



THE ROADMAP FOR EXCELLENCE IN THE FORMATION OF AERONAUTICAL ENGINEERS

The PEGASUS Network

*Partnership of a European Group
of Aeronautics and Space Universities*

*ACARE Workshop on Education and Training of Engineers and
Researchers in Aeronautics for Europe, Bruxelles - 25 February
2010*

KEY FACTORS FOR IMPROVED EFFICIENCY:

- Solid scientific background
- Appropriate research environment
- Support from industrial partners
- National networking
- International networking

ACADEMIC ROUTE

SPECIFIC EXAMPLE: ENSMA

Academic activities @ ENSMA

Commoncore syllabus	1 st year	Scientific, technical and human studies One month in a company as a worker		
	2 nd year	Engineering sciences		
Specialization	3 rd year	Engineering training in industry (3 to 4 months)		
		Advanced curriculum, 6 options		
		1 Aerodynamics Energetics Heat transfer	2 Structures Materials	3 Computer science for engineering
		Final year project (3 to 5 months) Eligibility for studies in foreign institutions		

ENSMA engineering diploma

RESEARCH BACKUP *(supporting teaching activities)*

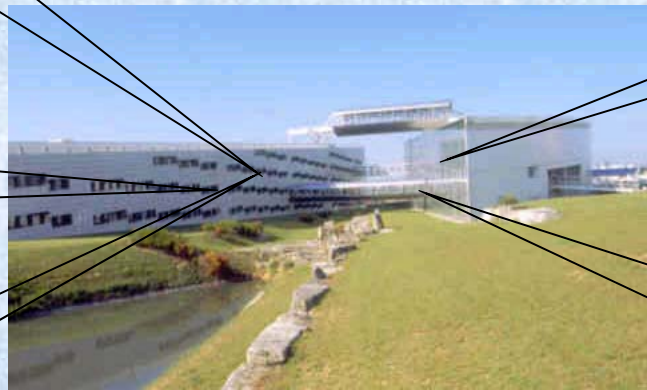
SPECIFIC EXAMPLE: ENSMA

Research activities and facilities @ ENSMA : 5 laboratories

Aerodynamics
LEA

Heat transfer
LET

*Combustion
and detonics*
LCD

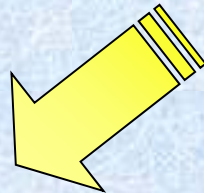


*Materials science
and mechanics*
LMPM

*Computer science
applied to engineering*
LISI

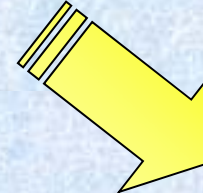
Staff : ~260

- Permanent positions : ~180
- PhD students : ~80



6 TEACHING DEPARTMENTS

- Fluid mechanics and **aerodynamics**
- **Energetics** and **heat transfer**
- **Materials** and structures
- **Computer Science**
- Electronics automatics computer
- Humanities



5 RESEARCH LABORATORIES

- Laboratoire d ' Etudes Aérodynamiques (LEA) - ***Aerodynamics***
- Laboratoire de Combustion et Détonique (LCD) - ***Combustion and Detonics***
- Laboratoire d ' Etudes Thermiques (LET) ***Heat transfer***
- Laboratoire de Mécanique et Physique des Matériaux (LMPM) ***Materials Science and Mechanics***
- Laboratoire d'Informatique Scientifique et Industrielle (LISI) ***Computer Science applied to engineering***

INDUSTRIAL PARTNERS

(Required support)

SPECIFIC EXAMPLE: ENSMA



Industrial backup: partner companies

EADS
SNECMA
SEDATEC Aéroconseil
Renault
PSA Peugeot Citroën
DASSAULT
SEGIME
AIRBUS
CEA
EDF

MBDA
ALTRAN
SAGEM
THALES
ALCATEL Space Industries
BOSCH
VALEO
ALSTHOM
BOMBARDIER

NATIONAL NETWORKING

SPECIFIC EXAMPLE:
ENSMA + ENAC + ISAE

Strong connection with other schools of Aeronautical Engineering: ISAE (SupAéro+ ENSICA), ENAC that allows:

- *Students mobility*
- *International Projects, i.e., the French-Chinese College of Aeronautical Engineering*

INTERNATIONAL NETWORKING

EU + rest of the world

- *Since several decades industrial and research activities in aeronautics and space are strongly integrated at the European level.*
- *Therefore a strong, unitary and well identifiable subject exists in the EU, posing common requirements to the university world*
- *The latter reacted as soon as 1998 by constituting the PEGASUS Network, joining only universities providing aerospace programmes selected on a quality basis.*
- *A dialogue between these two subjects started immediately and keeps being intensified.*

The fundamental quality issue for PEGASUS:

