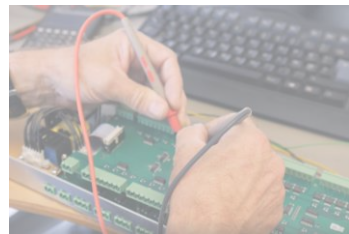
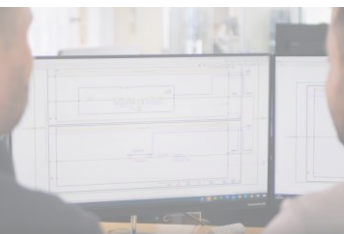


**Your partner in Industrial Process and Quality Control Systems**



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# WHO WE ARE

CCM is committed to providing solutions in industrial process and quality control systems.

We are experienced in electronic, mechanical, and software engineering.

We stay close with customers to offer custom solutions for both small and large businesses by designing and building high-performing electronics, as well as hardware according to customer requirements.

# OUR HISTORY

# OUR

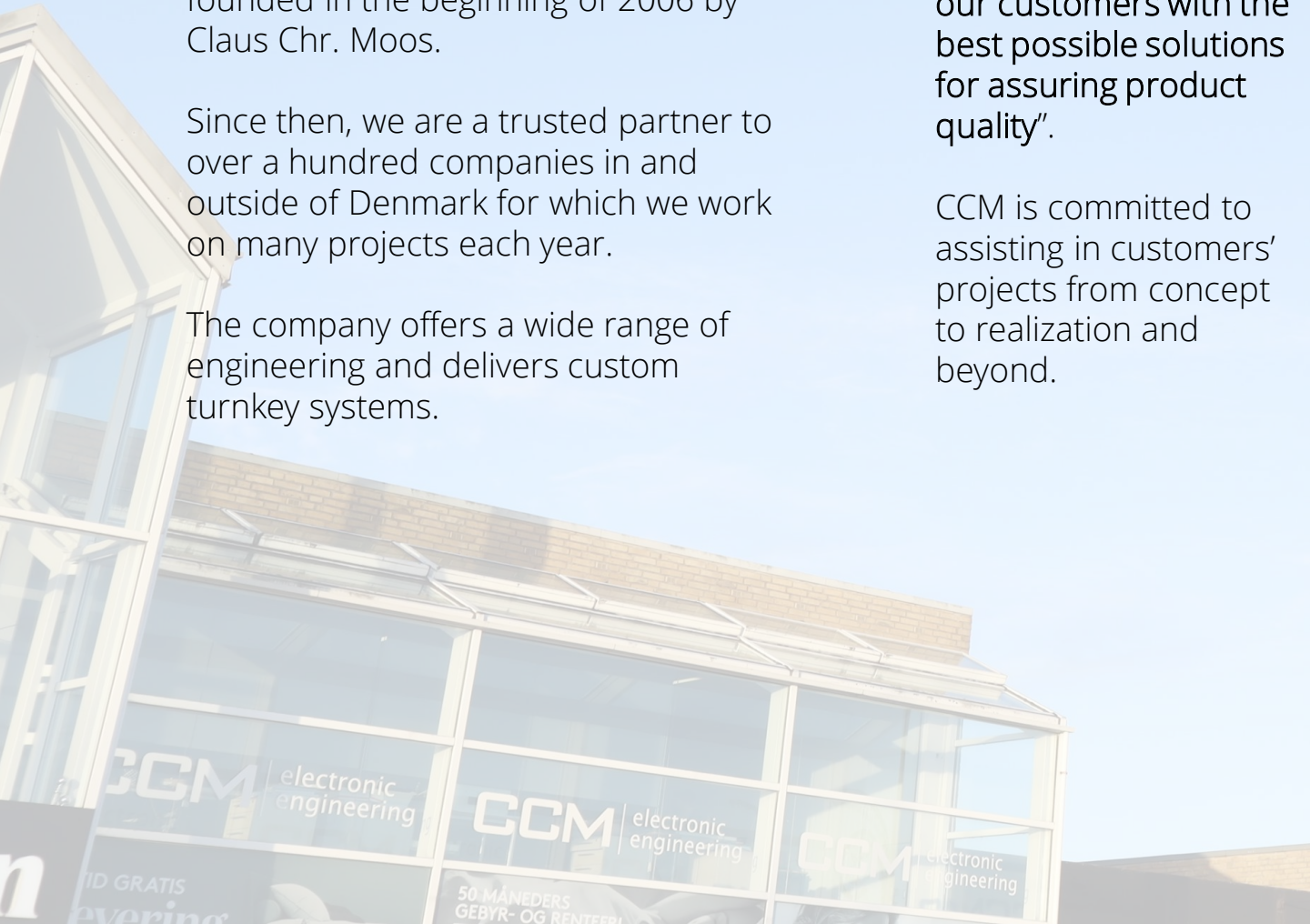
CCM - Electronic Engineering was founded in the beginning of 2006 by Claus Chr. Moos.

