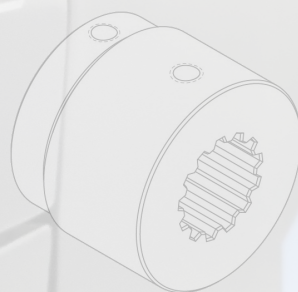
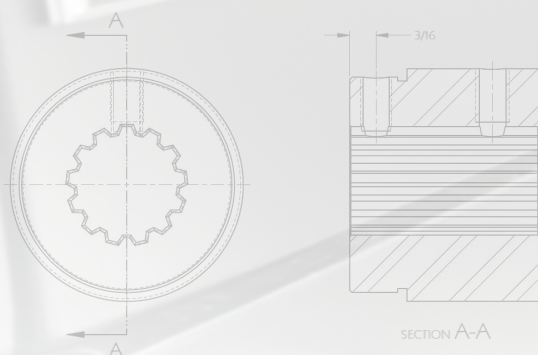
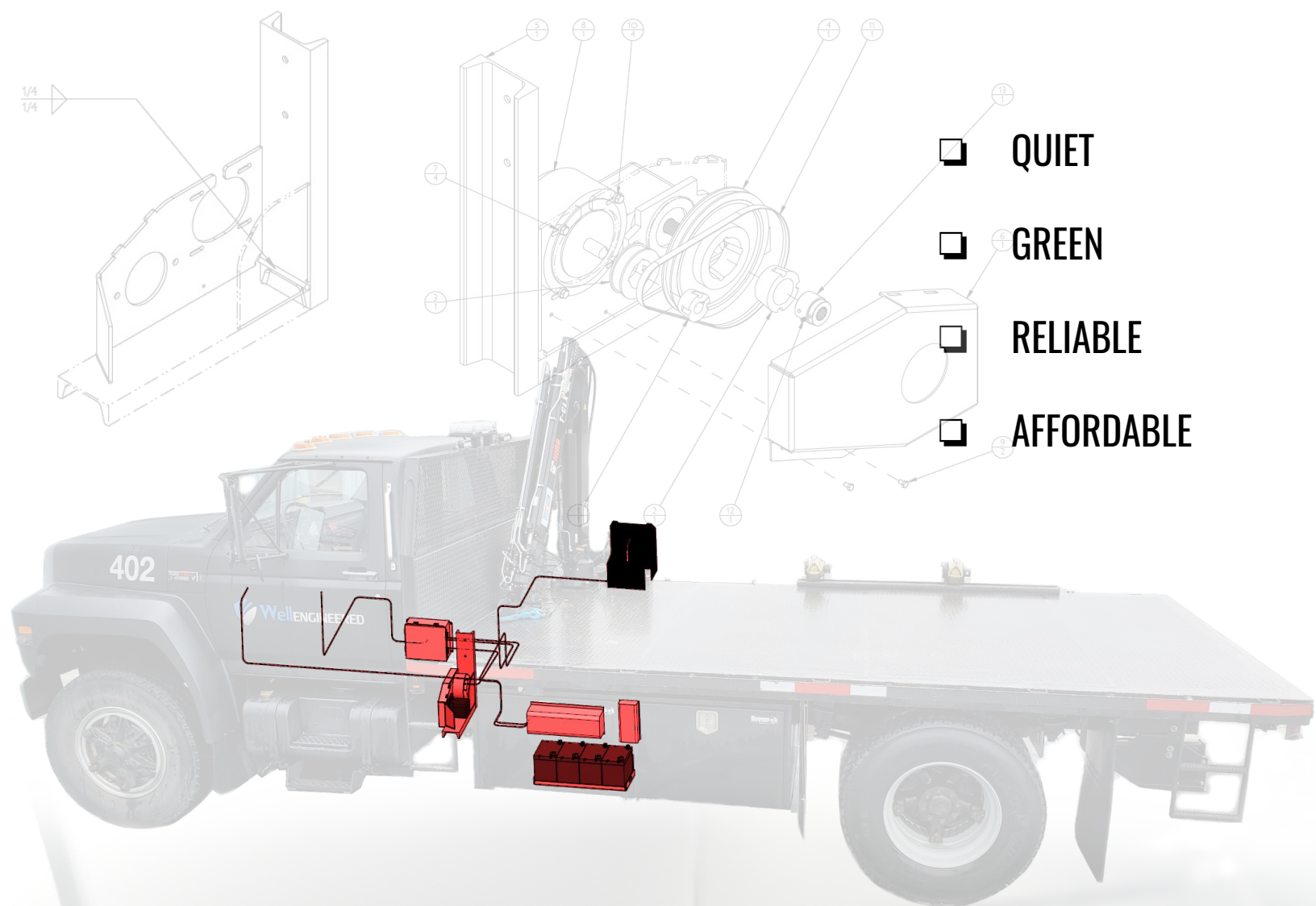


# HPTO

Hybrid Power Take-Off



Well Engineered is a customer and employee focused manufacturing company, specialising in custom product development. Since 2016, we have been providing high-quality products and services at an affordable price through innovation.

