A scenic view of a winding asphalt road through a forested valley under a dramatic, cloudy sky. The road curves to the left, with a double yellow line on the left side and a white line on the right. The surrounding landscape is lush with green trees and rolling hills. The sky is filled with large, white clouds, and the overall lighting is soft and atmospheric.

CSS ELECTRONICS

CLX000

CASE STUDIES



CSS ELECTRONICS

CASE STUDY

ZERO
MOTORCYCLES

Zero Motorcycles / Premium Electric Motorcycles / USA

ANALYZING RIDE PROFILES OF EV MOTORCYCLES

#electricvehicles #twowheelers #motorcycles #batterydata #bms

About: Zero Motorcycles manufacture 100% electric motorcycles - and are aiming to become the Tesla of motorcycles with a focus on high performance EV bikes

What PROBLEM did you need to solve?

Electric vehicle systems have a lot of critical information on the CAN bus. Many different devices all need to work together. We needed a cost effective, simple to use CAN logger to collect data on our EV systems to diagnose issues. Before the CLX000 I used a BeagleBone Black with a custom CAN logger program, but it took >15 seconds to boot and had issues if it lost power. Also, the CAN logger had to be small to hide on the bike

HOW did you solve it?

We got one of the CL1000s - we loved it and ended up purchasing more. We have also used the Kvaser Memorator Pros, but they cost ~1600\$ each. For data collection, having a larger data sample size for the same budget is a no brainer

“We loved it! And I can put 5 of the CLX000 CAN loggers on our test fleet for the price of one of the Memorator loggers”

What BENEFIT has this led to?

We have been able to track many issues in our system. Due to the low cost and small size, we can also send the loggers out with customers to get “ride profiles”. With the CLX000s we can now record all data during a ride and “playback” the data into our test systems (motor dyno, battery simulator, etc)

Why did you CHOOSE the CLX000?

All other options required us to use proprietary software and closed source formats. The CLX000 is both low cost and it's simple to write programs for the data (vs. e.g. Vector). Also, I really like that the development keeps going!

- Bryan Cady, Battery Specialist at Zero Motorcycles, Inc

Learn more: [CSS Electronics](#) | [CL2000](#)

CSS ELECTRONICS

CASE STUDY

Riversimple / Hydrogen Fuel Cell Electric Vehicles / United Kingdom

ANALYZING TEST CAR DATA - THE LIGHT WAY

#electricvehicle #batterydata #fuelcells #riversimple #hydrogen #optimization

About: Riversimple manufacture hydrogen-powered fuel cell electric vehicles (FCEVs). The company aims to offer customers the first affordable, hassle free, fun-to-drive eco car.

What PROBLEM did you need to solve?

We needed to log data from the ECUs of our vehicle control system. The aim was to check vehicle and fuel-cell performance - and for post test-drive investigation of any faults. Our toolchain for ECU software development required a laptop to be connected to the CAN network. The toolset licensing tied up a laptop and thus a development seat during all test driving

“The CLX000 is very easy to use with minimal need for configuration. For the cost, it is unbeatable!”



HOW did you solve it?

We connected the CLX000 to the car to read powertrain control data directly from the CAN bus. The uploaded data was parsed by an in-house tool (using CAN DBC files) and could be viewed for later analysis by various 3rd party tools

What BENEFIT has this led to?

The CLX000 allows us to speed up our software development by releasing a laptop.

Why did you CHOOSE the CLX000?

It was very simple to use and set up, it is very small, the logged data is easy to post-process and it is very competitively priced. Further, the live streaming is great for checking system operations before the car goes out for testing - and the support for CAN DBC files makes the downstream analysis much easier

- Douglas Ponsford, Senior Systems Architect at Riversimple

Learn more: [CSS Electronics](#) | [CL2000](#)

CSS ELECTRONICS

CASE STUDY



Idrobotica / Submarine ROVs (Remotely Operated Vehicles) / Switzerland

RECORDING UNDERWATER ROV BATTERY DATA

#batterydata #maritime #postanalysis #optimization #bms

About: Idrobotica is the world leader in the design and manufacture of ROV Systems - with focus on solutions dedicated to defense, science and institutional organizations

What PROBLEM did you need to solve?

We produce ROVs with LiPo battery management systems (BMS) inside, sending a lot of info via CAN. We wanted to gather all the data, but only a small part could be sent via our remote console due to byte limitations

HOW did you solve it?

We connected a CL1000 in the vehicle. Once the ROV returned from underwater activities, data could be analyzed ex post from the CL1000's SD card



“The CL1000 is a powerful stand-alone CAN logger and an easily configurable system”

What BENEFIT has this led to?

The CL1000 helped us truly understand the behavior of the LiPo batteries by getting insight on all the data from the BMS (which had no storage system itself)

Why did you CHOOSE the CLX000?

Because it was small, stand-alone and it cost less than others

- Emanuele Musazzi, Senior Software Engineer at Idrobotica

Learn more: [CSS Electronics](#) | [CL1000](#)

CSS ELECTRONICS

CASE STUDY



DOMTEKNIKA / Engineering Company / Switzerland

ANALYZING CARS VIA VIDEO & CAN BUS

#vehicledvelopment #diagnosis #troubleshooting #prototype

About: DOMTEKNIKA is an engineering company with expertise in fields including plastics, mechanics, hydraulics or electronics across sectors green tech, appliances and medical

What PROBLEM did you need to solve?

