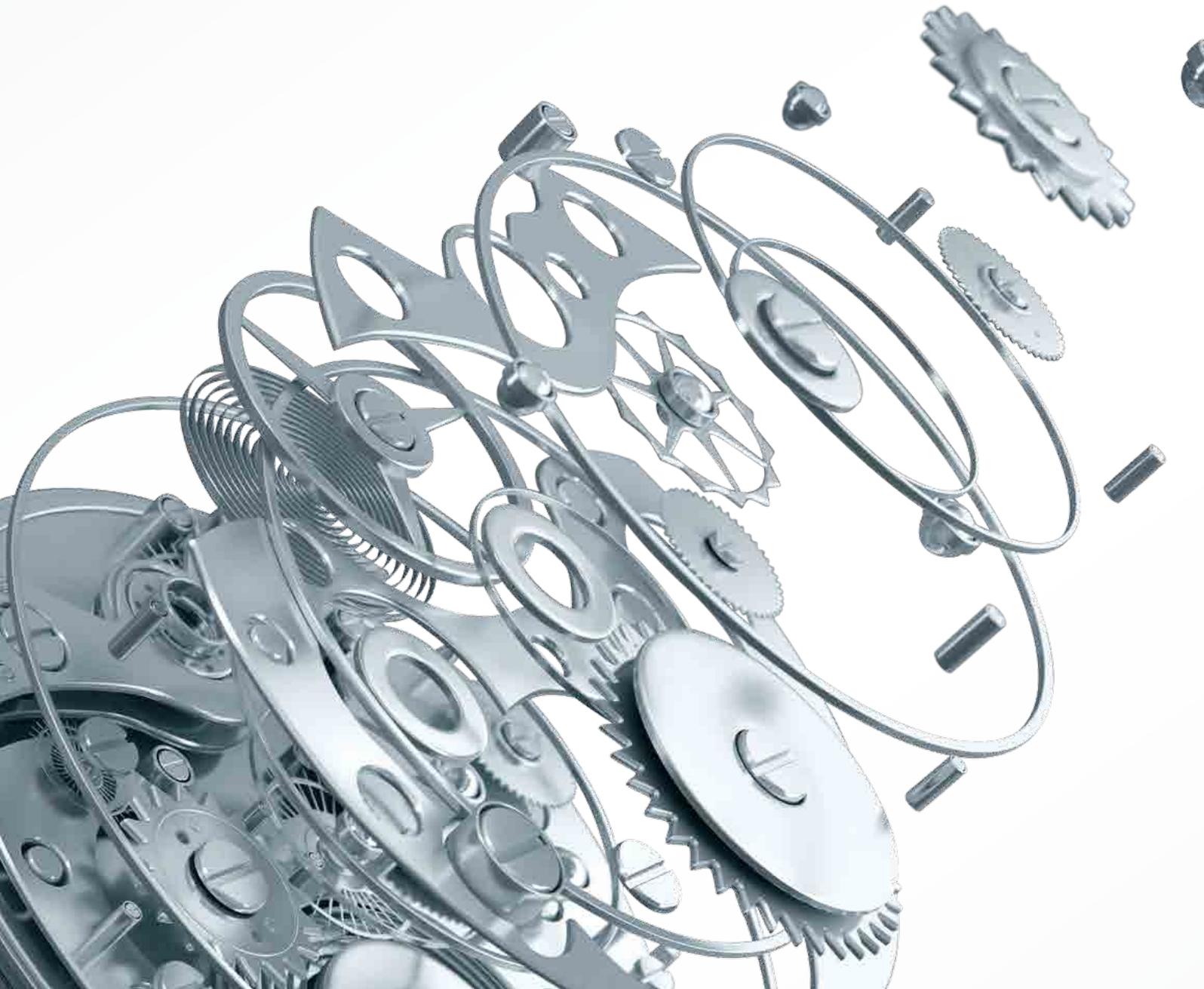


Swiss Precision Manufacturing

Reliable routine testing on medium-voltage circuit breakers at ABB in Switzerland

All of the production steps need to run like clockwork at a manufacturer's site, because that's the only way to guarantee seamless and efficient production.



In 2014 Andreas Brauchli, the Senior Technical Manager at ABB in Zuzwil realized that their routine testing equipment for circuit breaker (CB) production was getting old and maintenance efforts had increased considerably. It was also no longer able to cope with the increasing number of necessary tests which created a bottleneck at the end of production.

Therefore, Andreas Brauchli started looking for a reliable and automated testing solution for routine tests on their single- and two-pole outdoor medium-voltage vacuum CBs with an electronically-controlled magnetic actuator (17.5 kV – 27.5 kV). These CBs are mainly used for railway applications.

During his research Andreas Brauchli found out that we have a CB test set for medium- and high-voltage CBs called CIBANO 500. "In early 2014 we had already purchased a CMC 356 from OMICRON for testing the protection relays on our medium-voltage switch-gear that we were quite happy with," Andreas Brauchli remembers. "Therefore, in the beginning of October 2014 I sent an email to OMICRON with some basic information and a description of our necessary measuring tasks."