The **HPTO** is **QUIET, GREEN, RELIABLE**, and **AFFORDABLE**.

The HPTO was developed by Well Engineered to provide an alternate power source for the power take-off (PTO) of the vehicle.

In order to operate the PTO system, the vehicle must be running, expelling exhaust and noise into the environment. Electric PTO systems are available for purchase. However, they are expensive, and they also remove the ability to use the conventional engine as a backup.

The HPTO is a a joint electrical and mechanical system that can be used to power the PTO without removing the existing conventional power source. The HPTO consists of four subsystems:

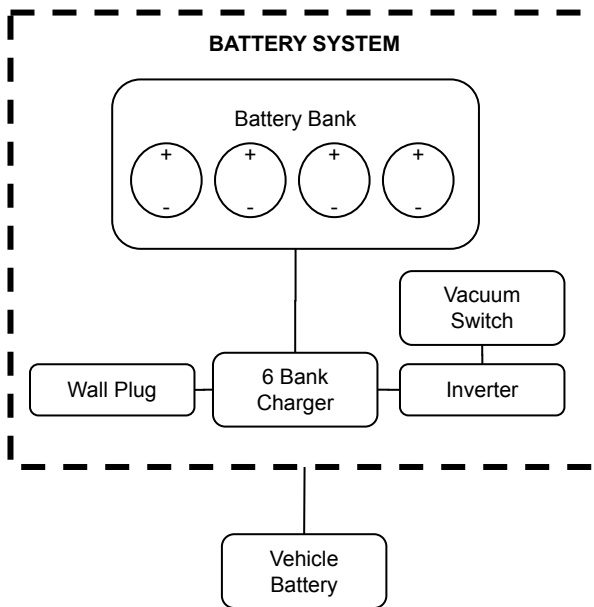
1. A Battery System, containing four 12V batteries, a six bank charger, an inverter, an engine vacuum switch, a relay connected to circuitry, and the wall plug.
2. A Control Box that houses the controller that operates the motor and relevant circuitry.
3. An Operator Interface System that contains the crane throttle, pause switch, and power display panel. This system also contains the cab throttle and system power switch.
4. A Drive System that includes the poly chain assembly, the electric motor, chain, sprockets, bushings, and cover.

In some cases, the HPTO can also be used to power the drivetrain of the vehicle, so it can be driven short distances at a walking pace. This feature allows the user to move the vehicle while in enclosed spaces or in environmentally sensitive areas without expelling fumes and exhaust. Relay logic is included to prevent inadvertent motion of the vehicle, and there are many intrinsically safe features. Even without training, it is procedurally very difficult to inadvertently set the vehicle in motion. This feature is currently only available on manual transmission vehicles with a transmission-mounted PTO.

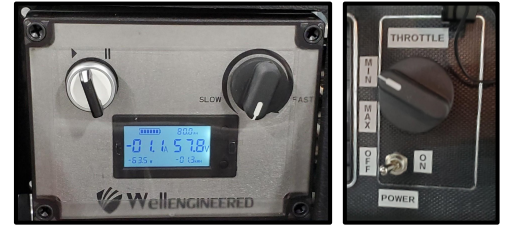
## System Overview



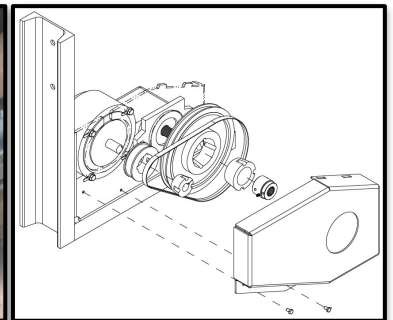
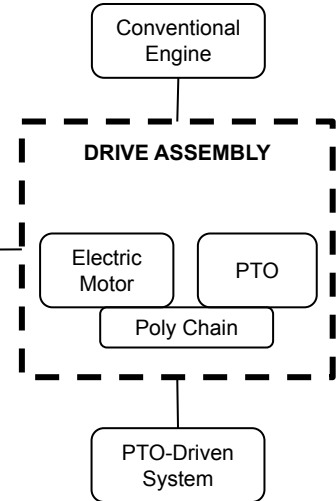
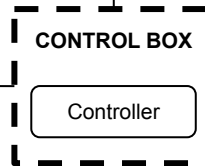
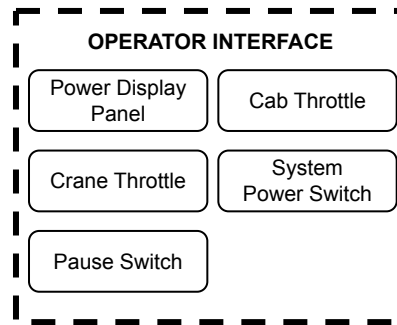
**Battery System**



