YRH Spectrum
VOLUME 2 NUMBER 1
October 2003

Electromagnetic Interference (EMI)

Every day we are surrounded by electrical and electronic equipment. When one piece of equipment interferes with the normal operation of another, the results can be tolerable, annoying, or in some cases, catastrophic.

For example, a malfunctioning elevator motor can cause computer monitor located next to the elevator shaft to flicker. The use of a blender in the kitchen can cause bad reception on a television screen. These instances can cause many frustrations to the users, but are still tolerable.

However, in hospitals, some types of incubators can be affected by the use of nearby telecommunication devices, causing serious repercussions for the patient. In other example, a crane susceptible to electromagnetic interference could drop its charge when an unaware VHF radio user is transmitting.

It is then extremely important that electrical and electronic devices do not cause electromagnetic interference capable of disturbing or destroying other equipment. It is equally important to include protection against electromagnetic interference in the design of sensitive equipment.

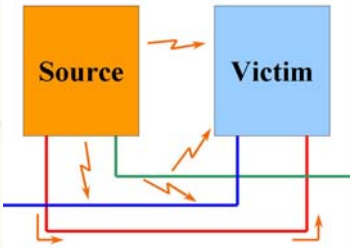
International Electromagnetic Compatibility Standards (EMC)

For many years, electrical and electronic equipment manufacturers have had to comply to electromagnetic standards, which change with the type of product and their market territory. The purpose of these standards is to reduce the risk of causing electromagnetic interference.

In Canada, Industry Canada's Interference Causing Equipment Standard (ICES or NMB in French) sets out the technical requirements limiting the radiated and conducted radio noise emissions. Electrical and electronic equipment manufacturers must certify their equipment before selling their products on the Canadian market.

Also, in the United States, the FCC (Federal Communications Commission) requires that radiated and conducted emissions limits be respected, and in Europe, the CE standard requires that manufacturers not only meet the conducted and radiated emissions standards, but also measure the immunity level of their equipment against different types of electromagnetic interference.

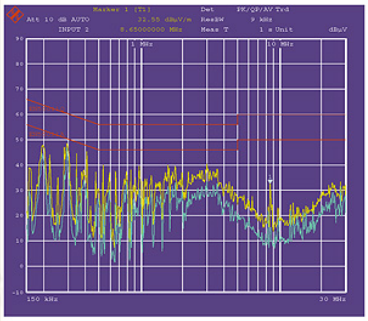
Every territory possesses their own limits and criteria with which manufacturers must comply before commercializing their equipment.



Source vs. Victim

Electromagnetic interference can propagate through different paths:

- *Radiating*
- *Common impedance*
- *Field to cable*
- *Crosstalk (cable to cable)*



Standards

Electromagnetic standards define the maximum conducted and radiated emissions limits. This means that the electromagnetic noise produced by the usage of a device must not be higher than the limits for its power supply cord, its inputs/outputs and the radiated energy.

Electromagnetic disturbance immunity standards require qualifying the resistance of the equipment to different types of electromagnetic disturbances such as electrostatic discharges and fast transient burst.

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Preventing before curing

The best way to prevent electromagnetic interference problems is to proceed at the design stage with an approach that takes into consideration electromagnetic phenomena.

It is necessary to properly select the electronic components and to assemble them correctly in order to reduce the levels of conducted and radiated emissions. In certain cases, filters and EMI protection devices (diodes, varistors, surge arrester) are necessary to improve the electromagnetic compatibility performances of a device.

Yves R. Hamel et Associés inc. offers its clients design verification services of schematics, PCB layout, filtering and cabling which will reduce the costs of debugging electromagnetic compliance problems.

Electromagnetic compatibility (EMC) testing

In order to obtain an electromagnetic compliance certification, the unit under test must pass the emissions tests and, in some cases, the immunity to electromagnetic disturbances tests. These tests are usually performed in a certification laboratory. This process is usually long, and is very costly if the unit does not meet the prescribed standards. However, it is possible to perform on-site engineering tests in order to be prepared for the certification process.

Yves R. Hamel et Associés inc. can perform these on-site engineering tests in order to ensure the electromagnetic compatibility of the equipment before going to the certification laboratory.

Our EMC expertise

- *Electromagnetic compatibility certification program management services*
- *Schematic design revision and PCB layout verification services*
- *On-site conducted and radiated emissions measurement services*
- *On-site immunity level measurement services*
- *Electromagnetic compatibility consulting services*

If you are victim of electromagnetic interference, contact us for more information!

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Consultation

Yves R. Hamel et Associés inc. not only offers consultation services on electromagnetic compliance but also technical documentation services in order to meet the quality standards of our clients.

This includes the preparation of the following documents:

- *EMC Test Plan*
- *Test Procedure*
- *Test Report*
- *Modification Report*

Testing

Yves R. Hamel et Associés inc. performs engineering tests as per the following standards:

- *Low frequency magnetic field fields measurements as per Safety Code 6 and ICNIRP*
- *Conducted and radiated emissions as per EN 55011, EN 55022 and FCC Part 15*
- *Immunity to electrostatic discharges as per EN 61000-4-2*
- *Immunity to electrical fast transient bursts as per EN 61000-4-4*
- *Immunity to surges as per EN 61000-4-5*
- *Immunity to RF conducted fields as per EN 61000-4-6*