We needed to analyse the circuit behavior of a prototype car. However, using a CAN interface tool with a PC was not practical as the cars went through heavy stress testing and were used by various people

HOW did you solve it?

We used the CLX000 to record log file data. Further, we developed a small custom script to analyze and display the log file data together with recorded video. With this we could quickly diagnose the issue by linking mechanical events to the electrical ones



“The CLX000 is a very fast solution for diagnosing failures - making it a powerful device”

What BENEFIT has this led to?

The CLX000 is truly plug and play and it simply works every time it is plugged into the car - with no usage mistakes. The raw CAN data provides the basis for many use cases

Why did you CHOOSE the CLX000?

The CLX000 was very affordable, allowed automatic logging and had a small size

- *Adrien Hoffet, Head of Electronics at DOMTEKNIKA*

Learn more: [CSS Electronics](#) | [CL2000](#) | [Wireshark Streaming](#)

CSS ELECTRONICS

CASE STUDY



Louter Control / Control Systems / Netherlands

REMOTE REVERSE ENGINEERING OF MACHINERY

#mobilemachinery #reverseengineering #wifi #cloud #controlsystems

About: Louter Control specialize in process control, mobile automation and machine control within oil & gas, chemical, pharmaceutical, agriculture and more

What **PROBLEM** did you need to solve?

We needed to obtain CAN data from a mobile machine and reverse engineer it. This would enable us to add custom added functionality to the mobile machinery

HOW did you solve it?

We leveraged the timestamp of the data signals to easily link the performed actions with the recorded signals for simpler reverse engineering



“The ease of use and added value of the CL3000 is excellent. CSS responded quickly and adequately to our questions”

What **BENEFIT** has this led to?

The logger can be pre-configured and handed to a service engineer, who can install it at the machines and do tests & record actions with matching timestamps. The log data is pushed instantly to an FTP server, allowing software & service engineers to focus on their own jobs and skills

Why did you **CHOOSE** the CLX000?

Because it's a small device, low cost and with a huge amount of features. With the WiFi and FTP functions, data can be retrieved and analysed remotely.

- Remco Louter, Owner of Louter Control

Learn more: [CSS Electronics](#) | [CL3000](#)



ALBACH Albach Maschinenbau /

OPTIMIZING SYSTEMS IN MOBILE FORESTERS

#foresters #mobilemachines #treefelling #hackers #drivingsystems #longtermlogging

About: Albach specialize in self propelled mobile machinery, in particular within hacking and complex special constructions. Recently, focus has been on mobile felling cranes

What **PROBLEM** did you need to solve?

We needed to conduct long term analysis to optimize a Driving System for one of our mobile working machines

HOW did you solve it?

We used the CL2000 to record messages to the SD card, extract them and convert them to .CSV. After this, we analysed the data using special software



“The CLX000 works really well and we’ve had no problems”

What **BENEFIT** has this led to?

The CLX000 has provided us with a cheap tool with huge possibilities - and a simple way to get the data we need for optimizing our systems

Why did you **CHOOSE** the CLX000?

We decided on the CLX000 since it's a plug-and-play solution, it's got a small size and it's easy to use

- *Stefan Hierlmeier, responsible for control technology at Albach Maschinenbau*

Learn more: [CSS Electronics](#) | [CL2000](#)

CSS ELECTRONICS

CASE STUDY



Faculty of Forestry and Wood Sciences / University / Prague

ESTIMATING FORESTRY MACHINE PRODUCTIVITY

#forester #estimation #machinery #reverseengineering #productivity

About: FFWS provides forestry education systems to encourage and support rational forest management and sustainable utilization of the natural resources

What **PROBLEM** did you need to solve?

We needed to record raw data from forestry machines to estimate their productivity. In some cases, this involved reverse engineering the relevant data from the CAN bus

HOW did you solve it?

We used the CLX000 in two ways: For reverse engineering relevant data using the Wireshark plugin functionality - and for collecting all relevant data onto the SD card of the CLX000

“Thank you for making an awesome device at an unbeatable price!”



What **BENEFIT** has this led to?

The CLX000 has truly moved our possibilities further - at a price that was manageable within the project budget. As such, we already have new research ideas that may lead us to purchasing more CLX000 units

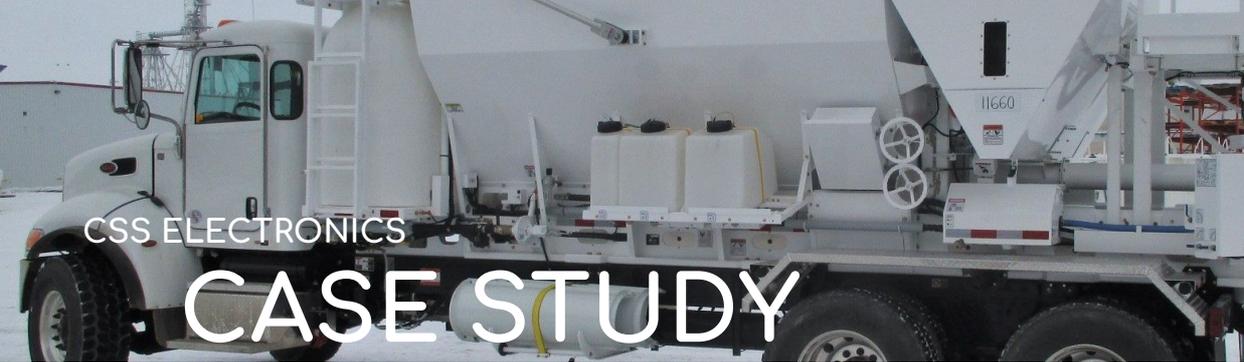
Why did you **CHOOSE** the CLX000?

