

EDITION 2



Electromagnetic compatibility



Consulting for
troubleshooting



LABORELEC

The technical Competence Centre
in energy processes and energy use.
From R&D to operational assistance.

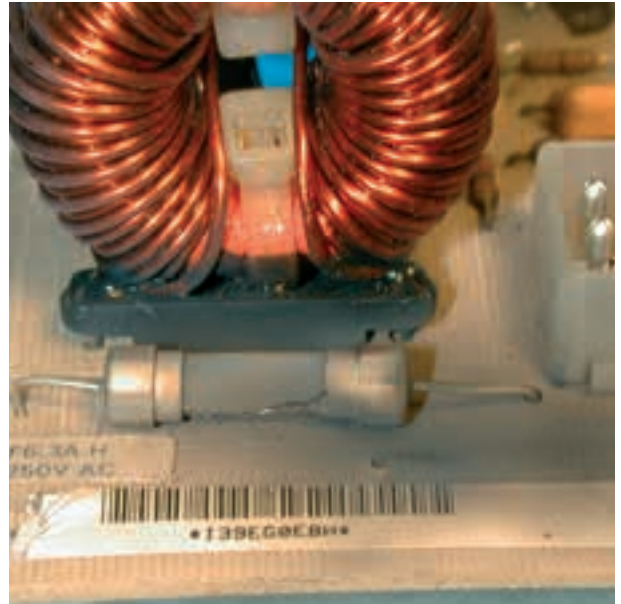
Identifying malfunctions and finding solutions

Tiny ripples make huge waves

The identification of the electromagnetic sources that lead to malfunctions can be very subtle. Sometimes, just starting an engine, using a mobile phone or activating power electronics can be enough. Disturbances can dramatically affect electronic systems, generating huge production losses or limit the reliability of vital equipment. In the worst cases, they may constitute a threat to safety.

Guaranteeing EMC by practical approach

To prevent malfunctions (guaranteeing 'electromagnetic compatibility'), the cause of the phenomenon must first be identified. The causes are multiple and diverse, such as voltage transients, electromagnetic radiation, electrostatic discharges, lightning, etc., and each case requires an adequate remedy.



The malfunctions can be avoided by:

- acting on the disturbance source if it is within reach
- decreasing the existing coupling
- increasing the immunity of the disturbed equipment

Not a simple job

Identifying the disturbances, checking their effect on the various plants and installations and finding appropriate solutions - these are all jobs for specialists. They require sophisticated measuring equipment, and the experience needed to correctly interpret the results. Laborelec has all the necessary expertise in this area.

Five reasons for you to choose Laborelec

1. You have one-stop shopping

Laborelec's EMCS team offers a total service, from identification of the disturbance source to the suggestion for corrective actions:

- Measurement on site of the disturbance sources
- Expertise in the lab of damaged equipment
- Working out of effective solutions
 - improved wiring
 - filters
 - shielding
 - overvoltage protection
 - extra grounding
 - the wiring and earth connections on the shields
 - the earth network
 - the power systems (TN, TT or IT)
- Calculations or simulations to evaluate the effects of these solutions

To trace and identify EMC disturbances, Laborelec makes use of sophisticated instrumentation:

- a spectrum analyser
- CISPR receivers
- electrical and magnetic antennae
- digital oscilloscopes
- electrical and magnetic fields probes (low frequent and high frequent)

2. You get access to more than 40 years of experience

Take advantage of Laborelec's decades of experience in solving EMC malfunctions. Our experts keep abreast of the latest technical aspects and legislation. They actively participate in writing standards in the domain of EMC, both nationally (CEB) and internationally (CEI 77 A&B, CENELEC 210).

3. You increase the profitability of your installations

You make the best use of your electrical installations if experts implement the electromagnetic compatibility rules in your premises. This is key to relying on the success of your factory process and improving the reliability of your vital equipment.

4. You benefit from independent and confidential advice

Laborelec is not selling or installing equipment. This guarantees you neutral and independent advice.

5. You are supported by a recognized and accredited laboratory

Our EMC troubleshooting advices have proved themselves in numerous interventions. They are recognized for their efficiency and reliability.

Have a look at our testimonials!

Testimonials

INFRABEL

Infrabel - manager of the Belgian national railway network - saved thousands of Euros by having Laborelec study the EMC of one of its substations. Poor EMC had caused Low Voltage (LV) equipment of the substation to break down several times. Laborelec rethought the complete EMC concept.

Infrabel had installed a new substation on its Athus-Meuse line. It was equipped with a circuit-breaker protecting the 25 kV cables between Achêne and Houyet. Low Voltage (LV) electronic systems in the substation were breaking each time the circuit breaker was engaged or disengaged. 'Thousands of Euros were going up in smoke every time. Until we called upon Laborelec.'

'The poor EMC of the installation was generating voltage surges between the LV equipment and the earth, in turn causing the breakdowns. Laborelec gave us concrete solutions to lower these surges below the 500 V limit tolerated by the apparatus. They recommended, for instance, building a



meshed earthing grid and improving the continuity of our screening.'