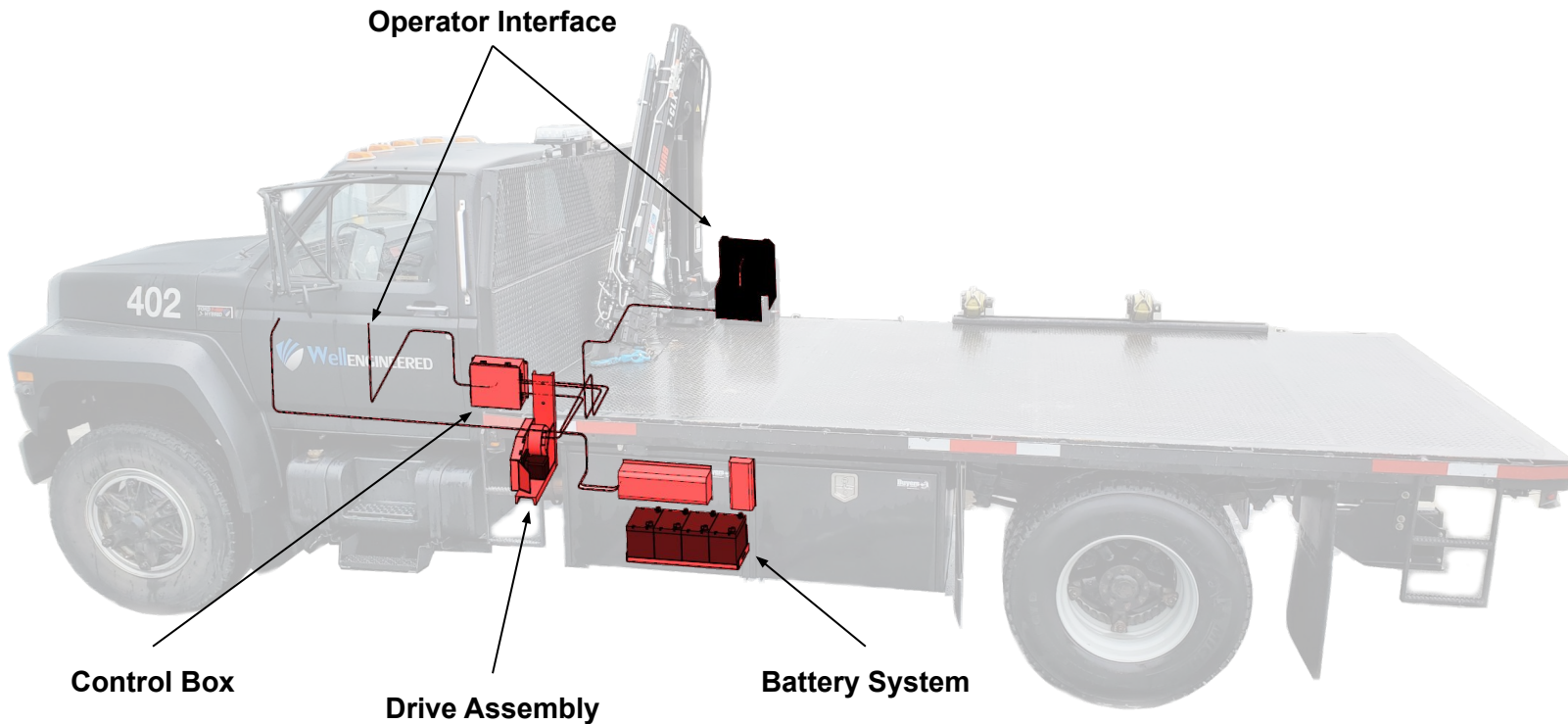
**Control Box**



**Operator Interface**



**Drive Assembly**



Well Engineered operates from a modern 6450 square foot facility in Dartmouth, Nova Scotia, Canada. Our 5380 square foot manufacturing space is optimised for efficient work flow, resulting in a high quality product that is built to the highest standards of workmanship.

In addition, Well Engineered has an ISO 9001:2015 certified Quality Management System (QMS). This standard is used by organizations to demonstrate their ability to consistently provide products and services that meet customer and regulatory requirements and to demonstrate continuous improvement.

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