The combination of real-time streaming via Wireshark and data logging to an SD card is a perfect match for our needs - at an unbeatable price.

- *Andrew Nuhlicek, Assistant / Ph.D. student at FFWS*

Item acquired thanks to the National Agency for Agricultural Research Czech Republic, under the project no. QJ1520005

Learn more: [CSS Electronics](#) | [CL2000](#) | [Wireshark Streaming](#)



CSS ELECTRONICS

CASE STUDY



PROALL
Reimer Mixers

ProAll / Concrete Mixer Trucks & Solutions / 100+ FTEs / Canada

TESTING A PROTOTYPE CEMENT MIXER

#concrete #mixers #trucks #j1939 #actuator #prototype #diagnosis

About: ProAll Reimer Mixers create specialized solutions for quality, cost-effective on-site mixing on truck, trailer or static-mounted units across 50 countries for 50+ years

What PROBLEM did you need to solve?

We had two challenges: 1) We prototyped a new load cell concept on our mobile cement bins and wanted to do road tests (rough braking, shocks etc.) to see peak cell loads; 2) We tested a new electric actuator (CAN bus) on a prototype machine, which was causing strange behaviour in our CAN input devices (keypad and rotary encoder)

HOW did you solve it?

1) The load cell module was CAN bus, so we simply connected the CLX000, set up the data stream and quickly determined that the load cells were more than capable. 2) For the strange actuator behaviour, we logged the J1939 data during the events to find that the keypad manufacturer's firmware did not properly filter out certain messages, instead interpreting them as commands - causing the random behavior. We logged 1 mn+ lines of data to identify the patterns - and using this, the manufacturer could update their FW

"The CL2000 is very easy to setup, the software is intuitive and the DBC conversion feature is nice - highly recommend this product!"

What BENEFIT has this led to?

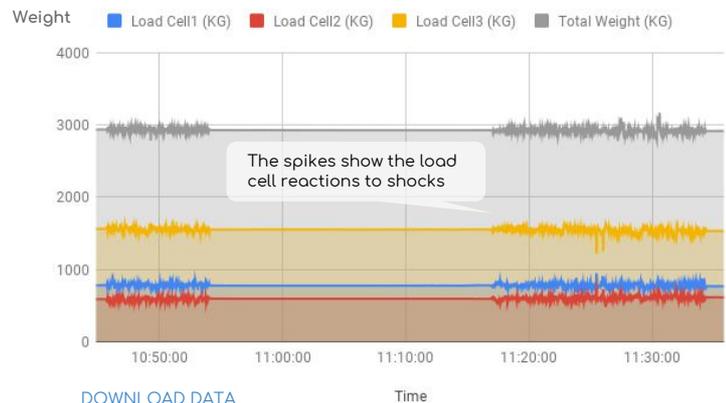
We could quickly verify potential/real issues in our prototype - and solve them. Without the CAN logger we would have needed extensive programming and time

Why did you CHOOSE the CLX000?

It was recommended by a supplier of ours and we really needed something easy to use yet powerful enough to be able to capture and organize CAN data quickly and seamlessly

- Curtis Steele, Manager Product Development at ProAll

Learn more: [CSS Electronics](#) | [CL2000](#) | [J1939 DBC](#)



[DOWNLOAD DATA](#)

CSS ELECTRONICS

CASE STUDY



Quality Systems & Controls / Control System Integrator / USA

DIAGNOSING DUMP TRUCK HYDRAULIC FAILURE

#qsc #heavyduty #mobilemachinery #diagnostics #j1939

About: QSC creates customized electric, hydraulic and pneumatic solutions for mobile controller, sensor and industrial systems - e.g. within mining and agriculture

What PROBLEM did you need to solve?

We needed to resolve an intermittent hydraulic failure causing expensive downtime for a mining dump truck - this required isolation and diagnosis

HOW did you solve it?

We used the CL2000 to record sensor data over several months on our customer's equipment at a remote mining site. Specifically, the customer fed several analog signals to a QSC unit, which would digitize the signals and transmit them via J1939 to the CL2000's SD card.

***"My overall experience with CSS was outstanding!
Thank you for selling an excellent product!"***

What BENEFIT has this led to?

After several weeks the hydraulic failure occurred again - and with the CL2000 we managed this time to capture the data for analysis!

Why did you CHOOSE the CLX000?

- 1. The excellent data manual clearly describes the interfaces & toolset*
- 2. The removable memory card was well-suited for the extremely remote environment (a radio would be best, but far too expensive)*
- 3. Reasonable cost, ruggedness - and compact size, yet large memory*
- 4. Great support from CSS on technical questions*

- *Andy Pagones, Electrical Systems Engineering Manager at QSC*

Learn more: [CSS Electronics](#) | [CL2000](#) | [J1939 Data Logger](#)

CASE STUDY



Precision Governors / Control Systems Manufacturer / USA

OPTIMIZING HEAVY DUTY CONTROL SYSTEMS

#precisiongovernors #heavyduty #development #logging #j1939

About: PG provides engineered control solutions to industrial markets including Marine, Oil & Gas, Renewable Energy, Power Generation, Agriculture, Construction and Industrial

What PROBLEM did you need to solve?

