Design- Blades would be mounted to curved edge of cut-out



Potential Four-Blade Design- Blades would be mounted to curved edge of cut-out

Semester Deliverables:

1. Team Contract
2. Kick-Off Meeting
3. Whitepaper
4. Preliminary Design Review
5. Poster
6. Risk Memo
7. Final Report
8. Final Project

Company Deliverables:

1. CAD Models:
 - Chipper Drum
 - Belt Drive System
 - Chipper Knife
 - Feed Roller
2. Calculated Data and Analysis
 - Chipper Drum
 - Belt Drive System
 - Chipper Knife
 - Feed Roller



Faculty Mentor: Dr. Ben Akih-Kumgeh



Brinley Bruening



Christian Meadows



Kiana Abreu



Pablo Morales