



The World is Mine

Graduate School in Science, Engineering and Economics

Pierre BALADI

Deputy-Director of International Affairs

Why 'MINES ParisTech'?



The World is Mine



- 'Ecole des Mines', est. 1783
 - At a time when mining was at the **forefront** of technology



- Evolved over the centuries
 - Adapting to emerging technologies and to its environment
 - Broadening the scope of research and studies: not only technical, but also economical and managerial



- Nowadays at the **forefront** in Applied Maths, Applied Physics, Social & Economics Sciences

- Graduate engineers of class 2009 working in:
 - Civil Eng. (including Mining): **1%**
 - Banking, Finance & Audit, IT: **35 %**

- The historical name 'Mines' remained but **no more as a mining school !**



1783: establishment decree



1st Prize in Innovation
'01 Technologia' Awards 2008
Graduate Schools of Engineering Category

21st century: award in innovation
from an IT magazine

Why 'MINES ParisTech'?



The World is Mine



- MINES ParisTech is a founding member of ParisTech

- ParisTech = 'Paris Institute of Technology'

— Consortium of 12 excellence institutions in Science, Engineering, Economics & Business

— Leaders in their fields

ParisTech



 Ecole des Ponts ParisTech <i>Ecole des Ponts ParisTech</i>	 Ecole Polytechnique ParisTech <i>Ecole Polytechnique</i>	 Chimie Paris Paristech <i>Chimie Paris Paristech</i>	 Arts et Métiers ParisTech <i>Arts et Métiers ParisTech</i>	 TELECOM ParisTech <i>TELECOM ParisTech</i>
 ENSAE ParisTech <i>ENSAE ParisTech</i>	 ENSTA ParisTech <i>ENSTA ParisTech</i>	 MINES ParisTech <i>MINES ParisTech</i>	 ESPCI ParisTech <i>ESPCI ParisTech</i>	 HEC PARIS <i>HEC</i>
	 AgroParisTech <i>AgroParisTech</i>	 Institut d'Optique Graduate School <i>Institut d'Optique Graduate School</i>	 HEC <i>HEC</i>	

Contents



The World is Mine



- Overview of MINES ParisTech
- Research at MINES ParisTech
- Academic programmes
- International cooperations





2,150 PEOPLE

— 750 permanent staff incl. **265 faculty** staff

— **1,400 students:**

- 500 at Master level (+ 180 in co-operated programmes)
- 450 at Post-Master level (non-doctoral)
- 450 at Doctoral level (PhD)



RESEARCH :

— 15 research centers in 5 main scientific fields

— 450 PhD students, 60 PostDoc fellows

EDUCATION IN SCIENCE AND ENGINEERING:

— Master Degree in Science and Executive Engineering (150 degrees per year)

— Masters of Science, Advanced masters, PhD, (500 degrees per year)





● 4 + 1 sites :

- **Paris:** in the Latin Quarter
- **Evry:** 30 km South of Paris
- **Fontainebleau:** 60 km South of Paris
- **Sophia-Antipolis :** French Riviera
- **Palaiseau:** new ParisTech Sud Campus



Paris



Evry



Fontainebleau



Sophia Antipolis





- Under the supervision of the **Ministry of Economics and Industry**



- High quality **research linked to companies:**

- 1000 contracts / year
- ¼ with at least one foreign country
- Financial turnover / year : **30 Million Euros**
- 70 patents, 5 Million Euros of software licensing
- **Ranked n°1 in France for contractual research** since more than 12 years
- Creation of research & teaching chairs supported by companies



- **Nobel Prize Laureates:**

- Maurice ALLAIS - Economics - 1988
- Georges CHARPAK - Physics – 1992





- 15 research centres in **5 scientific departments**



- **Applied Mathematics**
Computer Science, Systems and Control



- **Process Engineering & Energetics**
- **Material Sciences & Engineering**
- **Geosciences**
Environment Sciences
- **Social & Economics Sciences**





- Computer Science
— (*Fontainebleau*)



- Systems and Control
— (*Paris, Fontainebleau*)



- Applied Mathematics
— (*Sophia*)

