

# **An Example of Strategy for International Partnership in engineering education Through two Different Double Degree Programs : Ten years of Experiment in Europe and Overseas : 1987 - 1997**

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**Abstract:** Ecole Centrale Paris is developing since 1987 two different types of double degree programs.

First, the TIME ("Top Industrial Managers for Europe") program, which allows French and foreign students to obtain two engineering degrees, each for a nominal study period of 5 to 6 years after high school graduation, with no intermediate degree. 31 Technical Universities of 14 European countries are now belonging to the TIME Network (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Russia).

Another double degree program works with industrialized countries whose educational system is based on the North American organization, that is with an intermediate degree, the Bachelor's degree, before the Master's degree. We have 25 Technical Universities in 4 countries, (Canada, Japan, United Kingdom, United States), in this program.

After some general information on these two double degree engineering programs, some figures will be discussed versus the origin of students, while giving some advantages of this new way of international engineering studies. The impact of these two programs on the industrial recruitment will be focused through the kinds of jobs, the location of jobs and the types of companies.

A proposal will be developed with countries from Latin-American region (such as Brazil) or from Asia-Pacific region (as China or Indonesia).

As a conclusion, some comments have to be made on this ten-year experience and on our projects for the future.

**Keywords:** Engineering Education - Double Degree Program - Top Industrial Managers

## **Introduction**

Ecole Centrale Paris, a School of Engineering created on 1829 at the service of industry, is developing since 1987 two different types of Double Degree programs in Engineering :

- the TIME Double Degree Program (for Institutions of the Continental Europe),
- the Master's Degree Program (for Institutions with an intermediate degree : B.Sc.).

It may be interesting to focus on ten years of experiment in Europe and Overseas from 1987 to 1987.

## **TIME Double Degree Engineering Program**

### **Introduction on the TIME Network**

European Institutions of higher education dedicated to the training of engineers have developed syllabuses enabling selected students to obtain the engineering qualifications awarded by Institutions in two different countries on the condition that students prolong the duration of study for a maximum of one year while complying with the statutory regulations for the conferral of such awards. The training courses for engineers referred to here are those which correspond to the course of the longest duration when there are several such courses available in a given country.

The TIME (Top Industrial Managers for Europe) network was founded on 1987 by 16 European Institutions under the proposal of Ecole Centrale Paris.

A **charter** was signed on October 13th, 1989. Let us recall a part of this charter :

*The signatories to this document declare themselves associated for the purpose of furthering high level educational programmes for engineers and industrial executives, preparing them to function accross national borders in the European Community and in the world. A dual cultural background is believed to be an indispensable component of an effective and complete scientific and technical training.*

*These aims are to be accomplished through the development of exchanges among highly rated national engineering schools and universities, possibly leading to dual diplomas recognized equally in the participating countries.*

*Each signatory institution will designate a representative to a coordinating committee which will be denoted as TIME (Top dustrial Managers for Europe). TIME will be the means for internal communication between its members and represent the association in matters involving other national or international organizations.*

This **TIME Network** has since expanded to include new members. 31 Technical Universities from Europe is now belonging to the TIME Network (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Russia). These Institutions agree for developing a double degree program, the TIME ("Top Industrial Managers for Europe") program, which allows european students to obtain two engineering degrees for study covering a period of no more than 6 years after high school graduation.

#### Foundation of the TIME Association

During ten years, this TIME network has operated successfully. On May 15th, 1997, it was proposed to give a **formal recognition** to its existence by the creation of an Association.

There are several reasons for this, namely :

- to ensure the continued existence of the network and to extend it beyond those initially involved,
- to ensure recognition of its reality,
- to ensure that its activities become better known both internally and externally,
- to set up and jointly adopt the same methods of management, information and advertising.

Ecole Centrale Paris has ensured the organization and follow up of the activities of the network from its creation, and will continue to handle the co-ordination between institutions for the departure of the TIME Association.

On the campus of Ecole Centrale Paris (at Chatenay-Malabry, south Paris), Prof. Daniel GOURISSE, Director of Ecole Centrale Paris, welcomed the Rectors, the Presidents, the Directors of the Institutions belonging to the TIME Network.