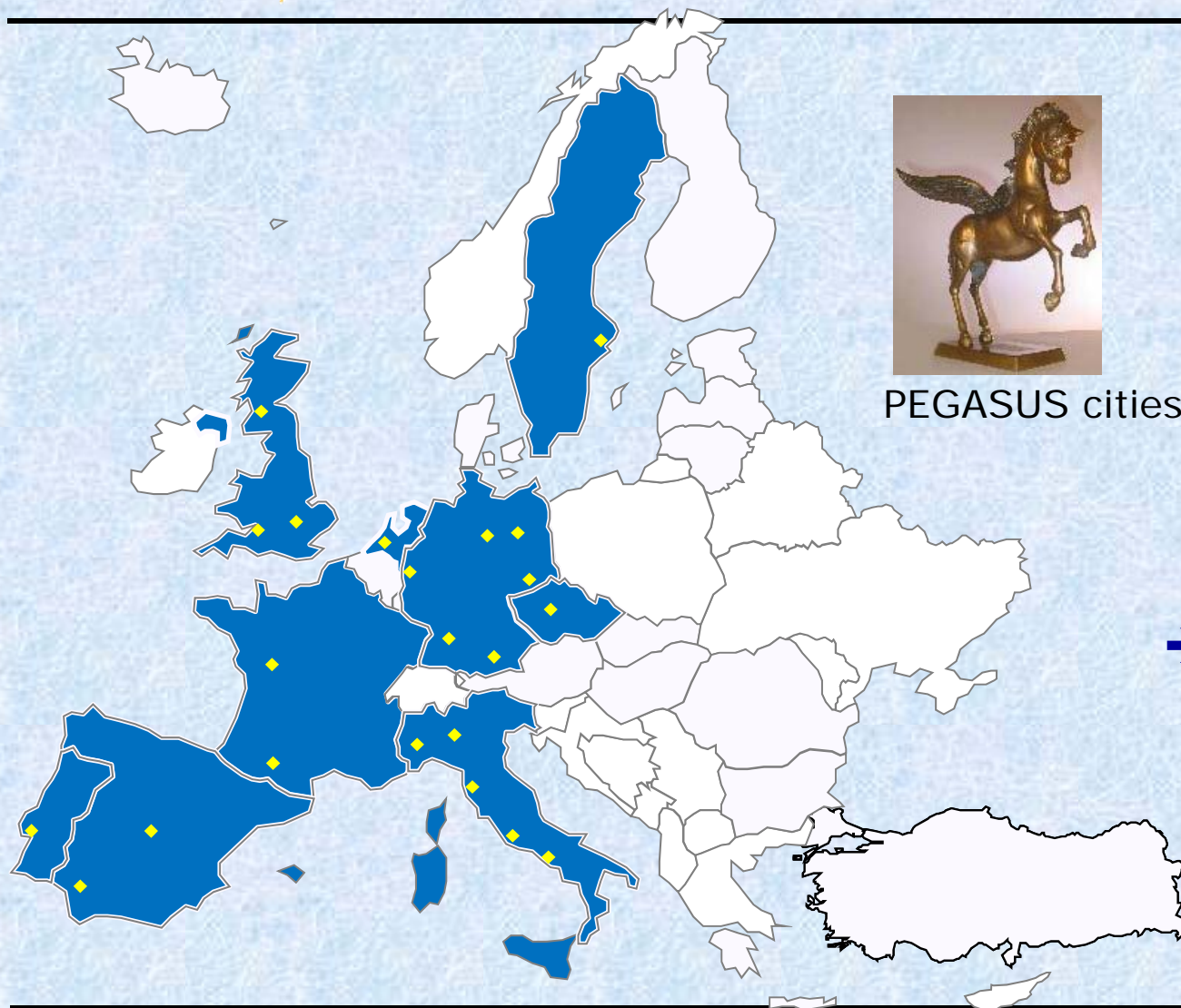
- ⇒ Define standards for aerospace education together with the EU stakeholders*
- ⇒ Cross breeding of curricula and new “crossed” engineering profiles generated by the EU student mobility*
- ⇒ Strong connection w/ laboratories to support the internship availability on top of industrial placements*

Founded in 1998 in Toulouse

- 20 Founding Members till 2002-03
- Presently 24 member Institutions
- 9 European countries represented
- Yearly output: more than 2500 BAC+5 graduates in aerospace engineering from the whole network
- website: www.pegasus-europe.org
- PEGASUS is open to all EU institutions providing a sufficiently qualified education in AS engineering (e.g.: Bac+5 curricula with a well balanced blend of subjects, education combined with research ...)