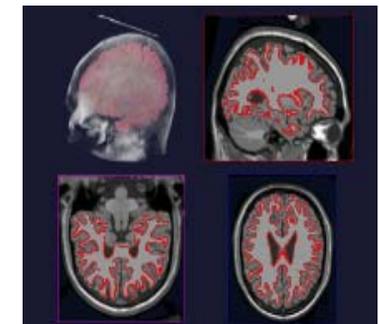
- Computational Biology
— (*Fontainebleau*)

- Mathematical Morphology
— (*Fontainebleau*)

- CAD and Robotics
— (*Paris*)



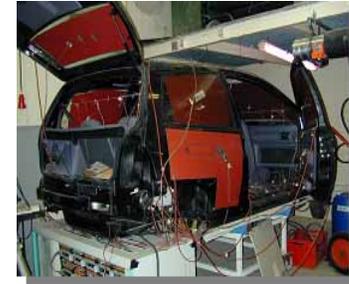
Mathematical morphology



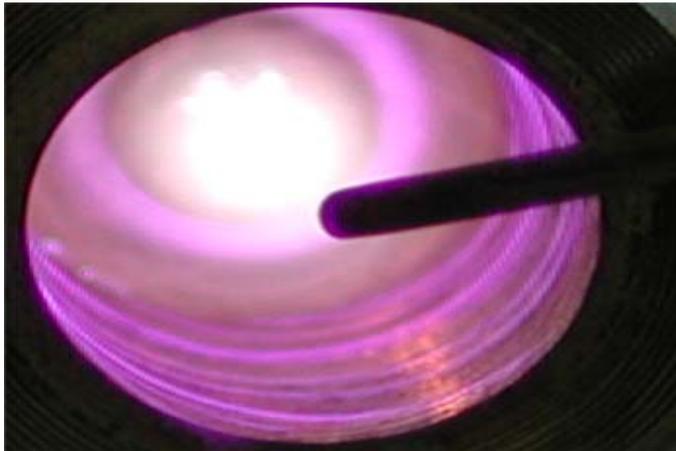
3D segmentation



- Process Engineering & Energetics
 - *(Palaiseau, Fontainebleau, Sophia)*



Air conditioning



Hydrogen production
by plasma



Artificial sun





- Material Sciences

— (Evry)



- Solid Mecanics Laboratory

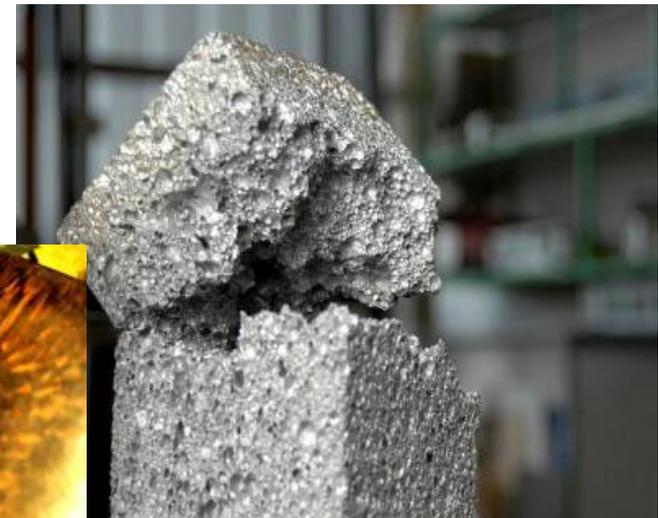
— (Ecole Polytechnique – common research centre)



After supercritical CO2 drying

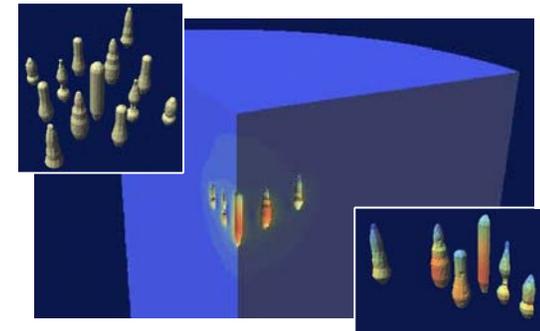
- Material Processing

— (Sophia)



