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Test Engineering Education in Europe: the EuNICE-Test Project

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Abstract

The paper deals with a European experience of education in industrial test of ICs and SoCs using remote testing facilities. The project addresses the problem of the shortage in microelectronics engineers aware with the new challenge of testing mixed-signal SoCs for multimedia/telecom market. It aims at providing test training facilities at a European scale in both initial and continuing education contexts. This is done by allowing the academic and industrial partners of the consortium to train engineers using the common test resources center (CRTC) hosted by LIRMM (Laboratoire d'Informatique, de Robotique et de Microélectronique de Montpellier, France). CRTC test tools include up-to-date/high-tech testers that are fully representative of real industrial testers as used on production testfloors. At the end of the project, it is aimed at reaching a cruising speed of about 16 trainees per year per center. Each trainee will have attend at least one one-week training using the remote test facilities of CRTC.

1. EuNICE-Test Genesis

This European network for test education is mainly based on the French CRTC experience [1-3]. A mixed approach is chosen, that combines both distributed and centralized test resources. Indeed, considering the huge cost of high-tech IC testers, the idea is to develop a one and only one test center for all the European academic partners. To avoid any expensive traveling of students from their university to CRTC in Montpellier, the implementation has been thought to make the CRTC tester reachable by net from any remote center.

CRTC is mainly equipped with high performing ATEs such as Agilent 83000-F330t VLSI tester. In each of the European centers, a server with test software facilities is implemented to allow the local development of test programs (Figure 1).

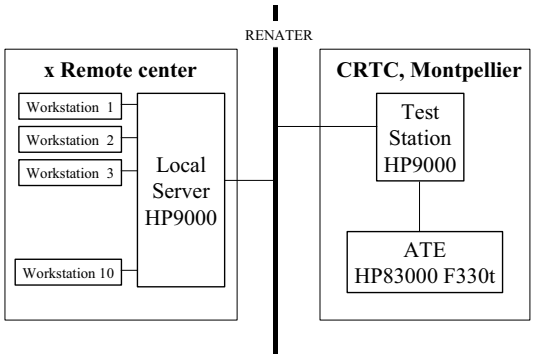

Figure 1. Network implementation for remote test

At the very last moment of the physical test, trainees connect on CRTC tester through the net and execute the test of the Device-Under-Test (DUT). Such an original remote testing implementation permits to save money first by equipping only one test center with performing resources and second by avoiding expensive costs induced by trainees traveling and accommodations.

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2. EuNICE-Test Activity

The training courses we propose is opened for pre- and post-doctoral students from universities or engineering schools [4]. These training courses contribute to address the shortage of skills in circuit testing for microelectronics industry. In particular, it is aimed to allow the trainees to acquire a solid knowledge in the strategic domain of mixed-signal and SOC testing.

The two main training courses we propose to initiate students and engineers to digital IC test are issued from those developed by Agilent for the 83000 tester. After completing level 1 training, each trainee will be able to make competent use of any digital ATE to test a device for its performance parameters and specifications, build up a test flow to automate the test execution and create a test program to be executed on the production test floor. After completing level 2 training, he will have gained the know-how to test complex devices, convert simulation data and make optimum use of tester resources. Both training courses use a standard digital circuit as DUT (Device Under Test) to simply illustrate all the test functions. Each training is built up on lessons and related lab exercises. The network configuration of CRTC allows any trainee in any distant center to prepare lab exercises using the local resources. Also the correctness of both input signal shapes and output strobe locations may be locally verified. Only the test execution itself necessitates a remote connection on the CRTC tester in Montpellier.

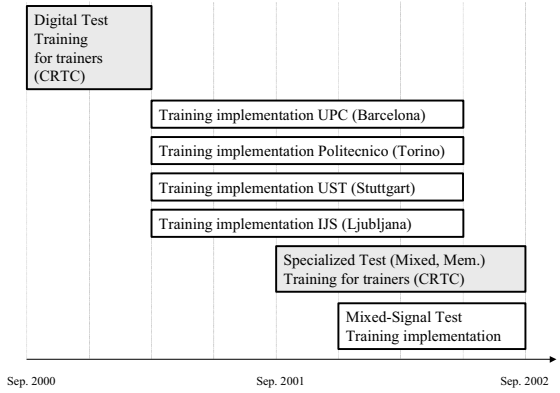

Figure 2. EuNICE-Test Project activities

The schedule for project planning is described in the Figure 2. First, trainers of each academic partner have been trained to engineering test on the Agilent 83K tester of CRTC in Montpellier. Then, these trainers have performed the same training course to their students concurrently in each center. About sixteen students per academic center have thus be trained. Finally, the industrial partner (Agilent) taught academic participants to specific test techniques. So, by the end of the project (Table 1), test engineering knowledge status will results in 3 European centers of competence in mixed-signal testing and 3 European centers of competence in memory testing.

This configuration will allow the per-year offer in test education in Europe to be:

- 5 training courses in digital test
- 3 training courses in mixed-signal test
- 3 training courses in memory test

Table 1. European centers of competence in teaching test engineering

Center	Digital Test	M-S Test	Memory Test	Teaching Language
Montpellier France	**X**	**X**	**X**	French English
Barcelona Spain	**X**	**X**		Spanish English
Torino Italy	**X**		**X**	Italian English
Stuttgart Germany	**X**		**X**	German English
Ljubljana Slovenia	**X**	**X**		Slovenian English

Such coordinated scheduling should permit any European student to dispose several time slots per year for attending basic and/or specialized test training.

3. Acknowlegements

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