'After all the measures were implemented, Laborelec checked their efficiency by manoeuvring the circuit breaker tens of times. To avoid new breakdowns during testing, LV equipment were only connected progressively. But Laborelec recommendations had reached their objective: no more breakdowns occurred. We will take these technical recommendations into account in the conception of new substations all over the country.'

Bruno Piette
Infrabel

Testimonials

ELECTRABEL DOEL 2

During major maintenance of Doel 2 nuclear reactor, sudden alarms from appliances measuring nuclear activity made it necessary to evacuate the hot zone. These were caused by EM disturbances.

Laborelec EMC team (EMCS) examined the coupling of the disturbances by determining the typical impedance of the reinforced shield of the circuits leading to the measurement probes. EMCS experts brought to light a discontinuity in the shield system. They suggested improving the shield complex and modifying the earthing of these shields.



ELECTRABEL Co-generation power station

At a co-generation power plant, instability in turbine temperature measurements was leading to frequent shutdowns of the turbine. This in turn was causing the stoppage of steam and electricity production.

Laborelec demonstrated that the measurement system was very sensitive to low frequency disturbances. Its team suggested modifying the temperature signal acquisition cards. This solution has proven to be effective and is now implemented during maintenance operations at other power plants.

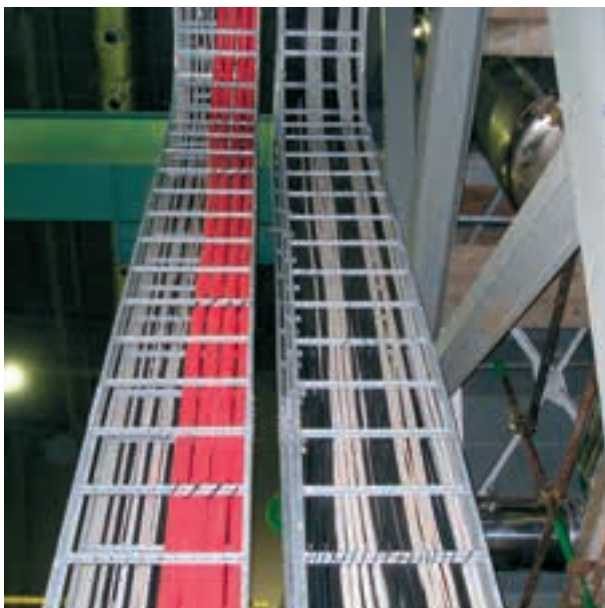
Testimonials

Voghera Energia power plant (Italy)

At a power plant, all details of the EMC concept must be implemented perfectly from the very start. Otherwise, EMC problems will occur sooner or later, leading to heavy additional costs. An example is given below.

The Voghera Energia power plant in Italy was experiencing EMC problems with one of its gas turbine valves. The signal controlling the valve was disturbed every time the variable speed drive (VSD) of one of the water pumps was turned on. This was leading to faulty valve behaviour and, at term, to plant stoppage. Laborelec EMC team was called in to audit the concerned circuits.

The experts quickly identified the origin of the problem. As with all power electronic devices, the VSD produces high EM fields along with the usual shielded power cables supplying the motor. At Voghera, these power cables were running parallel to the signal cables that control the gas turbine valve over a distance of about seventy meters. EM fields produced by the power cables were interfering with the control signals.



Laborelec investigated how to reduce EM emissions from the power cables. The most efficient solution was to replace the existing cables with more heavily shielded ones. But this represents huge costs. The experts therefore suggested rerouting the signal cables further away from the power cables so that they wouldn't interfere. This alternative enabled Voghera operators to restart the commissioning quickly and at significantly lower costs.

Alain Dumont
Electrabel

Testimonials

GlaxoSmithKline Rixensart

Laborelec is often called in for troubleshooting investigations when EMC problems are suspected. But sometimes, root causes other than EMC are uncovered. The EMC team then collaborates with the Power Quality team to precisely identify the origin of the problem and determine the best remedies.

GSK experienced this when the PCs controlling its freeze-drying lines started malfunctioning. 'Laborelec quickly discovered that the problem was due not only to EMC issues but also to defects in the uninterrupted power supply systems and in the PCs themselves. Its team came up with efficient solutions and got our lines back under control in no time.'

Francis Comelusse
GSK



Werktechnik and Volkswagen Brussels

Loosing an hour of production at Volkswagen means loosing a great deal of money. 'When a problem occurs on a production line, we want experts to identify the cause quickly and to propose fully reliable solutions.'

'EMC problems with one of our Programmable Logic Controllers (PLCs) recently caused production stoppages. Laborelec experts studied the defective PLC and its surrounding. They compared our installations with EMC best practices and compiled concrete recommendations for improvement in a clear report. This document is our roadmap for a completely sound EMC strategy.'

Hugo Van Nueten
Werktechnik and Volkswagen Brussels



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- you have one-stop shopping for your energy needs;
- you get access to more than 40 years of experience;
- you increase the profitability of your installations;
- you benefit from independent and confidential advice;
- you are supported by a recognized and accredited laboratory.



What is the meaning of «Electromagnetic compatibility» (EMC)?

Electromagnetic compatibility is the ability of a device or system to function satisfactorily in its electromagnetic environment without introducing any electromagnetic disturbances into that environment that might lead to any inefficiencies or malfunctions.

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