We needed to log data from a mobile test vehicle during R&D to analyse various controllers (temperatures, currents, voltages, interactions) - the purpose was to design our control systems optimally vs. the vehicle requirements. The simplest way was to log the existing CAN based sensor data from the controllers

HOW did you solve it?

We started by developing an in-house CAN-to-SD logger. However, we quickly found that the CL1000 was both smaller, more portable and worked. We've used it for years now. We simply plug it in, log the data, extract it - and handle the J1939 data in Python

“These seem to be the ONLY affordable CAN loggers on the market”

What BENEFIT has this led to?

It's easy for us to get a complete log of data of everything going on on the CAN bus - allowing us to show customers data from when they've operated the vehicle

Why did you CHOOSE the CLX000?

At the time, it was the only option on the market - and we stopped looking since. Other CAN logger suppliers said we were “not a good fit for their products” when we asked why we had to pay \$4,000 for a high end J1939 logging system

- Chad Clendening, Sr. Project Engineer at Precision Governors

Learn more: [CSS Electronics](#) | [CL1000](#)

CSS ELECTRONICS

CASE STUDY



 **BorgWarner** BorgWarner / PowerTrain Products / ~27,000 FTEs / ~10 bn\$ Revenue / USA

DEVELOPING COMPLEX CAR ECU MODULES

#cars #ecu #development #powertrain #streaming #obd2

About: BorgWarner is a global automotive components supplier, primarily known for its powertrain products incl. transmissions, clutches & turbochargers across 60 facilities

What **PROBLEM** did you need to solve?

We added a complex module to the CAN bus of a project car. We used the CL2000 to verify that the module is communicating correctly with the car

HOW did you solve it?

We attached the CL2000 first to the module separately, then the car separately - and then the combination of the two. By studying the 3 data streams, we confirmed that everything worked correctly.



"The CL2000 has been a really great device for us! Most importantly, the technical support from CSS has been outstanding!"

What **BENEFIT** has this led to?

I'm a novice in CAN, but I managed to quickly learn using the CL2000 and secure that our model worked as intended

Why did you **CHOOSE** the CLX000?

The CL2000 has a good combination of price and features. A real-time clock and live streaming were must haves, while OBD2 requesting was also useful

- Brock Fraser, Executive Director, Innovation and Investments at BorgWarner

Learn more: [CSS Electronics](#) | [Wireshark Streaming](#) | [CL2000](#)

CSS ELECTRONICS

CASE STUDY



PERFORMANCE TESTS USING CAN/OBD2 DATA

#aeristech #automotive #equipment #obd2 #logging #development

About: Aeristech develops electric air compressors for the automotive and other industries. Its products include electric superchargers and air compressors for hydrogen fuel cells

What PROBLEM did you need to solve?

We make devices for installation in vehicle powertrains to improve their operation. To analyse performance we wanted to log CAN data during road driving.

HOW did you solve it?

We used the CLX000 to record speed, RPM, manifold pressure etc. during road driving with/without our device turned on. Further, we developed a GPS-to-CAN module that allowed us to also record the exact position data with the CLX000

“The CLX000 is very compact, cost-effective, reliable and easy to use”

What BENEFIT has this led to?

The CLX000 provided a very easy and low-cost method for showcasing the performance of our device and evaluating the operation in detail, allowing us to make improvements

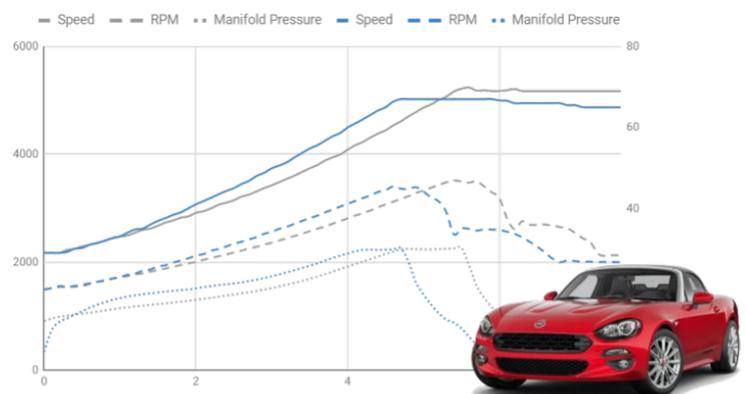
Why did you CHOOSE the CLX000?

Mainly because it was much cheaper and simpler than similar devices (e.g. Vector)

- Dr. Martin Palmer, Senior Electronics Engineer at Aeristech

Learn more: [CSS Electronics](#) | [CLX000](#)

Aeristech Boost Test - Speed, RPM, Manifold Pressure
Grey: Without boost | Blue: With boost



Google maps plot of GPS position with vehicle speed colorization legend

CSS ELECTRONICS

CASE STUDY



TOYOTA

Toyota Motor / Car Manufacturer / ~350,000 FTEs / North America R&D

BETTER UNDERSTANDING VEHICLE USERS

#toyota #automotive #cars #fieldtests #logging

About: Toyota Motor is the World's largest car manufacturer with revenues of ~250 bnUSD. Based in Japan, Toyota sold 10,000,000 vehicles globally in 2017

What **PROBLEM** did you need to solve?