Since then, we are a trusted partner to over a hundred companies in and outside of Denmark for which we work on many projects each year.

The company offers a wide range of engineering and delivers custom turnkey systems.

Our mission is “Impress our customers with the best possible solutions for assuring product quality”.

CCM is committed to assisting in customers' projects from concept to realization and beyond.



# MISSION

We thrive in offering custom solutions for assuring product control systems and industrial processes.

Developed by our certified engineers, we build systems using **National Instruments** hardware and software, and have done so for **more than 10 years**.

Customers' satisfaction is our top priority, and we strive for continuous improvement and to keep up with the latest trends.

# OUR VISION

We are pushing the boundaries for custom test systems.





## CCM collaborates with NI to maximum benefit for our customers.

*"We are a National Instruments partner" - Automate your Test and Measurement systems with a Global Leader*

National Instruments (NI) equips engineers and scientists with systems that accelerate productivity, innovation and discovery, and fosters a network of highly skilled professionals. Our skilled certified developers work with **LabVIEW** and **TestStand** to develop software applications for our customers.

We are Silver Partner with National Instruments, with a **specialty in Vision Systems** since 2011.



# OUR TEAM

CCM is **ISO 9001:2015** certified. We have a group of dedicated software experts, who are certified by National Instruments.

Everyone in the company is keen on technology and experienced in complex solutions, ready to take on new challenges and support our clients.

- Certified LabVIEW Architect – Mohammad Zaabalawi
- Certified LabVIEW Developer – Claus Christian Moos, Rasmus Ejlersen, Ricky Jakobsen
- Certified TestStand Developer – Rasmus Ejlersen



# OUR SOLUTION

## SOFTWARE

## ENGINEERING

### LABVIEW

**LabVIEW** is a tool for advanced software development for applications that require test, measurement, and control with rapid access to hardware and data insights from **National Instruments**. It is designed for optimal data acquisition and processing from test system sensors.

Our certified LabVIEW developers and system architects will make a *user-friendly application with the interface of your choice*, so that you can focus on operational control.

Thanks to **TestStand**, we can develop automated test and validation systems faster. It also improves the operator experience, which is very important to us.

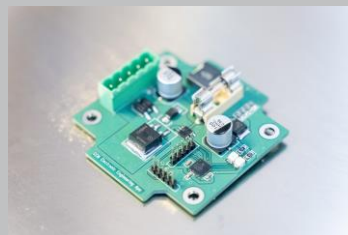
### ROBOT INTEGRATION AND PROGRAMMING

- Integration in system via PC or National Instruments cRIO
- 3D Localisation for bin picking
- Item sorting
- Installation of components
- Unit inspection
- UR, KUKA, DENSO



### EMBEDDED PROGRAMMING

- LabVIEW RealTime
- LabVIEW FPGA
- Arduino
- Raspberry Pi
- ARM





# OUR SOLUTION

## MECHANICAL

## ENGINEERING

Reliable fixtures and housing for your devices -  
*the right place to be.*

- Product development
- Concept development / Visualization in the start-up phase
- Enclosure of electronics in cabinet, integrated with connectors, buttons, display, keyboard...
- Fixtures with electronic components
- Test needle beds
- Parts 3D printed in metal

### MECHANICS DESIGN

We can help you design and build durable machines and devices, including test stands. There are almost no limitations to the application area.

We also offer consulting and help to design products, such as Hammer Jet, a handheld jet road dryer produced by Zirocco ApS.



### TEST FIXTURES

Every system needs some physical interface. We can build cabinets, fixtures, and complete setups for your workplace.

Test fixtures connect DuT with electronic equipment, such as programmers, LEDs, user input components, multimeters...



# OUR SOLUTION

## ELECTRONIC

## ENGINEERING

### DEVELOPMENT OF ELECTRONICS

From concept ideation to turnkey application.

- Concept development / Visualization in the start-up phase of the project
- Simulation using NI Multisim
- PCB layout in PADS, Orcad, or Ultiboard
- 3D drawings
- Design and build cabinets, plastic enclosures, alu profiles, foil linings etc.

### HARDWARE

We deliver solutions customized to your need with optimal performance.

