

# CONTROL SOLUTIONS FOR MOBILE VEHICLES



# MOBILE MACHINE CONTROL FROM CONCEPT TO PRODUCTION!

What makes Cross Company's Mobile Hydraulics and Controls Group unique is our unmatched expertise in solving the most challenging applications in both hydraulic and electronic control systems.

We understand the mechanics and control of your vehicle's design. Our team of application designers and engineers offer custom system solutions designed to optimize the control of your machine.

## CUSTOM SYSTEM SOLUTIONS

- Utilize open source Codesys 2.3 and Codesys 3.5 software with our CAN based controllers so that you own the software, and can make changes as you see fit
- Utilize multiple hardware platforms that are selected specifically for your application
- Expertise with interfacing to Tier 4 diesel engines
- Vehicle electrification: we design, engineer, and implement electronic and hybrid drive technologies
- Custom HMI displays designed for you and your customers' specific needs
- CAN joysticks, switches, and keypads to simplify wiring and troubleshooting
- Utilize Power Distribution Modules for high current applications
- Vehicle diagnostics, data logging, and telematics to increase machine productivity, ease troubleshooting, and provide remote monitoring
- Radio remote control systems for wireless operation of some or all of your machine functions
- Collision Avoidance Systems - both 2D and 3D camera systems for protecting your vehicle and the environment around your vehicle



## Components Designed for On-Road and Off-Road Vehicles

### KEY VEHICLE ELECTRONIC CONTROL PRODUCTS

- CANbus Controllers
- Power Distribution Modules
- Operator Displays
- Engine Displays – Tier 4 final
- I/O and Power Distribution CANbus Modules
- Joysticks – CAN and analog
- Wireless Remote Controls
- CAN Rocker Switches and Keypads
- Position Sensors (proximity, ultrasonic, radar)
- Pressure and Temperature Sensors
- Tilt and Inclination Sensors – CAN and analog
- Electronic Foot Pedals
- Linear Position Transducers
- Telematics

### KEY VEHICLE VISION PRODUCTS



- 2D Camera Systems
- 2D Video Splitters for split screen viewing
- 3D Collision Avoidance Systems (with automated braking)



# Vehicle Electrification

Vehicle Electrification means converting a vehicle with a standard engine and drivetrain with hydraulic driven functions into a full electric vehicle, or some form of hybrid version.

With features like immediate torque and silent operation, coupled with premium performance and efficiency, electrification offers high productivity while lowering fuel and maintenance costs.

EXAMPLES OF MARKETS	BENEFITS OF ELECTRIFICATION
 <p data-bbox="167 721 547 788"><b>AGRICULTURAL IMPLEMENTATION ELECTRIFICATION</b></p>	<ul style="list-style-type: none"> <li>• <b>Waste Reduction:</b> Through optimum settings of the implement</li> <li>• <b>Improved Power Efficiency/Reduced Fuel Consumption:</b> Implement drives how much power is used</li> <li>• <b>Ease of Use:</b> Electric steering provides operator comfort and less wear on mechanical parts</li> <li>• <b>Simple and Safe:</b> Reliable connection between tractor and implement</li> </ul>
 <p data-bbox="167 1010 344 1040"><b>UTILITY FLEETS</b></p>	<ul style="list-style-type: none"> <li>• <b>Noise Reduction:</b> Enables extended work hours</li> <li>• <b>Lower Operating Costs:</b> Fuel and maintenance costs are lower</li> <li>• <b>Emissions Reduction:</b> Eliminates idle emissions</li> </ul>
 <p data-bbox="167 1257 578 1324"><b>GROUND SUPPORT EQUIPMENT, INDUSTRIAL VEHICLES, LIFT TRUCKS</b></p>	<ul style="list-style-type: none"> <li>• <b>Emissions Reduction:</b> Eliminates idle emissions</li> <li>• <b>Convenience:</b> Fuel storage eliminated</li> <li>• <b>Noise Reduction:</b> Allows indoor use</li> <li>• <b>Regenerative Braking:</b> Brake motors used to recharge the batteries</li> </ul>
 <p data-bbox="167 1540 475 1570"><b>NON-MONETIZED BENEFITS</b></p>	<ul style="list-style-type: none"> <li>• <b>Better Communication:</b> Reduced noise for improved safety</li> <li>• <b>Extended Work Hours:</b> Eliminates idling and extends work time available with reduced noise</li> <li>• <b>Public Perception:</b> Electric vehicles are positive, proactive stories for your company</li> </ul>

## LET CROSS COMPANY SHOW YOU AND YOUR CUSTOMERS THE BENEFITS OF ELECTRIFICATION

With a global demand to reduce petroleum usage and reduce harmful emissions, electrification is the path forward. Current legislative policies necessitate an increasing percentage of electric vehicles in order to meet long term public health, petroleum displacement, and climate protection goals.

# Advanced Diagnostics and Telematics

Troubleshooting a vehicle with electronics can be a challenge and costly for your vehicle operators and your service department. Our team of mobile hydraulic control specialists have developed several methods for diagnosing problems on your vehicle to help reduce downtime and reduce costs.