We were trying to understand the standard use of a work vehicle to ensure it was designed properly for customer usage. In particular, we needed to collect the data with a method where the driver didn't have to do anything

HOW did you solve it?

We used the CLX000 to log data to the internal SD card, which allowed us to post analyse the data and quickly verify that our product was designed properly

"The CLX000 is low cost and easy to use - and enables data logging without driver interaction with the logger"

What **BENEFIT** has this led to?

We managed to save time and quickly move forward with our project

Why did you **CHOOSE** the CLX000?

*Based on online information, it was a good match to our case
- and very low cost!*

- Rob MacArthur, Engineer, Electrified Vehicle Control, Toyota North America R&D

Learn more: [CSS Electronics](#) | [CL2000](#)

CSS ELECTRONICS

CASE STUDY



TORQAMP

SRM Solutions (TorqAmp) / Combustion Technology / Netherlands

LOGGING TURBO BATTERY TEMPERATURE DATA

#moduledevelopment #combustion #vehicledevelopment #temperature #batterydata

About: SRM are developing the TorqAmp, an electric driven centrifugal compressor for the aftermarket automotive, also called an "electric turbo" (for boosting a combustion engine)

What PROBLEM did you need to solve?

During testing we wanted to gather a lot of data, e.g. the temperature sensors, boost time, current flow, etc - CAN bus is a nice way to communicate these data, add extra sensors (e.g. pressure, GPS) or show values on a screen

HOW did you solve it?

During test drives we always connected the CL2000 to easily debug when a problem occurred. We knew when a problem occurred - and based on sensor data, we knew exactly where to look and how to solve the problems

"The CL2000 is a great plug'n'play product for easy data logging!"

What BENEFIT has this led to?

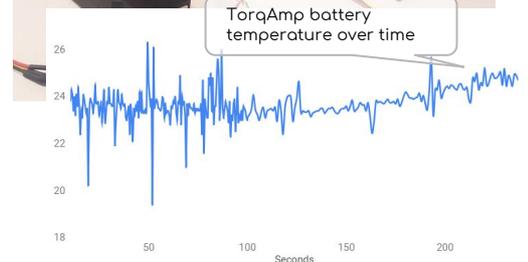
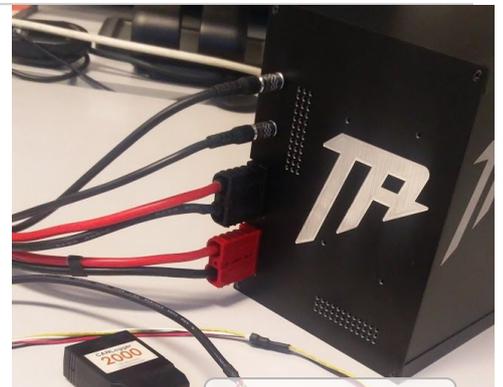
The major benefit is plug-and-play data logging and easy data evaluation via our data analyzing tool. An important aspect of our product is that the temperature is kept within limits - and connecting multiple temperature sensors was key in designing the product

Why did you CHOOSE the CL2000?

We chose the CL2000 because of the integrated real time clock (RTC) - for temperature measurements it's great to know the date and time so we can look back what the atmospheric temperature was for proper data evaluation. The CL3000 was not yet released, otherwise we would probably have bought it for the nice WiFi benefit

- Daniël Hilgersom, CTO at SRM Solutions B.V. (TorqAmp)

Learn more: [CSS Electronics](#) | [CL2000](#)



CASE STUDY



REVERSE ENGINEERING PROPRIETARY OBD2 DATA

#other #iot #obd2 #reverseengineering #predictivemaintenance #streaming

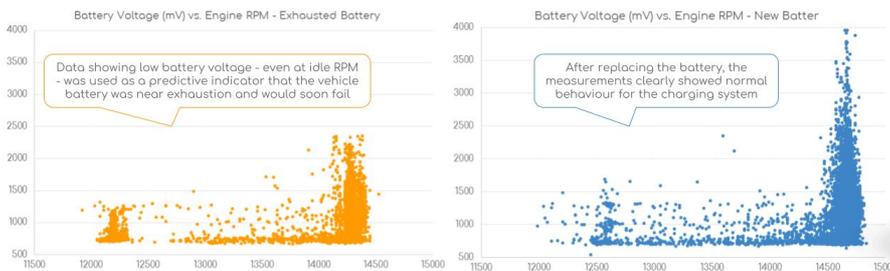
About: Quadrar Tecnologia is a project and engineering company, specialized in the development of electronic products and embedded software with focus on M2M / IoT

What PROBLEM did you need to solve?

We used the CLX000 to read OBD2 data and to “sniff” proprietary data (not directly accessible from the OBD standard). The car makers in Brazil have to follow the SAE standard for basic items related to pollution - the rest we have to discover ourselves.

HOW did you solve it?

We used the CLX000's streaming functionality and Wireshark to stream OBD data and trying to identify the meaning - a tough task! We used the data for predictive maintenance applications, e.g. identifying soon-to-be exhausted batteries



“The CLX000 has been the most practical and useful tool amongst similar devices we’ve tried so far”

What BENEFIT has this led to?

