Electromagnetic Compatibility for Next Generation (EMC NG) of Embedded Devices

A project in Research for Innovation

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Knowledge Foundation

Partners:

Halmstad University, NIBE, HMS Industrial Networks, AES Nordic, Digital Metal part of Höganäs Group, and Swedish Adrenalin.

Background and Motivation

This research project is a strategic effort to increase the knowledge of the next generation of EMC requirements and possibilities in the context of two important and ongoing technology trends: the pervasive computing revolution, also known as Internet of Things (IoT), and new production methods, known as additive manufacturing. There is a need for understanding the new EMC environment and the requirements of electronics and embedded systems, which will follow in the footprints of the pervasive computing revolution.

Research Problem and Approach

The electromagnetic properties of the materials used in additive manufacturing are to be investigated, examples of important material parameters are: granularity, conductivity, permittivity, and permeability. Different additive production processes may provide varying structure granularity, spatial resolution, and a wide range of materials. However, there is a lack of standardized specifications for mechanical as well as electromagnetic properties enabling a good prediction on how manufactured parts will perform. To increase the opportunities of innovation in the area of additive manufacturing the following research questions have been formulated:

- How can we provide the necessary knowledge and control of processes, structures, and materials used in additive manufacturing to produce commercially useable devices?
- What electromagnetic properties do additive manufacturing provide, and does it provide new features usable for further integration of embedded electronics while sustaining EMC performance?
- What possibilities are there for extreme integration of electronic components, like antennas, for future wireless systems by applying additive manufacturing?

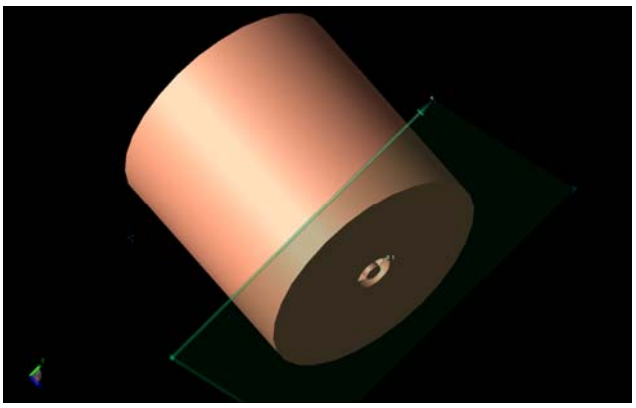

Fig 1. FEM Model of Cavity

Goals

Besides the goal of achieving answers to the research questions, secondary goals of the project are: develop or improve laboratory measurement methods and models that more accurately reflect new requirements related to the pervasive computing vision; and develop best practice and recommendations for implementing these techniques into new EMC test standards. Accelerate the adoption of additive manufacturing and 3D printing technologies in the electronics sector and to increase competitiveness.

Results so Far

Three hypothesis are assessed for additive manufacturing of electronics: building practice for naked chips (asics), inkjet antennas and printed metal cavity for resonance circuits. The first FEM models has been developed for cavity, Fig 1. Setting up lab-environment, surveying different materials.

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