The Subsea Industry: an Exciting Business

A Young Engineer’s View
Pierre GERARDIN
The Subsea Industry: an Exciting Business

Personal background

Education
Job Hunt

The Subsea Business in the Oil & Gas industry

Overview: Facts & Figures
Numerous disciplines
What makes it specific / attractive?

My job in the subsea industry with Total

Training (classes, programs)
Managing projects and people
Travelling and Working
Personal background
Personal background

> Education

- Ecole Nationale Supérieure d’Arts et Métiers
- Georgia Institute of Technology

- **Spring 2004**: « Diplôme d’ingénieur », Industrial & Mechanical Engineering
- **Fall 2004**: Master of Science in Mechanical Engineering
- **2005**: Started a Ph.D. with the Fluid Mechanic Research Lab. at GaTech (Atlanta)
- **April 2006**: Start with Total
Personal background

> Job Hunt, my criteria

- Europe-based
- Large company
- A flexible company listening to my wishes
- Be in the real world!
- A corporate world
- Learn and be challenged
- International Career and opportunities
- Cutting-edge technology

What do YOU want?
Personal background

> Job Hunt

- Consulting
- Aeronautics
- Defence
- Nuclear Energy
- Automotive Industry

>>> Some good offers but nothing really exceptional or new…

>>> And the OIL & GAS INDUSTRY not considered…
Acknowledge you might be wrong !!!
The Subsea Business
The Subsea Industry

> from (1950;~10m WD) to (2007; 2000m WD)

Deeper and deeper…
The Subsea Industry
> Deepwater production / Forecast

Source: The World Deepwater Market Forecast 2006-10 Douglas-Westwood

Sustainable future...
The Subsea Industry

> Total operated subsea fields – mid 2007

- **Norway**
  - Skymo byggve
  - Vittoria
- **Netherlands**
  - L4G
  - K5F
- **UK**
  - Ellon
  - Grant
  - Nuggets
  - Otter
  - Forvie
  - Jura
  - Laggan
- **Congo**
  - Moho Bilondo
- **Gulf of Mexico**
  - Matterhorn
  - Gotcha
- **Angola**
  - Girassol
  - Dalia
  - Rosa
  - Pazflor
  - Clov
  - Block 32
- **Argentina**
  - Argo
- **Nigeria**
  - Akpo
  - Usan
  - Egina-Preowe
- **Congo**
  - Mono Bilondo
  - Moho Tert.
  - Pegase Andr.
- **Flowing**
- **Under Construction**
- **Under study**
The Subsea Industry

> Numerous disciplines

It’s nothing new: mechanical / electrical / hydraulic design, control, process, robotics… BUT everything has to be marinized, remotely operated, pressure resistant!

- Electronics/communication
- Cathodic protection
- Valves & actuations
- Manual Control Panel
- Umbilical
- Interface with the Well Head

A X-Tree ready to be installed on ROSA field (1300m WD)
The Subsea Industry

> What makes « subsea » so specific?

- 20+ years lifetime => high reliability
- High pressures
- Corrosion issues
- Compact design / Complex interfaces
- Difficulties to re-create real conditions
- Remote Installation & Intervention Ops
- Costly Maintenance
- Stringent Environment Requirements

*Highly integrated systems requiring a multi-disciplinary approach!*
My Job in the Subsea Industry with Total
My Job in the Subsea Industry with Total

> My position in the group

- Geosciences
  - Find reservoirs

- Affiliates
  - Produce oil & gas

- Technics Dvlpmt Ops
  - Build equipments (with sub-contractors)

- Architecture/R&D
  - Propose development architectures

- Project
  - Group expertise
  - Support
  - Technical assistance

Total

- Upstream
  - Exploration & Production
  - Gas & Electricity

- Downstream
  - Refining & Marketing
  - Trading & Shipping

- Chemistry
My Job in the Subsea Industry with Total

> My position in the group

- Geosciences: Find reservoirs
- Affiliates
  - Produce oil & gas
- Technics Dvlpmt Ops
  - Build equipments (with sub-contractors)
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- Architecture/ R&D
  - Propose development architectures
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  - Group expertise
My Job in the Subsea Industry with Total
> Training, Process Engineer Program

- From complete inexperience to in-depth knowledge of the subjects...

- First, DO ask for the acronyms you do not know! There are plenty of them in the subsea business > e.g. What does WAT mean?

- Go on the field

- Get hands-on experiences

- Learn from every knowledgeable person

- Be patient

- Take classes too!!! Attend seminars!!!

- Attend international conferences

SAY what you want to DO!
My Job in the Subsea Industry with Total

> Training, Process Engineer Program

No such learning than on the field!
My Job in the Subsea Industry with Total

> SWIMMER

Hybrid Autonomous Underwater Vehicle

Affiliate: Angola

Manufacturer: Cybernetix
My Job in the Subsea Industry with Total

> SWIMMER
My Job in the Subsea Industry with Total

> MEDIDOR

Retrofit on existing production system of a multiphase meter

Affiliate: Angola
Manufacturer: DES/Cameron
My Job in the Subsea Industry with Total

K5F

CameronDC Subsea Production System

1. Electric Subsea Control Modules
2. Electrically Actuated Chemical Injection Valves
3. Electrically Actuated Subsea Retrievable Choke
4. Electrically Actuated Production Valves
5. Electrically Actuated Annulus Valves

Electric Power Regulation and Communication Modules

(not shown, mounted on template/manifold)

Subsea valves
all-electric actuation

Affiliate: Netherlands

Manufacturer: Cameron

Courtesy of CAMERON COOPER
My Job in the Subsea Industry with Total

> Travelling and Working during my 1st year

- **France** (Pau, Paris)
- **Angola** (Luanda, Block 17)
- **Norway** (Kongsberg, Oslo)
- **USA** (Houston, GoM, New-Orleans)
- **UK** (Aberdeen, Invergordon, Leeds)
- **Germany** (Hanover, Celle, Berlin)
- **Netherland** (Den Helder, Amsterdam)
Conclusions
The Subsea Industry: an Exciting Business

> Conclusion

- The Subsea business is expanding fast (and is key to the future)…

- … thus, the Oil & Gas Industry is putting a lot of effort and money in it…

- … and consequently creates a lot of good opportunities for young engineers…

- … to do something unconventional and exciting !!
A few snapshots...

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QUESTIONS?

Contact me at pierre.gerardin@total.com