The CLX000 is the most practical tool we have for this purpose and it has helped provide us with a much better understanding of the codes we could read

Why did you CHOOSE the CLX000?

We tried other brands, but they didn't help us much vs. the CLX000

- Marco Vettori, Owner of Quadrar Tecnologia

Learn more: [CSS Electronics](#) | [CLX000](#)

CSS ELECTRONICS

CASE STUDY



Campus Motorsport / Motorsports / Student Team / Germany

OPTIMIZING & DIAGNOSING RACE CAR

#motorsport #formula #development #vehicles #studentteam

About: The Campus Motorsports team was founded in 2007. The teams face the challenge of designing a competitive race car every year for Formula Student competitions

What PROBLEM did you need to solve?

We had many sensors (acceleration, temperature, angles, ...) connected to the CAN bus - and we needed data on all of it

HOW did you solve it?

We used the CLX000 to gather the data for analysis, simulation and development of our Formula Student race car

"The easy commissioning and operability characterize your data logger. It's plug and play!"



What BENEFIT has this led to?

We were able to use the data we collected to analyze driving behaviour. Also we managed to search for problems (e.g. power losses, suspension behavior, etc.) and identify the causes

Why did you CHOOSE the CLX000?

Your system is the only one on the market that meets our requirements. The transfer rate, flexibility and ease of use in combination with the compact design can not be found anywhere else

- Simon Kupfer, Head of Electrical Engineering at Campus Motorsport

Learn more: [CSS Electronics](#) | [CL2000](#)

CSS ELECTRONICS

CASE STUDY



Formula Technion 2017 / Motorsports / Student Team / Israel

BUILDING A WINNING FORMULA RACE CAR

#motorsport #vehicledevelopment #formula #studentteam

About: Formula Technion 2017 is a student race team from Israel Institute of Technology - the team took formula car for races in Formula Student AU (FSA) and DE (FSG)

What PROBLEM did you need to solve?

We needed data from all the sensors in our car. These were connected to an automotive controller (M220 by Pi Innovo), outputting readings to the CAN bus - incl. e.g. suspension potentiometers, steering rack sensors and hall effect encoders. The engine control unit (ECU) and power distribution module (PDM) were also connected

“The CL2000 is a great piece of hardware!”

HOW did you solve it?

We connected the CL2000 to log data during test drives and the 2017 season

What BENEFIT has this led to?

The great amount of data from test drives allowed us to validate our dynamic models and the car's performance. This allowed us to design a real-time control system for the car (an active anti-roll bar this year)

Why did you CHOOSE the CLX000?

It is reliable, easy to configure, very light and has plenty of storage capacity

- Ben Levenzon, Dynamics Team Leader at Formula Technion



Learn more: [CSS Electronics](#) | [CL2000](#)

CSS ELECTRONICS

CASE STUDY



Kverneland Group / Agricultural Equipment / ~2,000 FTEs / Norway

FIELD TESTING AGRICULTURAL EQUIPMENT

#agriculture #equipment #fieldtests #farming #standalone #simple

About: Kverneland Group is an international agriculture equipment manufacturer focusing on soil preparation, seeding, forage, balers, wrappers, fertilisers, spreaders and more

What PROBLEM did you need to solve?

We're regularly conducting field-tests with agricultural equipment - typically done by an engineer who brings a PC for logging. This time, however, we added a telematics system to the equipment and tests were done by farming personnel. Thus, we needed a CAN logger that could simply be connected to the system without special knowledge. We wanted something reliable, but also cheap enough to send to a farmer (who had to cooperate without worrying about a financial loss if a logger was destroyed)

HOW did you solve it?

We provided the test-farmers with the logger along with instructions on how to connect it to the CAN bus. We then let them perform tests over a period of time and after that had them return the loggers. To ease the use of the device and protect it from moisture and dust in the rough environment it's been used in, we put the unit into a protecting housing with a J1939 compatible cable

"We used the CL2000 for months now - despite rough environments we found the device sturdy and reliable"

What BENEFIT has this led to?

Since the tests are mostly conducted by non-technical personnel it allowed us to get performance and behavior information about the equipment in the field

Why did you CHOOSE the CLX000?

Based on price vs. performance. We tried many other loggers: Some were not reliable, some were far too expensive - but the CLX000 is both very reliable and well-priced

- Caspar van Zon, Senior Software Developer at Kverneland Group (Netherlands)

Learn more: [CSS Electronics](#) | [CL2000](#)

CASE STUDY



Tribine Industries / Agricultural Equipment / USA

LOGGING A FULL HARVEST SEASON OF DATA

#agriculture #equipment #fieldtests #farming #standalone #simple

About: Tribine innovates in the design and engineering of harvesting systems, from the cleaning systems to the farmer's cab experience - recently with the released T1000 Harvester

What PROBLEM did you need to solve?

I was looking for a cost-effective and easily available device to log input and output data for developing a harvesting machine. Other options which I had worked with in the past had long lead times, high cost, and expensive restricted licenses



"The CL2000 lets us leave it in the machine all of the time - and the price lets us afford enough units to fully utilize this ability"

HOW did you solve it?

We installed a CL2000 in each of our development machines for the entire harvest season. The CL2000 allowed me to diagnose countless deficiencies in both mechanical and electronic systems by letting me see real time data and the relations between inputs, commands and responses. Most importantly, it was easily used in the field with minimal setup and without requiring a dedicated computer

What BENEFIT has this led to?