Testing and decision phase

We quickly set up a task force of two experts which took Andreas Brauchli's information and developed an automated test configuration for the integration of CIBANO 500 in the ABB production line.

In mid-December 2014 Jakob Hämmerle and Holger Schindler, both working at OMICRON, made their first tests with CIBANO 500 in the ABB test bay in Zuzwil. They analyzed ABB's needs step by step and considered all of the necessary test details. "We used the PTM software for a plausibility check of the existing ABB test routine which was supported by a database in Microsoft® Excel®," Jakob explains.

The challenge was to use the existing ABB database, containing all of the necessary test data, as a basis and implement a Visual Basic™ mask which served as an interface for CIBANO 500. The test routine was supposed to run automatically through all of the necessary tests, make an overall assessment of the breaker, and as a result print out a test certificate. ▶

«The first tests showed us that CIBANO 500 was able to do it and thus actuate the breaker. This was a decisive step for us.»



Jakob Hämmerle

Application Engineer, OMICRON

Magnetically-actuated vacuum CB

When compared with a breaker that is classically operated with a spring-charge mechanism, the major difference lies in the control unit which electrically stores the tripping energy in a capacitor bank and transmits this energy to move the high voltage pole. The actuator is a bi-stable magnet system, made of two permanent magnets that maintain the device in an open or closed position, and two electrically excited coils. This unique design eliminates several moving parts, making the breaker robust, reliable and essentially maintenance-free.

22 Application

«Using the CIBANO 500 concept with the integrated AC/DC power supply plus the μ -Ohm-meter, allows us to take all of the measurements within one measuring cycle without any additional devices.»



Andreas Brauchli
Senior Technical Manager at ABB
in Zuzwil, Switzerland



Control Unit CIBANO 500

CIBANO 500 is the central measuring and controlling device. It is an AC/DC power supply, μ -Ohm-meter and timing analyzer at once.

ABB

ABB is a world leading independent supplier of innovative and reliable technologies for training manufacturers and railway operators. ABB's range of medium-voltage products for the railway industry includes the complete range of switchgear solutions and substation components for 16.7 Hz to 25 Hz and 50 Hz to 60 Hz applications.

First our team had to find out if CIBANO 500's integrated power supply was capable of loading the CB's capacitor bank. Otherwise the entire process wouldn't have been possible. "The first tests showed us that CIBANO 500 was able to do it and thus actuate the breaker. This was a decisive step for us," Jakob adds smiling.

After further tests in Austria Jakob was able to confirm that the following test sequences work with CIBANO 500:

- > Resistance of the main contact
- > Charging of the capacitor bank
- > Discharging the capacitor bank / consumption CB control board
- > Voltage observation of the capacitor bank
- > Timing tests at 115% of nominal supply voltage
- > Timing tests at 75% of nominal supply voltage
- > Measuring closing, opening or O-C, C-O time
- > Closing or opening synchronism of two pole CB
- > Closing and opening speed of a main contact

Due to these capabilities, ABB decided to use the CIBANO 500 solution instead of trying to expand and refurbish their existing system.

CIBANO 500 + IOB1 + 2 CB MC2 + CB TN3 can test two medium-voltage vacuum CBs simultaneously



Input / output module IOB1

The IOB1 offers the necessary input and output channels for connecting to the CB's supply, trip, close and capacitor bank.

Main Contact Module CB MC2

The CB MC2 modules digitally transfer the resistance signals from the CB's main contacts to CIBANO 500 for processing.

Transducer node CB TN3

The CB TN3 module digitally transfers the motion signals from the CB's main contacts to CIBANO 500 for processing.

Final tests and implementation phase

In February 2015 several further tests took place at ABB in order to compare the performance of CIBANO 500 with their existing test system. By the end of March 2015 they were able to begin regularly testing the FSK II CBs in their test field.

The final solution consisting of CIBANO 500, IOB1, two CB MC2 modules, one CB TN3 module, and all the necessary cables, was installed on a trolley where all of the devices were readily available for optimum usability. For security reasons a 3-color warning lamp and an external emergency stop button had to be mounted and connected to CIBANO 500. The warning lamp was connected to the capacitors on the CBs' magnetic actuators which can stay under voltage if the test procedure is interrupted. It displays a yellow light whenever a voltage of 30 V is exceeded. Since CIBANO 500 has several open interfaces, the connection was not a problem.

"Thanks to the new test procedure that CIBANO 500 offers us, we can now keep detailed records of all the tests we perform. Additionally, we receive reliable assessments which allow us to release the CBs in compliance with our own strict quality guidelines and the different applicable CB test standards. Using the CIBANO 500 concept with the integrated AC/DC power supply

plus the μ -Ohm-meter, allows us to take all of the measurements within one measuring cycle without any additional devices," Andreas Brauchli explains. "With our previous test system we had to take velocity measurements in a separate measuring cycle and we even needed an additional device for the μ -Ohm measurements."

"As of now, we have already ordered a second CIBANO 500 test set that we can use in parallel and also as a backup system to achieve redundancy," he concludes. 📌



CIBANO 500 test trolley at ABB production line on medium-voltage vacuum CBs.