A **Constitutive General Assembly** was held. The statutes of the TIME Association were defined and adopted unanimously. Internal regulations were adopted unanimously.

A first **Advisory Committee** of the TIME Association with ten Institutions was elected unanimously :

- for Belgium : Université Libre de Bruxelles;
- for France : Ecole Centrale Paris, Ecole Supérieure d'Electricité;
- for Germany : Technische Universität Darmstadt, Technische Universität München;
- for Italy : Politecnico di Milano, Politecnico di Torino;
- for Spain : ETSEI Barcelona, ETSII Madrid;
- for Sweden : Royal Institute of Technology Stockholm.

A **Board** was elected unanimously by the Advisory Committee :

- - President : Ecole Centrale Paris
- - Vice-President : Politecnico di Milano
- - Secretary : ETSII Madrid
- - Treasurer : Technische Universität Darmstadt

Prof. Dominique DEPEYRE, Adviser for International Relations at Ecole Centrale Paris, was nominated as

**Coordinator** of the TIME Association. An **Admissions Committee**, with 5 experts, was nominated by the Advisory Committee with as Chairman, Prof. Daniel GRIMM (Ecole Centrale Paris), and as members, Prof. Robert PONCELET (Université Libre de Bruxelles), Prof. Juan-José SCALA (ETSII Madrid), Prof. Giancarlo SPINELLI (Politecnico di Milano) and Prof. Dieter VORTMEYER (Technische Universität München).

For this Constitutive General Assembly a first **set of data** were discussed :

- 276 engineering students are involved on the year 1996-1997 through 71 bilateral agreements;
- on May 1997, more than 350 double degree engineers are already graduated in the TIME Network.

#### The organization of the TIME double degree engineering program

On the example of Ecole Centrale Paris, it is possible to understand the double degree engineering TIME program :

- for a student coming from ECP :
  - 2 years in Preparatory Classes before the entrance at ECP,
  - 2 years at ECP with a two-year « generalist » common core,
  - 2 years in an host Institution with a specialization;
- for a student coming from Germany or Italy or Spain :
  - 2 years in a technical University in relation with a specific department,
  - 2 years at ECP with a two-year « generalist » common core,
  - 2 years in the first technical University with a specialization.

A **selection of students** is organized every two years in this scheme.

For these both ways, a student can obtain two engineering degrees in a delay of 6 years (1 year more than for 1 degree) from two high-level European Technical Universities.

In order to assure the best adaptation of this program to the needs of industry and to provide the necessary financial support (scholarships) for these exchanges, the program is running at ECP in partnership with several large companies, which make up the Club TIME-Plus of ECP.

#### Master's Double Degree Engineering Program

Another Double Degree Program works on the basis of cooperation with the industrialized countries whose educational system is Anglo-Saxon in nature (Canada, United Kingdom, Japan, United States).

In the framework of bilateral agreements, students may attend graduate school in place of their final year of studies (thus obtaining a Master of Science or a Master of Engineering degree along with their degree from ECP),

while students from these partner Universities obtain a « Mastère Spécialisé » degree from ECP.

### **Some features on the TIME Double Degree Program**

At the occasion of the 10th birthday of the TIME Network an important work was made about **figures and statistics**. Allow us to show some of these figures.

On table 1. is listed the name of the 29 European Institutions which were founders of the TIME Association on May 15th, 1997.

Two new members are elected by the Advisory Committee on its meeting of February 27th, 1998 :

- Chalmers University of Technology - Göteborg (Sweden),
- Bauman Moscow State Technical University - Moscow (Russia).

Now the TIME program is running with 31 European Technical Universities coming from 14 countries.

On Table 2. is listed the number of student exchanges for the TIME double degree program for the year 1996-1997. Two main figures are given : figures through TIME Institutions and figures through countries with TIME Institutions.

On table 3. it is possible to see the **success story** of the TIME double degree engineering experience starting on 1987 with the number of double degree engineers graduated by the TIME program on May 1997.