As a startup, the low cost and free licenses allowed us to purchase and use more than one device so we can monitor more machines across multiple locations simultaneously. With other devices on the market, we would be limited to a single logging tool. Further, logging the CAN bus all of the time allows us to more effectively diagnose problems and deficiencies almost instantly without guesswork

Why did you CHOOSE the CLX000?

Simplicity and cost were the main driving factors to purchase this device

- Greg Leck, Electronics Design Engineer at Tribine

Learn more: [CSS Electronics](#) | [CL2000](#)

CSS ELECTRONICS

CASE STUDY

 SunSource / Fluid Power Distribution / 150,000 Products / USA

REMOTELY RESOLVING DRAINAGE PLOW ISSUES

#production #diagnostics #machinery #industrial #maintenance

About: SunSource designs and distributes fluid power and motion control technologies. Key industries incl. oil & gas, infrastructure, agriculture, mining, forestry, and energy

What PROBLEM did you need to solve?

One of our OEM customers had been complaining about performance issues in one of their machines (a drainage plow)

HOW did you solve it?

The idea was to implement a CAN logger to trace machine system & engine data to review performance and identify the anomalies causing the complaints



*“Never used a tool like this before
- the support was exceptional!”*

What BENEFIT has this led to?

The CL2000 is a very cost effective tool. Instead of sending out a technician in the field with added airfare and accommodation, we could resolve the issue remotely. It gives our company an added resource item to achieve our daily commitment to assist and provide technical support for our customers

Why did you CHOOSE the CLX000?

We chose the CAN logger CL2000 as it was cost effective, very compact and easy to install in our system

- Jason Le, Technical Specialist at SunSource

Learn more: [CSS Electronics](#) | [Wireshark Streaming](#) | [CL2000](#)



Xcerra Corporation / Semiconductor Testing / ~1700 FTEs / USA

DIAGNOSING RARE MACHINE ERRORS

#production #diagnostics #machinery #industrial #maintenance

About: Xcerra Corporation provides test & handling equipment, interface products and test fixtures for the semiconductor and electronics manufacturing industries globally

What **PROBLEM** did you need to solve?

We needed to solve machine operational issues, which occurred rarely - e.g. only once per month

How did you solve it?

We used the CL2000 as a "ring buffer": If an error situation occurred, we'd analyze the log file to see what went wrong

What **BENEFIT** has this led to?

With the CL2000 it's been easy to detect sporadic errors, which helps us to further optimize our machines

"The CL2000 is a perfect tool for machine diagnostics!"

Why did you **CHOOSE** the CLX000?

The CL2000 is exactly the right tool for finding sporadic errors:

- *It's small and needs no external power supply*
- *It's got a ring memory and a listen-only mode*
- *It's inexpensive*

- Philip Overfeld, Senior Design Engineer at Xcerra



Learn more: [CSS Electronics](#) | [Predictive Maintenance Solutions](#) | [CL2000](#)

CSS ELECTRONICS

CASE STUDY

CSIRO Energy / Federal Government Agency / ~5,500 FTEs / Australia

DESIGNING FIELD EQUIPMENT STATUS DISPLAYS

#energy #hydraulicfracturing #development #minepreconditioning #wifi #cloud #j1939

About: CSIRO is an independent Australian federal government agency responsible for scientific research, aiming to improve the social & economic performance of the industry

What PROBLEM did you need to solve?

We're needed to develop a real-time CAN data streaming system to be shown on a customized interface display (SAE J1939 protocol). This will allow hydraulic fracturing field operators to get quick feedback on the operation of field equipment and maintenance needs

HOW did you solve it?

We developed a custom program and used the CL3000 to verify correct reception and conversion of the CAN bus data



"The added features of the CL3000 were extremely useful in helping us develop our application"

What BENEFIT has this led to?

The CL3000 provided us with a convenient way to verify the correct operation of our program

Why did you CHOOSE the CLX000?

The additional features of the CL3000 (WiFi, auto-pushing to an FTP server, RTC) were very useful in developing our application - they definitely made life easier!

- Sam Cantrill, Research Assistant at Hydraulic Fracturing Team, CSIRO Energy

Learn more: [CSS Electronics](#) | [CL3000](#) | [FTP Push](#)

CSS ELECTRONICS

CASE STUDY



DDR Marine Projects & Engineering / Engineering Services / Netherlands

REVERSE ENGINEERING PROPRIETARY J1939 DATA

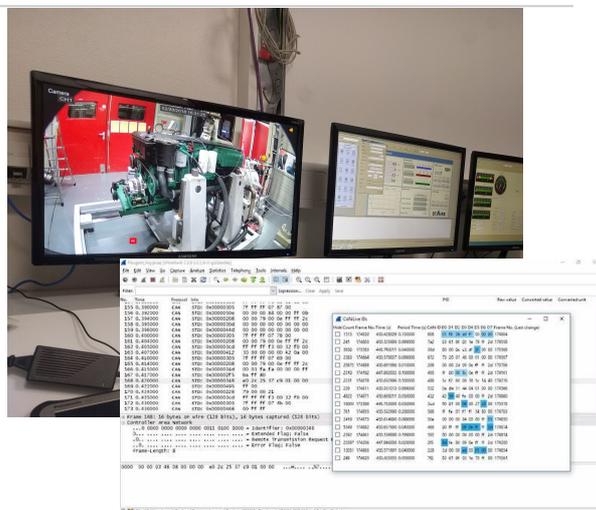
#marine #diesengine #dynoroom #j1939 #reverseengineering #wireshark

About: As an independent entrepreneur, Daan de Roos focuses on technical aspects of the propulsion installations of all types of (commercial) ships, work boats and yachts

What PROBLEM did you need to solve?