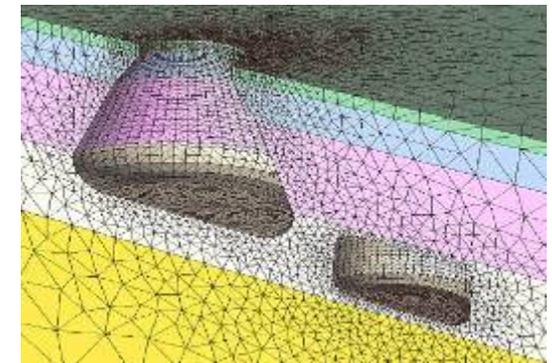


- Geosciences:
 - (Fontainebleau)
 - Geostatistics
 - Engineering Geology
 - Hydrogeology
 - Underground Works Engineering
 - Geophysics



Gas storage

- Institute for Environment Engineering and Management
 - (Fontainebleau)





- Industrial Economics
— (Paris)



- Scientific Management
— (Paris)



- Sociology of Innovation
— (Paris)

- Crisis and Danger Sciences
— (Sophia)





- 'Intelligent' car and car-pooling



- Common work of 6 research centres:

- Computer Science
- Systems and Control
- Applied Mathematics
- Geostatistics
- Mathematical Morphology
- CAD and Robotics





- MINES ParisTech develops an increasing number of **Research & Teaching Chairs**
- Enabling **companies (or clusters of companies)** to work with academics
- For a **public diffusion** of emerging knowledge, also benefiting to our students
- On subjects of interest for the **whole community** (the State, companies, general public)
 - Water
 - Nuclear
 - Energetic strategies
 - Safety
 - Bio-plastics
 - Capture, transport, storage of CO₂



- 14 Chairs developed by MINES ParisTech alone or within the ParisTech consortium
- Nearly 17 Millions Euros raised over 5 years

Academic Programmes at MINES ParisTech



The World is Mine



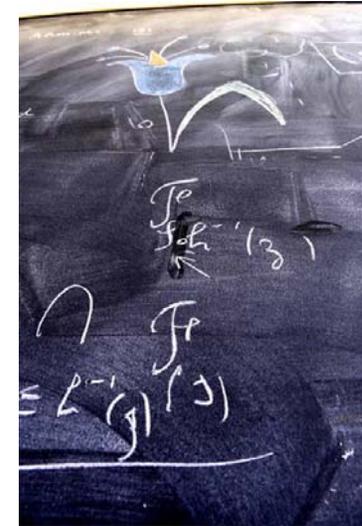
- Master Degree in Science & Executive Engineering (Engineering curriculum)



- MSc (Professional / Research)

- Advanced masters (Post-master non doctoral)

- PhD (Doctoral studies)



Academic Programmes: an overview



UNDERGRADUATE		GRADUATE			DOCTORAL			POSTDOC
PREPARATORY CLASSES		ENGINEERING COURSE			PhD			
1	2	1	2	3	1	2	3	

Master Degree in Science & Executive Engineering →



Masters of Science and joint masters →



Advanced masters →



PhD (possibility of co-supervision) →



Post-doc positions →





- French Curriculum:
 - The 'Grandes Ecoles' system
- Objectives of the programme
- Syllabus and pedagogical features
- Career opportunities and practical considerations



Curriculum: the French system



The World is Mine



- French selection system
 - 700, 000 students passing the 'Bac' examination at end of Secondary education (A level - 18 years old)
 - 160, 000 pass the 'Bac' in Science
 - 20, 000 students admitted to "scientific preparatory classes" (for 2 or 3 years) who candidate to several national competitive examinations
 - 1, 000 firsts entering Ecole Polytechnique, **MINES ParisTech**, Ecole Centrale Paris, Ecole Normale Supérieure Ulm

- French 'Grandes Ecoles' system / international frameworks:

