

Concept Design

Mechanical Engineers: **\$39.65** hourly*
(17-2141)

Perform engineering duties in planning and designing tools, engines, machines, and other mechanically functioning equipment. Oversee installation, operation, maintenance, and repair of equipment.

Prototype Development

Machinists: **\$19.13** hourly*
(51-4041)

Set up and operate a variety of machine tools to produce precision parts and instruments. Includes precision instrument makers who fabricate, modify, or repair mechanical instruments...applying knowledge of mechanics, mathematics, metal properties, layout, and machining procedures.

Field Testing

Inspectors, Testers: **\$17.09** hourly*
(51-9061)

Inspect, test, sort, sample, or weigh nonagricultural raw materials or processed, machined, fabricated, or assembled parts or products for defects, wear, and deviations from specifications. May use precision measuring instruments and complex test equipment.

Film Documentation

Camera Operators: **\$23.29** hourly*
(27-4031)

Operate television, video, or motion picture camera to record images or scenes for various purposes, such as TV broadcasts, advertising, video production, or motion pictures.

Film Documentation *(continued)*

Film and Video Editors: **\$29.75** hourly*
(27-4032)

Edit moving images on film, video, or other media. May edit or synchronize soundtracks with images.

Fabrication Drawings

Mechanical Drafters: **\$24.62** hourly*
(17-3013)

Prepare detailed working diagrams of machinery and mechanical devices, including dimensions, fastening methods, and other engineering information.

Instruction Manuals

Technical Writers: **\$31.85** hourly*
(27-3042)

Write technical materials, such as equipment manuals, appendices, or operating and maintenance instructions. May assist in layout work.

CAD Documentation

Industrial Designers: **\$29.76** hourly*
(27-1021)

Prepare detailed working diagrams of machinery and mechanical devices, including dimensions, fastening methods, and other engineering information.

Machine	Concept Design	Prototype Development	Field Testing	Film Documentation	Fabrication Drawings	Instruction Manuals	CAD Documentation	Development Cost - Total
Hydraulic Motor	\$12,688	\$7,591	\$4,102	\$2,449	\$985	\$2,548	\$1,190	\$ 31,553
Industrial Robot	\$25,376	\$21,887	\$4,102	\$3,510	\$1,477	\$3,822	\$1,786	\$ 61,959
Metal Roller	\$12,688	\$33,182	\$4,102	\$4,362	\$1,970	\$5,096	\$2,381	\$ 63,781
Nickel-Iron Battery	\$6,344	\$5,296	\$4,102	\$1,596	\$492	\$1,274	\$595	\$ 19,699
Open Source Car	\$25,376	\$33,182	\$4,102	\$4,570	\$1,970	\$5,096	\$2,381	\$ 76,677
Universal Power Supply	\$25,376	\$12,091	\$4,102	\$2,449	\$985	\$2,548	\$1,190	\$ 48,741

Operations

Organization/Revenue Development

Machinery Total\$ 302,409

Operations Total\$ 30,000

Surdna Grant Total\$ 332,409

*Average hourly wage - U.S. Bureau of Labor Statistics

Hydraulic Motor

The backbone of the GVCS platform, the hydraulic motor is a modular unit that can be transferred from one machine to another to use liquid fluid power to control heavy equipment. It enables the creation of the following machines:

- Industrial Robot
 - Dimensional Sawmill
 - Biomass Pelletizer
- Bioplastic Extruder
 - Rod and Wire Mill
 - + 24 other machines

Nickel-Iron Battery

The Nickel Iron Battery is the primary electrical renewable energy storage device for the GVCS.

- Long lifetime of 50 years
- Open source design of electrodes
- Cells scalable: from 1 to 50kW hrs
- Nickel and iron obtained from reprocessed scrap.
- Completely closed loop material cycle ecology.

Industrial Robot

The industrial robot is task versatile, multi-way programmable, repeatably accurate, and modular with scalable reach and payload. It serves a universal function, mimicking a human arm, so it can fill in (after being programmed) for any repetitive operation not better done by humans; other times, the industrial robot can be directly operator-controlled to act as a mega-arm machine where the high reach, payload, and working envelope are advantaged.

Open Source Car

The OS Car will be a lightweight and aerodynamic two passenger long range car that will be fueled with ethanol biodiesel. The current plan is for the car to have a reverse trike configuration: two front wheels and one rear wheel which is the only driven wheel.

As the car design matures, some components from donor vehicles and off-the-shelf components can be replaced by scratch-built open source components. If desired, forks can be spawned from the original project for variants such a four or five passenger car, or perhaps a car with a hybrid electric powertrain.

Metal Roller

Metal rolling is a centralized industrial process that is done in large-scale (kiloton per day) steel mills. We aim to open-source this technology for use in small-scale (ton per day) flexible fabrication facilities which allow local communities to produce virgin metal from scrap feedstocks.

Universal Power Supply

This is a combination inverter, converter, pulse-width modulation current controller, and high frequency power supply for applications from off-grid power, charge controllers, to power supplies for welders, induction furnaces, and plasma cutters.

A large range of power electronic devices is desirable within the infrastructure of communities. Having an individual power supply for each is redundant and expensive. A modular UPS construction kit is desirable as an analogue to the ‘industrial-strength Lego’ that we have already demonstrated for heavy mechanical hardware infrastructures.

Organization/Revenue Development

OSE will file its 1023 this year, and will begin laying the organizational foundation for long-term success and national expansion. We are also engaged in a revenue development campaign to fund our programs.