We needed to build a test stand for maintenance and power testing of machine and boat engines, in particular Volvo Penta EVC controlled engines. A requirement was to add a simple start, stop & (de-)accelerate system for the various engines. One method for controlling the engine was via CAN bus (J1939). However, some parameters are proprietary - reverse engineering was necessary

"The CLX000 worked perfectly for reverse engineering proprietary J1939 data"



Check the [DDR blog post](#) for the full story

HOW did you solve it?

We used the CLX000's logging function and the Wireshark reverse engineering plugin to read, log and label proprietary J1939 parameters. This in turn enabled direct control of the machine via CAN bus and allowed use of Horiba software / hardware

What BENEFIT has this led to?

The result was a CAN bus communication system for various electronically controlled motors. Further, mechanical motors are controlled via an actuator. The actuator was also controlled via CAN bus from the Horiba software 'Stars'

Why did you CHOOSE the CLX000?

Strong price and quality - and it's easy to use with both stand-alone logging features and real-time streaming via Wireshark

- Daan de Roos, owner of DDR Engineering & Marine Projects

Learn more: [CSS Electronics](#) | [CL2000](#) | [Wireshark Streaming](#)

CSS ELECTRONICS

CASE STUDY



SINGULAR
AIRCRAFT

Singular Aircraft / UAV Aircraft Manufacturer / Spain

BLACKBOX LOGGING IN UAV AIRCRAFT

#other #aerospace #blackbox #diagnostics #logging #wifi

About: Singular Aircraft is a new UAV manufacture in its prototyping stage. The first aircraft, 'Flyox I', has been designed for remote operations at dangerous or remote areas

What PROBLEM did you need to solve?

We had a problem with an electronics systems in our plane - and needed to diagnose this. As the plane is an UAV, this needed to be done in a standalone logging setup

HOW did you solve it?

We used the CLX000 as a blackbox in our plane as all communications on the plane are done via CAN bus. This allowed us to debug the issue via the logged data



"The CL3000 works perfectly - and it has one of the best value/cost ratios in the market"

What BENEFIT has this led to?

The CLX000 provided an affordable blackbox solution, which was a great fit due to the unmanned nature of our aircraft

Why did you CHOOSE the CLX000?

Because of the quality/cost ratio and because it is very easy to use

- Yago Yáñez Marco, PhD at Singular Aircraft

Learn more: [CSS Electronics](#) | [CL3000](#)



Inertial Labs / Position & Orientation Technology / USA

CONFIRMING DRONE DEVICE FUNCTIONALITY

#inertiallabs #other #drones #logging

About: Inertial Labs is a leader in position and orientation technologies for commercial/industrial and aerospace/defense applications

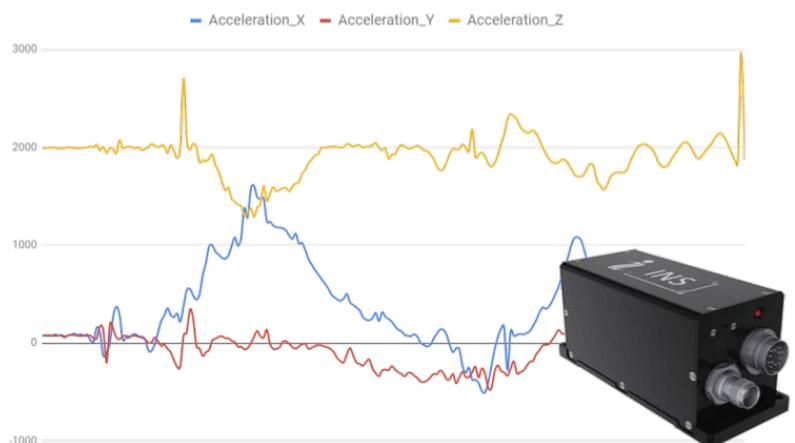
What PROBLEM did you need to solve?

Our 'INS' devices (GPS-Aided Inertial Navigation Systems) are equipped variety of serial interfaces including a CAN interface. We needed a way to evaluate that the CAN bus of our device was working as intended

HOW did you solve it?

*We use the CLX000 to collect data from the INS, which we then convert into physical values using our *.DBC file and the CANvas software*

CLX000 INS Data Sample - 3D Acceleration (g/4000)



"The CLX000 is very convenient to use - and the free software with DBC conversion is great!"

What BENEFIT has this led to?

The CLX000 allows us to convert our own CAN bus data to human-readable form and quickly analyse it for validity - incl. whether the device works as intended and if our data can be converted properly

Why did you CHOOSE the CLX000?

A key reason was the free CANvas software, which supports DBC conversion - as well as the CLX000 being simple-to-use and reasonably priced

- Maxim Zhukov, Inertial Labs

Learn more: [CSS Electronics](#) | [CL2000](#)