Years	1	2	3	4	5	6	7	8
"Bologna"	Bachelor			Master		Doctorate		
International	Undergraduate			Graduate		Doctoral studies		
French 'Grandes Ecoles'	Preparatory classes		Engineer curriculum			Doctorate		



- Major: **Science and Executive Engineering**

- Minors: 17 possibilities

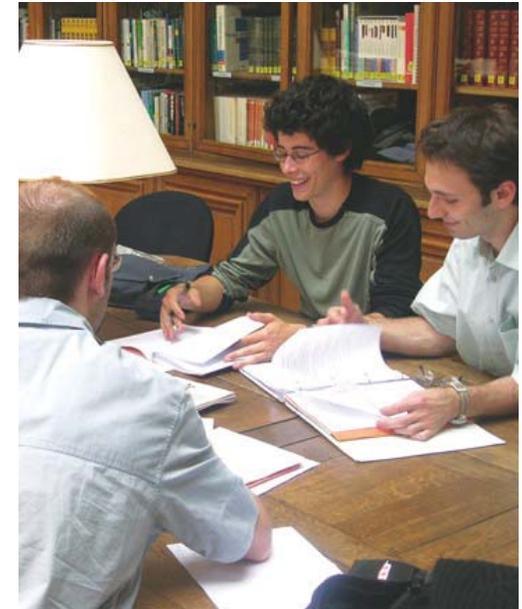


- Aim is to train:

- Highly skilled engineers able to become **managers**
- For various industrial fields : production, R&D, management, finance...
- With high scientific knowledge, competitive at international level (double degrees)
- Preparing the international dimension of their careers

- Attracting top 1% of science students in France: very high selection

- Numerous teachers, mostly coming from MINES ParisTech research centres (active tutorial, connection with industry)



Minors: 17 Minors in 3 main fields



- MATHS AND APPLIED MATHS

- Computer Science and Information Technology
- Financial Mathematics
- Geostatistics
- Applied Math, Robotics, Systems and Control, Vision and Morphology (MAREVA)

- ENGINEERING SCIENCES

- Biotechnology
- Earth and Environmental Sciences
- Materials Science and Engineering
- Mechanical and Energy Engineering
- Nuclear Engineering
- Process Engineering
- Underground Engineering and management

- ECONOMICS AND SOCIAL SCIENCES

- Design Engineering
- Industrial Economics
- Innovation and Entrepreneurship
- Law and Business Economics
- Production Systems
- Scientific Management

Syllabus: general organisation



The World is Mine



- Semester organization : 6 semesters, 15 to 20 weeks each one



- *1st year : End of Bachelor*

- *Sciences and Pedagogical Change: development of personal and managerial skills*



- 2nd year : Master Year 1

- Sciences and Engineering : elective courses and engineer internship abroad in a company (12 to 16 weeks)

- 3rd year : Master Year 2

- 'Minor' period including internships in enterprise (14 weeks)

Syllabus: subjects taught



The World is Mine



- Mathematics and applied mathematics **Common core compulsory courses**
 - Computer science and Information technology
 - Physics, Mechanics, Material sciences, Electronics, Thermo-Mechanics
 - Bioengineering
 - Economics and social sciences
-
- Electives in numerous Engineering topics
 - Foreign languages offered: English, German, Spanish, Italian, Portuguese (Brazilian), Russian, Chinese, Japanese, Arabic, Hebrew, French (for foreign students)
 - **2 foreign languages are compulsory** (English and another language)
 - Most students choose to study 3 foreign languages, some study even 4!

A variety of career possibilities

The World is Mine

- Out of the last classes of graduates

- In employment (80%):

- 40% in industry - 50% in the service sector
 - More than 20% start abroad!

- In education (20%):

- 60% additional MSc or Post-Master short studies
 - 40% in PhD

- Former graduates are now CEO of major conglomerates

- Renault-Nissan, Peugeot-PSA, Vivendi, Corus Group, Alstom, Areva, Thalès...