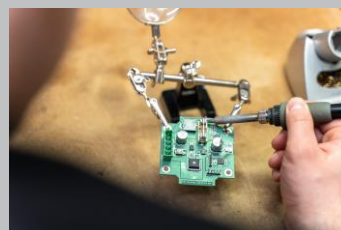
- Testing equipment for electronic products
- Testing equipment for mechanical products
- Control units and panels
- User interfaces
- Equipment interfacing with a robot
- Power supply
- Electronic modules
- Components and boards



### PCB DESIGN

We have years of experience in designing and assembling PCBs, from simple designs to custom single-unit complex solutions.

We can also recreate already existing designs by digitizing blueprints and reverse-engineering, for example, to replace old PCBs in devices.



# OUR SOLUTION TEST SOLUTION

## END-OF-LINE TESTING

Monitoring and automation are key parts of assuring quality control. Testing is needed to monitor your operations and can help you to introduce significant savings and improve the quality of your products.

Our machines can test electronic functionality, pins, buttons, screens, transmitting units, software functionality, part tolerances, etc. Our test systems can be used for electronic devices, metal parts, and more. Find some examples on [ccm-ee.dk](http://ccm-ee.dk).

## MEASURING SYSTEMS

### MEASUREMENT - INPUT CONTROL - OUTPUT CONTROL

- Construction of complete installations
- Optimized delivery time
- First-class project development
- User-friendly software tailored to your needs
- Great after-sales support



## PCBA TESTING

- Microcontroller programming for DUT
- Interchangeable fixture and steel cabinet
- Panel PC, Fanless PC, ensuring many years of operation without interruption
- NI LabVIEW / TestStand Software
- National Instruments Vision Development module
- 24 bit analog inputs for ultra-precise measurements
- Only industrial components are used to increase MTBF and minimize unplanned downtime
- Documentation and source code are included to support maintenance

## VISION SYSTEMS

Vision systems have many unknowns, therefore we offer a proof of concept of a vision assignment, to be sure we deliver what you need.

We have a variety of components in stock, so we can build a prototype **within a competitive time.**

- |                     |                       |                        |   |
|---------------------|-----------------------|------------------------|---|
| •Surveying          | •Display inspection   | •Inspection foil print | •Random Bin Picking                         |
| •Surface inspection | •Inspection of LEDs   | •Advanced lenses       | •SMD reel vision system and barcode scanner |
| •Localization       | •Backlight inspection | •Advanced lighting     |   |

# OUR PRODUCTS

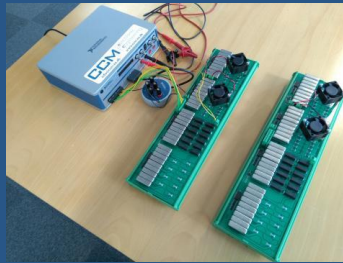
## Stepper Motor Driver and Analyzer



CCM 2282 and CCM 2283 modules are stepper motor drivers and analyzers for both unipolar and bipolar stepper motors.

The products are compatible with the NI CompactRIO platform and CCM is listed as an official 3rd party module supplier.

## Programmable Decade Board



0-999,9 $\Omega$   
Programmable Resistor Decade board with step of 0,1 $\Omega$  and maximum power rating up to 10w

## Tracebox



Invented by CCM, Tracebox is a modular system of intelligent boxes that assure the picking process is trackable and qualified.

Distributor of  
**AMETEK Solartron technology** – exclusive distributor in Denmark

We offer advice, system integration, and delivery of complete measurement solutions.

Visit our website [www.ccm-ee.dk](http://www.ccm-ee.dk) to see different types of products we offer.

We take great care when collaboratively developing a solution with a customer.

Our expertise covers all areas within software, electronic and mechanical engineering.



As a customer, you might know what your needs and goals are but you are not quite sure how to get there. The initial discovery stage and proof of concept stage are crucial for smooth project execution - we want to be sure you get what you need the first time. We are here with consulting services:

- project scoping
- discovery and definition
- product specification
- ensuring technical feasibility
- brainstorming
- technical working principle
- building of proof of concept
- integration with other equipment
- integration with other suppliers

We offer servicing and maintenance of machines, cells and other electronic devices. Besides products built in-house, we can also take over servicing of 3rd party equipment at your site.

We are available for urgent cases and we prioritize them to minimize downtime.