When we are looking at the first job obtained by these double degree TIME engineers, it is possible to realize that :

- 63 % of engineers obtained their job in a company of the sending Institution country,
- 22 % of engineers obtained their job in a company of the host Institution country,
- 15 % of engineers obtained their job in a company of a third country.

While discussing with industrial recruitment staffs, we understood that this bi-cultural engineering program (2 years abroad) of our TIME engineers is considered as equivalent to a first professional experience versus motivation, flexibility and dynamics of young engineers. These new engineers are for us the future **Top Industrial Managers for Europe**.

### **Some features on the Master's Degree Program of ECP**

At the occasion of the 10th birthday of the Master's Degree program Network an important work was made about **figures and statistics**. Allow us to show some of these figures.

On table 4. is listed the name of the 28 non-continental European Institutions which have signed an agreement with ECP for this program before May 1998.

On table 5. it is possible to see the **success story** of the Master's Degree Engineering experience with ECP starting on 1987 with the number of double degree engineers graduated by this program on May 1998.

When we are looking at the first job obtained by these double degree Master's program engineers, it is possible to realize that :

- 65 % of engineers obtained their job in a company of the sending Institution country,
- 16 % of engineers obtained their job in a company of the host Institution country,
- 19 % of engineers obtained their job in a company of a third country.

While discussing with industrial recruitment staffs, we understood that this bi-cultural engineering program (from 1 year and half to 2 years abroad) of our engineers is considered as equivalent to a first professional experience versus motivation, flexibility and dynamics of young engineers. These new engineers are for us the future **Top Industrial Managers for Europe and for Overseas**.

### **A proposal for the future**

Now we are discussing to enlarge these two Double Degree Engineering programs to Institutions of other countries.

Two directions are defined for this future :

- Latin-American region, with countries such as Brazil,
- Asia-Pacific region, with countries such as China or Indonesia.

We are ready to discuss with Institutions of these countries for defining on a bilateral way the possibilities of exchanging engineering students, which are with a high academic level and with a high level of motivation for a bi-cultural education in engineering.

### **Conclusion**

Our both TIME and Master's programs are now **operational tools** with more than ten years of expertise, with an increasing number of candidates coming from 18 European and Overseas countries and with an excellent image for industrial recruitment staffs.

We should like to thank all these students (more than 800 during 10 years) for their experimentation with the TIME Network and the Master's Degree ECP Network, for their clever comments about the pedagogical and technical organization, for their enthusiasm and their efficiency.

These students are for us the best ambassadors for the future.

**Table 1. : List of European Institutions belonging to the TIME Network (May 1997)**

<b>Austria :</b>	<b>TU Wien</b>	<b>Greece :</b>	<b>NTUA Athens</b>
<b>Belgium :</b>	<b>Faculté Polytechnique de Mons Université Catholique de Louvain Université de Liège Université Libre de Bruxelles</b>	<b>Italy :</b>	<b>Politecnico di Milano Politecnico di Torino</b>
<b>Denmark :</b>	<b>DTU Lyngby</b>	<b>Netherlands :</b>	<b>TU Eindhoven</b>
<b>Finland :</b>	<b>HUT Helsinki</b>	<b>Norway :</b>	<b>NTNU Trondheim</b>
<b>France :</b>	<b>Ecole Centrale Lille Ecole Centrale Lyon Ecole Centrale Nantes Ecole Centrale Paris ENSTA Supaero Supelec</b>	<b>Portugal :</b>	<b>IST Lisboa</b>
<b>Germany :</b>	<b>RWTH Aachen TU Darmstadt TU München Universität Erlangen-Nürnberg Universität Stuttgart</b>	<b>Spain :</b>	<b>ETSEI Barcelona ETSII Madrid ICAI Madrid</b>
		<b>Sweden :</b>	<b>KTH Stockholm</b>