- Nobel Prize Laureates:

- Maurice ALLAIS - Economics - 1988
 - Georges CHARPAK - Physics – 1992



**Renault
Nissan**
(Carlos Ghosn)

*Managers :
Alumni of
MINES
ParisTech*

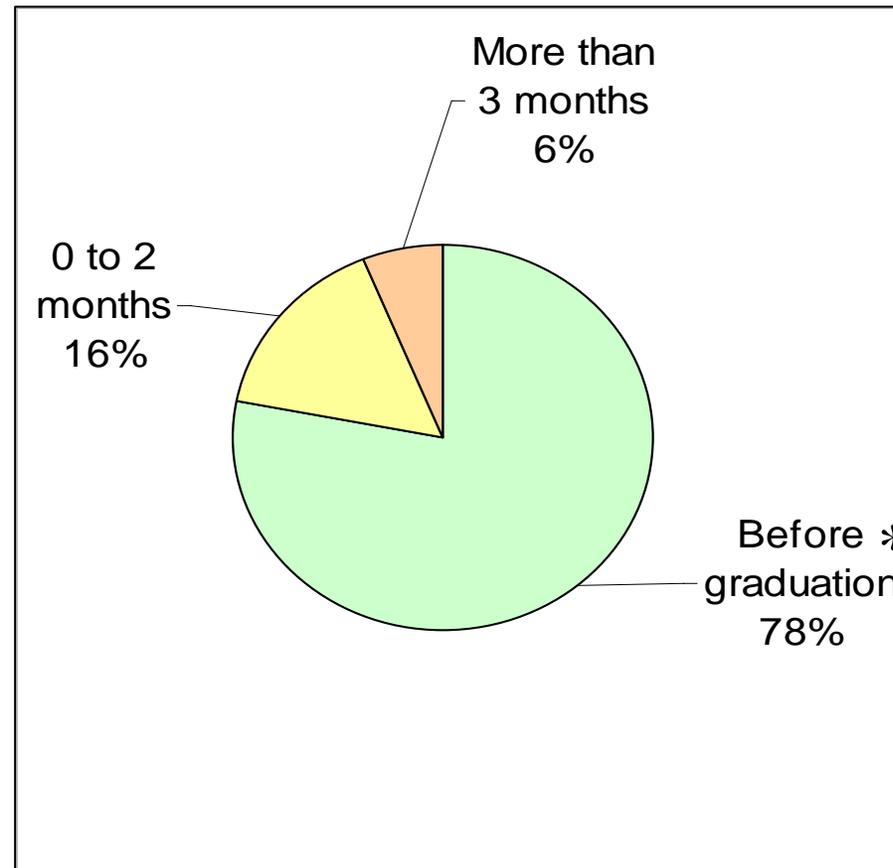


AREVA
(Anne Lauvergeon)



Peugeot-PSA
(Philippe Varin)

Time to get a job



* 1st job secured during final internship



- Fees

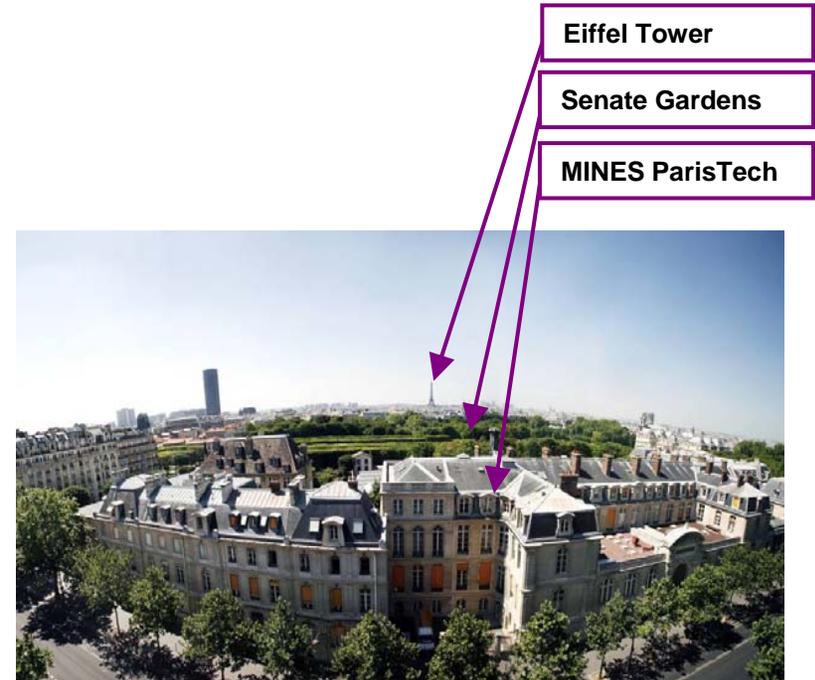
- Engineering curriculum
- Masters / Mastères spécialisés
- PhD