PEGASUS NETWORK TODAY



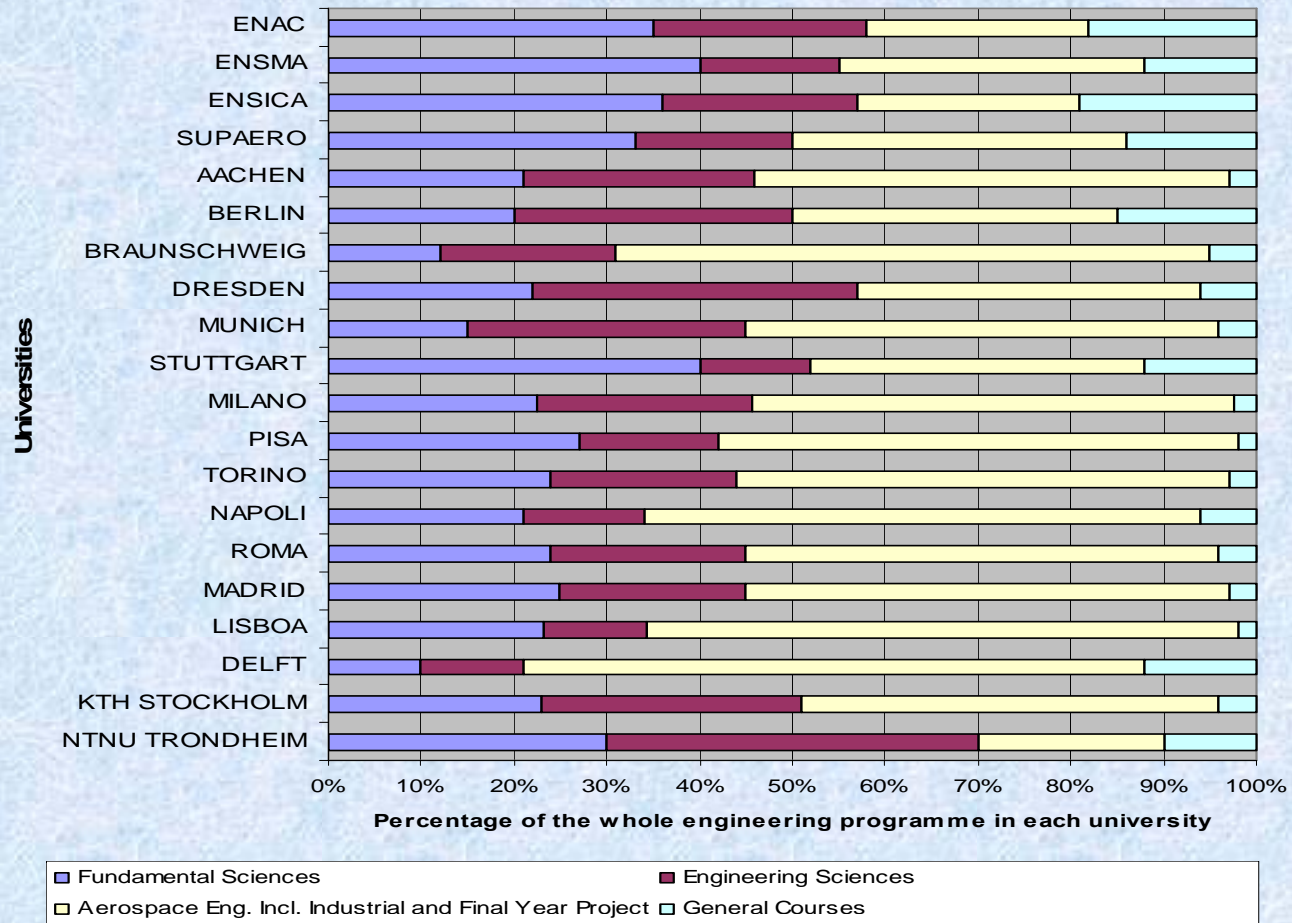
PEGASUS cities

➔ plus non-
EU
Associate
Partners

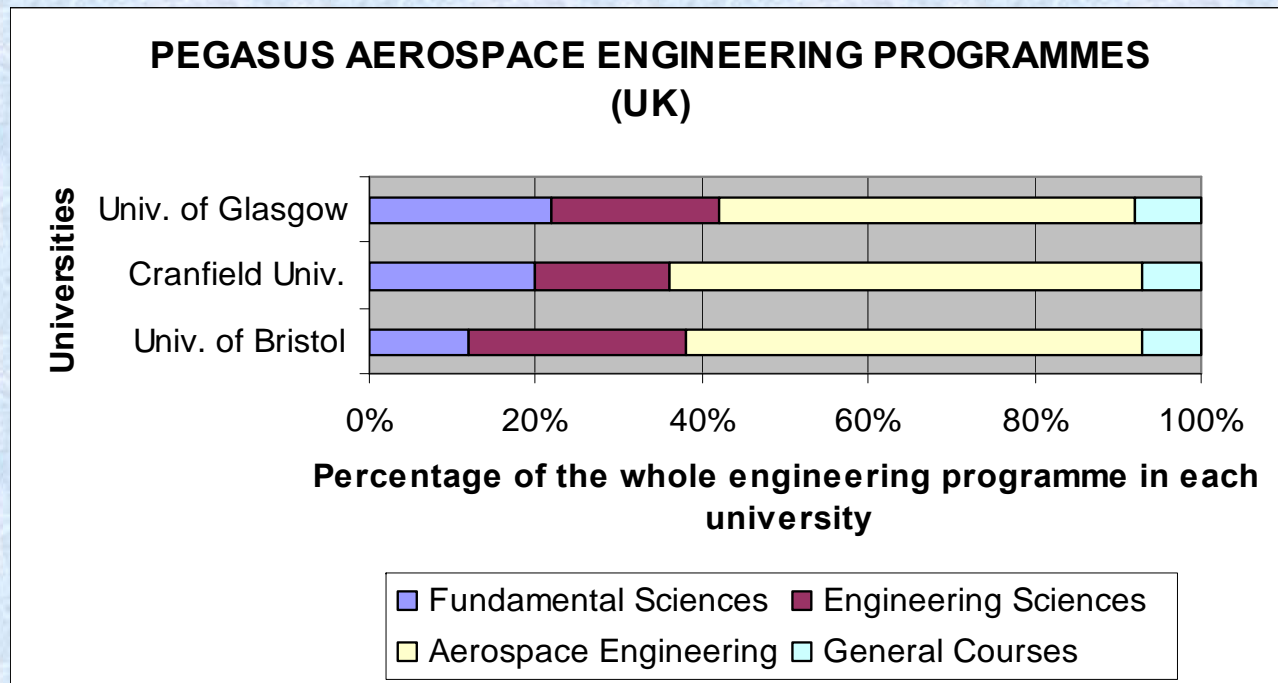
PEGASUS OBJECTIVES

- **Contribute to the development of a quality system for the European higher education in Aerospace Engineering**
- Improve educational process and curricula to specifically serve the needs of the aerospace industry
- Show similarities and differences of European curricula to the aerospace world
- Co-operate with other groups and networks to fulfil the EU policy lines in higher education
- Increase co-operation between partners and industry as well as national and European research agencies
- Contribute to attract non-European students and engineers through competitive curricula and continuing educational services
- **Be recognised as the most efficient channel to get university inputs at the integrated EU level**

PEGASUS AEROSPACE ENGINEERING PROGRAMMES (Continental Europe)



PEGASUS : analysis of curricula (2)



Admission to PEGASUS follows an assessment based on a small set of established criteria



Admission criteria

- Both qualitative and quantitative criteria
- Excellence as well as international co-operation are considered
- Criteria include both input and outcome aspects
- No assessment of process in the admission procedure



PEGASUS ACHIEVEMENTS

**Reciprocal recognition of common quality: the PEGASUS labels
Certificate and A.W.A.R.D.**



A.W.A.R.D.



Certificate

The PEGASUS – AIAA Student Conference