METHODS	SPECIFICS
 <p data-bbox="1721 822 2138 889"><b>LOCAL MONITORING WITH ADVANCED DIAGNOSTICS</b></p>	<ul style="list-style-type: none"> <li>• <b>Custom Display Development:</b> Diagnostics pages with sophisticated I/O status indicators, fault condition icons, and CAN network health</li> <li>• <b>JPEG Files Embedded in the Display:</b> Wiring, hydraulic, and vehicle schematics, vehicle manuals, and custom designed troubleshooting guides</li> <li>• <b>Data Logging:</b> Machine events with a date and time stamp for evaluation</li> </ul>
 <p data-bbox="1721 1211 2138 1278"><b>TELEMATICS: Remote monitoring – CAN to WiFi module (with Bluetooth)</b></p>	<ul style="list-style-type: none"> <li>• <b>Monitor Vehicle for Operating Issues:</b> If a WiFi connection is available, the vehicle data can send data through a router to the cloud for storage</li> <li>• <b>Machine Connection via Laptop or Smartphone:</b> Local connectivity through bluetooth using a laptop or an Android phone application</li> </ul>
 <p data-bbox="1721 1741 2138 1808"><b>TELEMATICS: Remote monitoring using a CAN to GSM radio modem</b></p>	<ul style="list-style-type: none"> <li>• <b>3G/GPS GSM Radio Modem:</b> This radio modem allows transfer of data directly to and from the vehicle controller either in real time or, if in a location without phone reception, is stored for later transmission to a server. This data is then available at all times via an internet portal. This portal data is customized for you and our vehicle.             <ul style="list-style-type: none"> <li>• <b>Lower Costs:</b> Reduce costs associated with travel, service, and downtime</li> <li>• <b>GPS Receiver:</b> Allows for geo-fencing</li> <li>• <b>Data Logging:</b> Can be done efficiently and easily utilizing the portal</li> <li>• <b>Machine Data Stored in the Modem:</b> The modem has memory which ensures reliable storage of data if in a remote area</li> </ul> </li> </ul>

# Value Added Solutions

We are an extension of our customer's engineering department. Our technical sales team, application engineers, and designers work alongside our customers to develop machines that are more efficient, more reliable, more competitive, easier to operate, and are easier to build.

AS PART OF OUR COMPLETE SYSTEMS APPROACH CROSS DESIGNS AND PROVIDES THE FOLLOWING PRODUCTS AND SERVICES:

- VEHICLE PROTOTYPING
- WIRING HARNESES
- CONTROL PANELS



## Service

Our mission at Cross Company is total support of our customers from the start of a project until completion. Projects are not completed until you and your customer agree that this vehicle meets your requirements and the market needs. To assist in meeting these requirements, we offer the following services:

**On-Site Startup of the Initial Prototype:** Allows you and your management team to sign off on the finished product

**Software Training:** We utilize open source Codesys software for programming most of our control solutions and provide training to whatever level you require to support your equipment

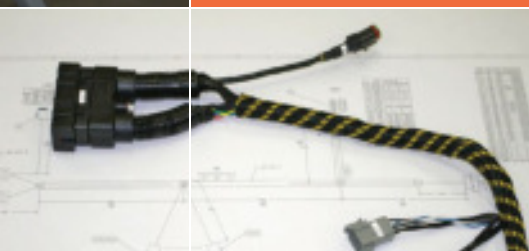
**Design Changes:** Once the prototype is in the field for testing, and you receive feedback from the customer, minor changes may need to be made. Our engineering team will support you with those design changes to project completion

**Supporting Documentation:** We provide supporting documentation such as wiring and hydraulic schematics

For more than seven decades, we have worked closely with our customers to provide professionally designed control solutions to optimize your mobile vehicles design and performance.

[Extensive Online Resources at CrossFluidPower.com/Blog](http://CrossFluidPower.com/Blog)

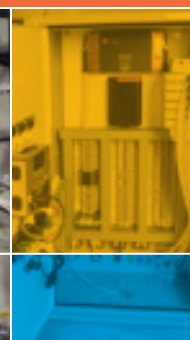
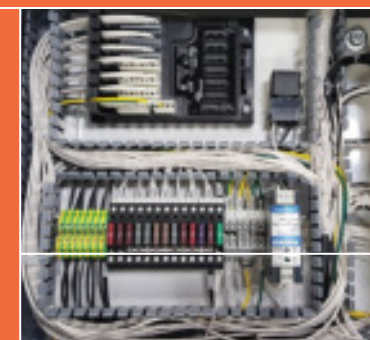
VEHICLE PROTOTYPING



WIRING HARNESES



CONTROL PANELS



# Experts in controls and hydraulics for mobile equipment

- The largest technical staff in the industry
- The most responsive customer service you will find
- Customized solutions guaranteed to work

Mobile Machine Control – From Concept to Production!



**Mobile Systems Integration Group**

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