- Possibilities of scholarships

- Language requirements

- Accommodation & Living costs in Paris



Master (MSc) Professional or Research oriented



- More specific than the Master Degree in Science & Executive Engineering



- Co-operated with other ParisTech Schools or Universities



- PROFESSIONAL-ORIENTED MASTERS

- Professionnally oriented trainings : lectures and internship in a company

- Duration : 1.5 year

- Transport and Sustainable Development
- Mastering Industrial Risks
- **Energy Systems and Policies**
- Water, Soil and Waste Engineering
- Process Engineering

- RESEARCH-ORIENTED MASTERS

- 13 MASTERS IN COOPERATION WITH OTHER INSTITUTIONS

Advanced masters

Non doctoral post-master training



- In French: 'Mastères spécialisés'
- High level professionally oriented trainings : lectures, and internship in a company
- Duration : 1 year
- Admission: after a Master (or a Bachelor and a some work experience in the field)
- 12 full-time Advance Masters (including 2 double-degrees):
 - Energy Engineering and Management (OSE)
 - Gas Engineering and Management
 - **International Energy Management (DD with Tsinghua)**
 - Renewable Energies
 - Environmental Engineering and Management (ISIGE)
 - **International Environmental Management (DD with Tsinghua)**
 - Industrial Management and Logistics
 - Management of Information and Technology Systems
 - **Computational Mechanics**
 - **Material Behaviour and Structural Design**
 - Plasticity and Shaping
 - **Bioplastics**
- 5 part-time executive Advances Masters:
 - Quality-Safety-Environment Management & Sustainable Development
 - Human and institutional factors in industrial safety management
 - Project mode management
 - Management of Information and Technology Systems
 - Production Engineering & open-system infrastructures



- Linked to industrial needs/contracts, in research centres



- New Label for PhDs: « Science and Enterprise » (management, innovation, economics, law)



- Duration : 3 years

- Required admission level : French Engineering Degree, or equivalent Master degree

- 2008/09:

- Recruitment of 113 PhD students (including 47 foreigners)

- 419 PhD students (40% foreign students, more than 50 different nationalities), 33% women

- POSTDOCS: new endorsement 'Institut Carnot M.I.N.E.S'



- Networks



- Exchange agreements worldwide



- Foreign students at MINES ParisTech

- Cooperation possibilities





- ParisTech: consortium of 12 of the foremost French institutes of engineering education and research
- GEM: group of the 7 'Ecole des Mines' in France
- ATHENS: European Network, 1 week exchange sessions, twice a year
- IDEA League: Imperial / Delf / ETHZurich / Aachen & ParisTech

Examples of exchange and double-degree agreements on all 5 continents...

The World is Mine



ERASMUS ZONE: AROUND 50 AGREEMENTS

KTH Stockholm
Chalmers
NTNU Trondheim
Aalto U. Helsinki

AGH Cracovie
BME Budapest

Moscow Baumann U.
St Petersburg Polytechnic U.
NSU Novosibirsk
Tomsk University
Ufa University

