Continuing Education for Small and Medium-Sized Industries: the French JESSICA Programme

P. GENTIL, Director of JESSICA France, Vice-President of CNFM
CNFM-CIME/INPG, 46 Ave. Felix Viallet, 38031 GRENOBLE cedex 1, FRANCE

Abstract

This paper presents a French public programme set up in order to assist small and medium-sized industries that are willing to implement ASICs or new electronic technologies in their products. After the presentation of the general frame of this programme, the specific actions will be detailed: SMIs awareness to new technologies, and specialised training sessions in microelectronics that were defined and realised for SMIs. We will then give quantitative results of the action and the characteristics of the SMIs that were provided help via JESSICA. Thanks to the positive results obtained by the programme over the last five years, JESSICA is likely to continue its action for a new period of four years.

1. The framework of JESSICA

Within the framework of the EUREKA JESSI (Joint European Submicron Silicon) Project "Small and Medium-sized Industries Support" -called SMI Support- a very efficient support network was created throughout Europe in order to facilitate the implementation of modern microelectronics technology in SMIs. JESSICA (JESSI ASIC design in French) is the French designation for the JESSI SMI Support. This programme has been in operation for more than five years.

JESSICA is a governmental programme mainly financed by the Ministry of Industry, with an annual budget of approximately five million dollars. About twenty public support and competence centres provide awareness sessions and training programmes and also help individual SMIs with advice, feasibility studies and design, prototyping and testing services. JESSICA offers these services to SMIs for free or at low cost in order to help them to define a new product integrating a new electronic technology. JESSICA does not provide direct financial support to SMIs; other national or European programmes do provide this type of support.

CNFM (Comité National de Formation en Microélectronique) and LETI/CEA (Laboratoire d'Electronique, de Technologie et d'Instrumentation / Commissariat à l'Energie Atomique) were jointly entrusted with the national co-ordination of JESSICA in France.

2. Training actions for Small and Medium Industries

Continuing education constitutes a very important part of the JESSICA programme. More than the third of the budget is devoted to SMIs training.

The CNFM is a network of eleven facility centres spread over France. More than thirty universities and engineering schools are associated to CNFM centres.

The CNFM is in charge of the continuing education and organises most of the training actions. Moreover, the CNFM plays an active part in the expertise and technical assistance provided to SMIs.

In France, SMIs are rather small-sized. JESSICA usually deals with "traditional" SMIs that are not considered as "high-tech". They cannot afford getting up-to-date with the new technologies and do not have time for training. Engineers in charge of JESSICA play an important part: when they get in touch with the SMIs they have to convince them that new electronic technologies can enable them to realise more efficient and more economical products.

Information on the help that JESSICA can give to SMIs is broadcasted using different ways: mailing, exhibitions, press advertisements, short (two hours) meetings, ... Engineers in charge of JESSICA are in constant contact with SMIs, they also visit them in order to know their problems better and offer them appropriate solutions.

All the services provided by JESSICA were defined in order to answer the concrete needs of the SMIs. It is difficult and often takes long to convince SMIs to use a new technology. However, when SMIs do agree, they wish to obtain results very quickly. The assistance provided must be concrete, and applicable immediately. These criteria apply to training.

The CNFM and its partners offer two types of training, especially defined in order to match the expectations of SMIs:

* Short training sessions (one to three days) present general data on the economical or technical aspects of ASICs or new electronic technologies. These sessions are generally organised to help SMI's managers start working in these new fields.

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Practical training sessions (from two days to some weeks) are proposed to engineers and technicians. This training gives them the opportunity to acquire the technical knowledge necessary to start the design of their first ASIC or set up a new electronic technology (by themselves or with a sub-contractor). These sessions are mainly composed of practical training, using industrial facilities such as Cadence, Compass, Mentor, Synopsis, Altera, Xilinx. They can also be materialised by the complete realisation and the test of a prototype.

At the beginning of the JESSICA programme, the training sessions mainly concerned ASICs technologies that were not familiar to SMIs. Since 1994, JESSICA spread out its action to the whole electronic field because of the necessity to cover all the aspects of electronic systems applied to a product. Furthermore, the use of ASICs does not concern a great part of SMIs products, most of all for economical reasons in the case of low productions. In 1996, the main topics of the training, besides ASICs, were as follows: programmable devices, VHDL, microcontrollers, microprocessors, Digital Signal Processor, integrated sensors and microsystems, Surface Mounted Components, design of electronic boards, ElectroMagnetic Compatibility, quality in manufacturing boards, RF transmissions, switched capacitors, ...

3. Results obtained by JESSICA

Since the beginning of the programme, the main results of the JESSICA action can be summarised as follows:

- General training: more than 1,200 trainees, coming from 750 different SMIs, were trained during 136 sessions, representing more than 2,000 trainee-days.
- Practical training: more than 650 trainees, coming from 300 different SMIs, were trained during 179 sessions, representing more than 2,600 trainee-days.
- Technical assistance: approximately 1,400 one-day visits and 300 up-to-5-days expert valuations were realised, and more than 50 technical assistance contracts (over five days) were completed. Thanks to four working groups, some SMIs gathered in order to realise an ASIC in common.
- JESSICA actions enabled SMIs to achieve the implementation of more than 120 specific integrated circuits in their products.

The SMIs that were trained via JESSICA can be described as follows:

- The main field of activity of about 2/3 of the SMIs is electronics. The others deal with various fields.
- The average number of people working in the SMIs is fifty. For more than half of the SMIs the staff is composed of less than twenty people. Only about 10% of the SMIs employ over hundred people.
- The average duration of the practical training attended by the SMIs is of roughly ten days per year. Approximately two trainees per SMI attend JESSICA courses.

Short training sessions must be proposed by JESSICA: two to three days with a maximum of five days for very small companies. Training sessions must be split up into several short courses when they require more than one week.

4. Conclusions and perspectives for JESSICA

In 1996, the JESSICA programme was evaluated on request of the Ministry of Industry. For 87% of the SMIs surveyed during this evaluation, the training had proved useful (even very useful) to the achievement of their project. The evaluation also showed that the SMIs having attended JESSICA training sessions obtain more chances of success with their project.

Globally, the action of JESSICA is considered as very useful.

JESSI programmes have come to term at the end of 1996. Nevertheless, because JESSICA obtained very good results, its major partners (CEA-the French Atomic Energy Agency- and CNFM) as well as the Ministry of Industry decided to continue the action. In November 1996, a new programme called NESSI (New Electronic Solutions Support for Industry), entirely devoted to SMIs, was recognised as a EUREKA project for 4 years. NESSI will constitute the new frame of the JESSICA action in France.

It must be outlined that it appears impossible in France to promote the introduction of new electronic technologies in SMIs without the financial support of a public programme.