**Table 2. : Student exchanges (1996-1997) for the TIME double degree program**

<b>through TIME Institutions :</b>		<b>through Countries :</b>	
<b>F : Centrale Paris</b>	<b>138</b>	<b>France</b>	<b>247</b>
<b>I : Politecnico Milano</b>	<b>59</b>	<b>Germany</b>	<b>94</b>
<b>E : ETSII Madrid</b>	<b>44</b>	<b>Spain</b>	<b>77</b>
<b>F : Supelec</b>	<b>39</b>	<b>Italy</b>	<b>73</b>
<b>D : TU München</b>	<b>34</b>	<b>Sweden</b>	<b>27</b>
<b>F : Centrale Lyon</b>	<b>31</b>	<b>Belgium</b>	<b>20</b>
<b>S : KTH Stockholm</b>	<b>27</b>	.....	
<b>D : TU Darmstadt</b>	<b>24</b>		
<b>D : Universität Stuttgart</b>	<b>23</b>		
<b>E : ETSEI Barcelona</b>	<b>22</b>		
<b>F : ENSTA</b>	<b>15</b>		
<b>I : Politecnico Torino</b>	<b>14</b>		
<b>B : FP Mons</b>	<b>13</b>		
<b>D : RWTH Aachen</b>	<b>12</b>		
<b>F : Centrale Lille</b>	<b>12</b>		
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**Table 3. : Number of TIME double degree engineers (May 1997)**

<b>F : Centrale Paris</b>	<b>199</b>
<b>I : Politecnico Milano</b>	<b>131</b>
<b>E : ETSII Madrid</b>	<b>105</b>
<b>D : TU Darmstadt</b>	<b>56</b>
<b>D : RWTH Aachen</b>	<b>33</b>
<b>D : TU München</b>	<b>28</b>
<b>E : ETSEI Barcelona</b>	<b>27</b>
<b>D : Universität Stuttgart</b>	<b>26</b>
<b>F : Centrale Lyon</b>	<b>20</b>
<b>I : Politecnico Torino</b>	<b>17</b>
<b>S : KTH Stockholm</b>	<b>16</b>
<b>F : ENSTA</b>	<b>15</b>
<b>B : UL Bruxelles</b>	<b>10</b>
<b>E : ICAI Madrid</b>	<b>10</b>
<b>F : Supelec</b>	<b>10</b>
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**Table 4. :List of Institutions belonging to the Master's Degree Program (July 1997)**

<b>Canada :</b>	<b>Ecole Polytechnique de Montreal</b>
	<b>McGill University</b>
	<b>Toronto University</b>
<b>Japan :</b>	<b>University of Tokyo</b>
	<b>Yokohama National University</b>
<b>United Kingdom :</b>	<b>Cranfield University</b>
	<b>Imperial College of London</b>
	<b>London School of Economics</b>
	<b>University College of London</b>
	<b>University of Cambridge</b>
	<b>University of Essex</b>
	<b>University of Oxford</b>
<b>United States :</b>	<b>California Institute of Technology</b>
	<b>Columbia University</b>
	<b>Cornell University</b>
	<b>Florida State Atlantic University</b>
	<b>Georgia Institute of Technology</b>
	<b>Harvard University</b>
	<b>Massachusetts Institute of Technology</b>
	<b>Stanford University</b>
	<b>University of California at Berkeley</b>

<b>University of California at Davis</b>
<b>University of California at Los Angeles</b>
<b>University of Colorado</b>
<b>University of Houston</b>
<b>University of Michigan</b>
<b>University of Minnesota</b>
<b>University of Wisconsin</b>

**Table 5. : Number of Master's degree engineers with ECP (May 1998) : more than 130**

<b>through Countries :</b>	
<b>United States</b>	<b>62</b>
<b>United Kingdom</b>	<b>53</b>
<b>Japan</b>	<b>17</b>
<b>Canada</b>	<b>2</b>
<b>through Institutions :</b>	
<b>GB - Cambridge</b>	<b>40</b>
<b>USA - Cornell</b>	<b>16</b>
<b>Japan - Tokyo</b>	<b>14</b>
<b>USA - MIT</b>	<b>12</b>
<b>GB - London SE</b>	<b>7</b>
<b>USA - Berkeley</b>	<b>6</b>
<b>USA - Florida</b>	<b>6</b>
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