- 1° edition 2005 in Toulouse
 - 2° edition 2006 in Munich
 - 3° edition 2007 in Naples
 - 4° edition 2008 in Prague
 - 5° edition 2009 in Toulouse → final winner at Orlando (USA)
 - 6° edition 2010 in Seville
 - 7° edition 2011 in Torino
- Analysis of differences and similarities of the EU curricula in aerospace: the PEGASUS Course Catalogue (3° edition 2009)**
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PEGASUS AND THE BOLOGNA PROCESS

Results of the increased mobility:

- New “crossed” aerospace profiles emerge spontaneously
- Cross-breeding of curricula is slowly taking place during the implementation of the Sorbonne – Bologna 3+2 scheme

Implementation of the three-level scheme in PEGASUS

- Fully accomplished by the Italian and Dutch partners
- Underway in Spain and others
- In Germany: started by the TU9 Group, formed by nine Technical Universities. All 6 German PEGASUS Partners are represented in TU9

OPENING TO UNIVERSITIES OUTSIDE EU

→ ASSOCIATE PARTNERS

- RUSSIA (KSTU, Kazan, 2009)
- UKRAINE (Univ. Kharkov, 2010)

(Participation to meetings and Workgroups but no decision making

CONNECTION TO EXISTING NETWORKS (e.g., AAAF)

STRENGTHENING OF INDUSTRIAL LINKS

→ PEGASUS-INDUSTRY Alliance (Airbus, Alenia, Safran, ...)



CONCLUSION

EQUATION FOR EXCELLENCE IN ENGINEERING EDUCATION

STRONG SCIENTIFIC KNOWLEDGE

+

RESEARCH LABORATORIES

+

INDUSTRIAL PARTNERS

+

NATIONAL NETWORKING

+

INTERNATIONAL NETWORKING



THANK YOU FOR YOUR
ATTENTION
QUESTIONS?

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