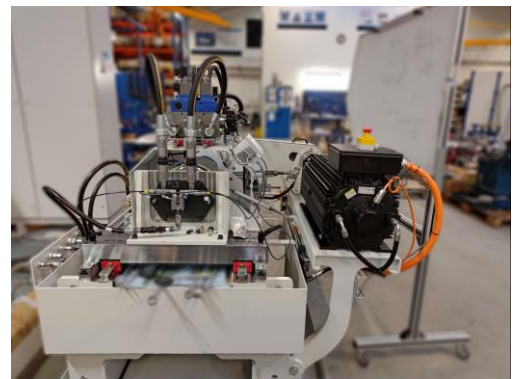
# CASE

## HYDRAULIC MOTOR TEST PANEL

This test panel is designed for testing hydraulic motor units in size from 8ccm to 500ccm, which are widely applied in agriculture industry, construction equipment, aerial platforms, road building, etc.

The test system is designed to offer both automated operations controlled by a computer and manual setup by an operator.

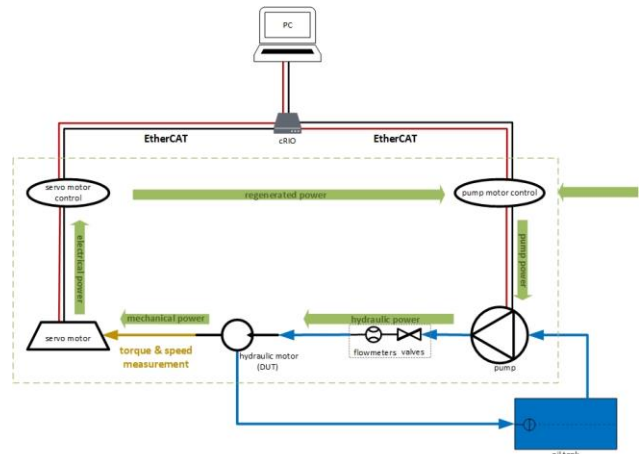
As a laboratory test system, it must be highly adjustable to perform various tests. This solution allows measurements on hydraulic motors carried out at different working points, for example, 20 working points consisting of different flows and pressures in both directions. The PC controls the pump, valve, and other test instruments, allowing them to provide a quick response and precise action. This enables verification of desired working points over a wide range.



When the hydraulic motor works, its speed is directly proportional to the flow passing through it. Therefore, a steady and constant flow is crucial to keep the motor running while testing its efficiency. Achieving precise control of the same system to provide flow rate of 1 l/min and 90 l/min was a challenge. This means the control system must be capable of adjusting control responses according to the changes.

10 different functional tests can be performed in both directions. A customized program was tailored for the system. From the user's perspective, the simple and intuitive LabVIEW user interface is easy to handle. Test data are all logged in a spreadsheet and saved in database.

In close collaboration with Serman & Tipsmark A/S, a servo motor is installed to control the load on the hydraulic motor. It communicates with LabVIEW via an EtherCAT protocol. The system is equipped with a regenerative braking system, similar to that of electric cars. This empowers the energy generated by the servo motor acting as a brake to be fed back into the system and used to power the pump, thus reducing the overall power consumption of the system while it is running. At CCM, we have always maintained a "Green" mindset for each project, and we are happy to put our efforts towards improving energy efficiency and delivering it to our customers.



# CASE

## TEST OF CHARGER CABLES WITH PLUGS FOR ELECTRIC CARS

Don't let the modest title fool you – this exciting project is an outcome of the latest trends, as the equipment tests charging cables for electric cars at Norsk Hydro ASA (Precision Tubing Tønder). The cable consists of two bent aluminum rods, covered with insulating plastic.

The central part of the tested item is the adapter plug between the cable and the car's battery, which must be both waterproof and electrically safe.

The tester measures the insulation resistance between the two cable conductors with 4.3kV DC with a permissible leakage current of 4  $\mu$ A, as well as a ground continuity test at 3A between the plug housing and the screen of the cables.

The plug's waterproofness is tested with air using a leak test at 1.5psi. The entire test takes place in one tension, which gives a high capacity with a cycle time of 30 seconds. The equipment is designed to be integrated into a fully automatic production line, which is already in the making.

From the user's point of view, the test is simple and intuitive to use, as an integrated touch screen provides the user with unambiguous test results and statistics, as well as the possibility of troubleshooting. The machine comes with 4 operating modes and a dedicated LabVIEW software application. The machine is designed with the operator's safety in mind, but also to be easily accessible for maintenance and cleaning.



We are excited to help bring more electric vehicles to the roads.

Find more case studies at [www.ccm-ee.dk](http://www.ccm-ee.dk).

# Partnership



**SAAB**

**Welltec**<sup>®</sup>



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