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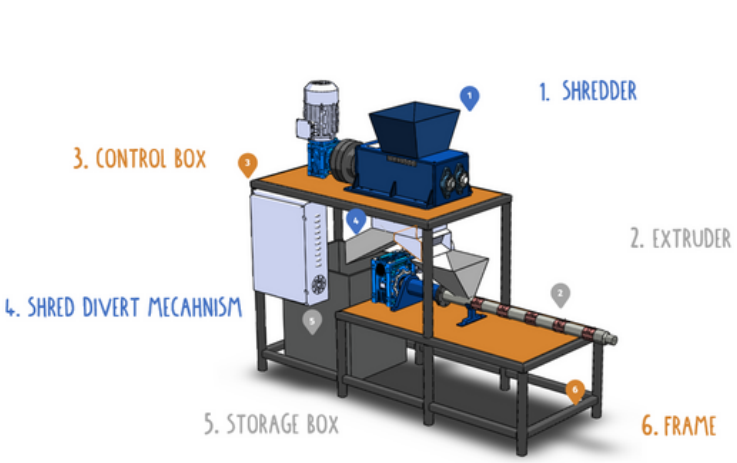
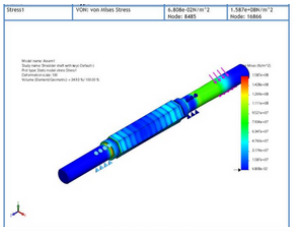
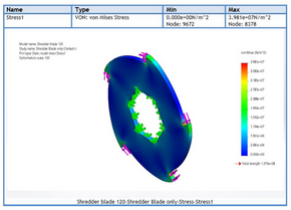
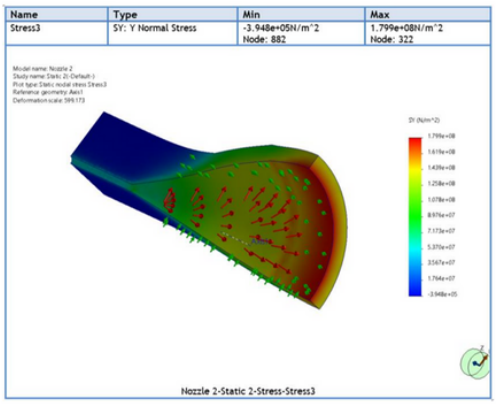
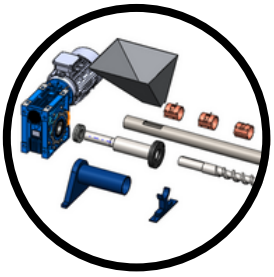
## AFFORDABLE & USER-FRIENDLY PLASTIC RECYCLING MACHINE

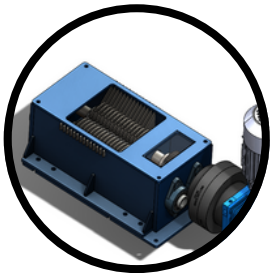


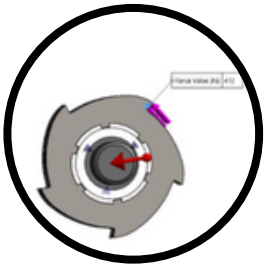



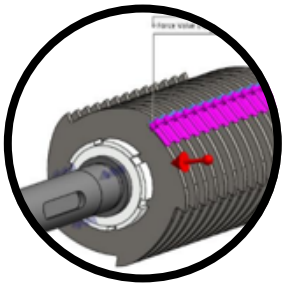


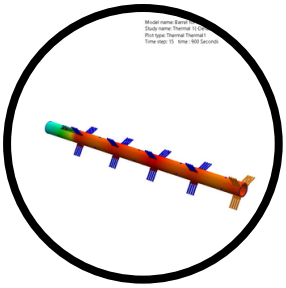










**What?**

- Designed an innovative plastic recycling machine tailored for **Small and Medium Enterprises (SMEs)** in Ethiopia.
- Focus on addressing the escalating environmental threat posed by plastic waste, especially in high-waste regions like Addis Ababa while concurrently creating Economic Opportunities.

**How?**

- Achieved affordability through modularity, incorporating a **shredder, an extruder, and interchangeable molds** into one system.
- Market analysis guided machine capacity, balancing cost-effectiveness and income generation, reducing material usage and machine size for versatile product creation.
- Modular design includes **inbuilt storage**, **a shred divert mechanism** offering flexibility in production (flakes or extruded filaments).
- Implemented a **PLC-based control system** for seamless operation, coupled with a user-friendly interface tailored to the tech literacy of potential users.
- Utilized **Python** for automation of **design calculations** and **data analysis**, ensuring precision in engineering decisions.

**Results**

- Rigorous simulation verified the machine's robustness against vibration, static, and fatigue failure.
- Specifics include shredder blades withstanding a force of **412.5 N** and a torque of **643.5 Nm** on each shaft.
- The extruder can operate in a temperature range of **265°C** up to **290°C**. maintaining performance
- Cost-effective design, with the machine being **40%** more economical than commercially available alternatives.
- A shredding capacity of up to **50 kg/hr**, offering a reliable solution for SMEs in plastic recycling.