EP Montréal
Univ Ottawa

TokyoTech
Tokyo Univ

MIT
CalTech

KAIST
Seoul National U.
PosTech

IPN Mexico
UNAM

Tsinghua
Shanghai JiaoTong
Shanghai Tongji

ETSEI Barcelone
ETSIT, ETSIM Madrid

U. of Hong Kong

Pontifica Catolica U.
Peru Lima

U. of Queensland
(Brisbane)
U. of New South
Wales (Sydney)

Pontifica Catolica U.
Chile Santiago

IT Buenos Aires
U. Cordoba

EP/U Sao Paulo
UFRJ Rio, UERJ Rio
UniCamp
Uni Federal Ouro Preto
UFRGS

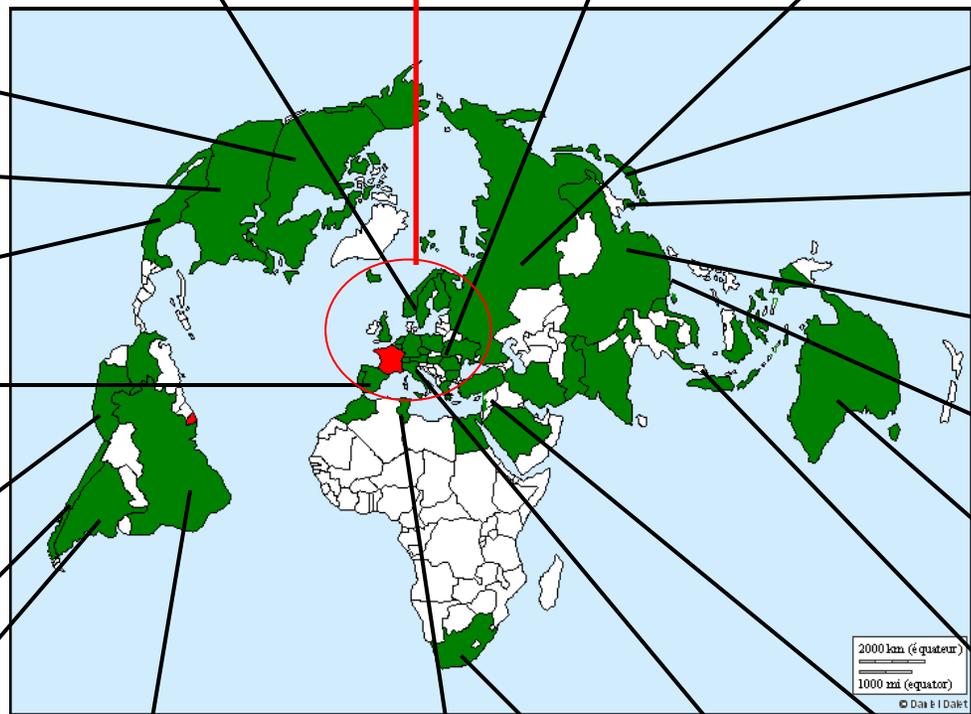
ENI Tunis
EP Tunis

Politecnico
Milano

U. Liban
ESIB

National U. of
Singapore

UKZN South Africa



2000 km (equator)
1000 mi (equator)
© Dan E. Dakl



- **Master level: 37%** (incl. co-operated programmes)
 - Engineering curriculum:
from less than 5% in 2001 to **25% nowadays**
- **Post Master non doctoral level: 45%**
- **PhD: 40%**



→ **Overall rate (all programmes): 40%**

Cooperation possibilities with MINES ParisTech



The World is Mine



● Exchange of students:

- ATHENS programme: 1 week in March and November
- Non degree awarding exchange (eg. ERASMUS): 6 to 12 months
- Double degrees (2 to 4 years)
- Internships in research centres (> 3 months)
- PhD / Doctorates (possibility of co-supervision)



● Other ways of cooperation:

- *Post-doctorate positions*
- *Co teaching workshops*
- *Joint training programmes*
- *Research: common funded projects*
- *Invitation of faculty members*



A few words about rankings



The World is Mine



- Established regularly by specialized newspapers about the engineering schools



- L'Usine Nouvelle (Feb 2010):

- Research contracts turnover: **1st**
- Graduates salary: **1st**



- L'Etudiant & L'Expansion joint ranking (December 2009):

- Criteria: selectivity, links with industry, faculty potential and international cooperations: **3rd** out of >200 institutions

- Le Nouvel Economiste (December 2009):

- Opinion of human resources managers about graduates: **3rd**



Thank you for your attention

Much more information at:

www.mines-paristech.eu

