# On-line Testing in Contineous Operation of Embedded Systems: Modeling and Performance Evaluation[1]

**Chouki AKTOUF**
LCIS - ESISAR - 50, rue Barthemely de Laffemas,
B.P 54, 26902 Valence Cedex 9, France
Chouki.Aktouf@esisar.inpg.fr

**Summary**

Testing is vital for nowadays electronic systems. The related testing process consists in applying tests and verifying the obtained results. This should be performed without stopping the system under which useful applications are running.

In this work, an on-line testing approach which allows tests to be applied *in situ* without any system perturbation is proposed. Using, optical probes fault effects are extracted through electro-optic phenomenon. By using the extracted optical signals, the proposed approach benefits from the capability of sending a huge number of optical information that are related to tests. For circuits whose size varies from a $mm^2$ to tens of $cm^2$, optical information can be sent in parallel with the application under execution.

The proposed testing approach takes fully advantage of the existing interactions between materials, especially those called electro-optical, and the optical effects that might appear when such materials are used.

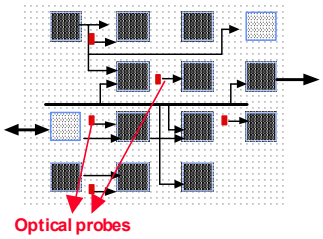


**Figure: Optical probing for on-line testing**

A queuing model that is used in the analysis of the proposed approach is detailed. The QNET software is considered to analyze the feasibility of the proposed approach. According to the number of probing elements that are put in the system under test, test performance are estimated. Furthermore, several physical parameters, such as processing capacity, memory and disk capacity are considered.

The obtained results are very encouraging especially in terms of fault coverage and fault latency.

[1] This work was supported by the National Polytechnic Institute of Grenoble under the BQR2000 project.