

Recycled Drill Generator

Team Members: Spencer Burnett, Maia Carrillo, Ben Ellis,
Jaylyn Jones, David Ko, Cory Uebelhor, Evan Walker
Mentors: James Condron



OVERVIEW

Unusable cordless power drills with dead batteries take up space but have useful hardware. This is important to reduce waste and generate quantifiable energy using available drill mechanisms.

Requirements

- Charge a 12V battery
- Battery management
- Thermal protection
- Characterize mechanical and electrical energy within system

Experimentation and Concepts

The method of energy generation is modeled after windmills and waterwheels, which have a general efficiency of around 20-40% due to drag and air resistance.

Charge Rate

Given a constant input rotation of 300 RPM it will take approximately 3.9 hours to charge the battery from 10% to 100%

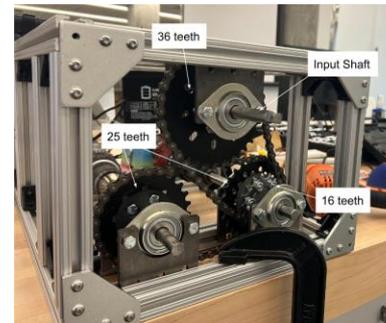
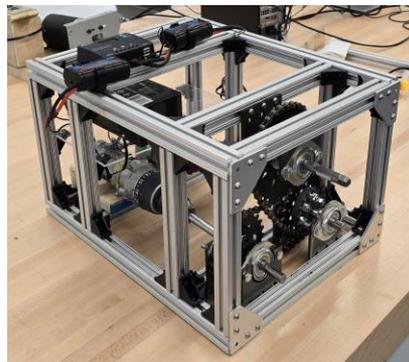
$$7 \text{ aH} / 1.8 \text{ A} = 3.89 \text{ hours}$$

Final Design

Gear 1: 32 teeth Gear 2: 16 teeth
Gear 3 & 4: 25 teeth

$32 \rightarrow 16 = 25 \rightarrow 25$ Gear 1 to Gear 2
Gear 2 is on same shaft as Gear 3
Gear 2 to Gear 3

Input: $204 \text{ rpm} * (32\text{T}/16\text{T}) = 408 \text{ rpm}$
Both drills supplied with 408 rpm



Final Design Description

80/20 aluminum, 3D printed hubs and housings, recycled cordless drills, DC incline meters, and a solar charge controller were used to create a compact but efficient design that would allow us to charge a 12V 7A sealed lead acid battery.

Testing

RPM	Power in (W)	N/m	In-Lb	Time Stamp	Power out (W)
110.4	0	0	0	20	0
187.1	0	0	0		0
198.3	0	0	0		0
252	0	0	0	27	0
299	0	0	0		0
337.2	49.8	0.00141	0.01248		34
324.3	13.7	0.00040	0.00357	37.3	38
227.2	0	0.00000	0.00000		0
365.1	59.7	0.00156	0.01382		14.4
305.6	46	0.00144	0.01272	47	47.4

