



duratiNet

Workshop "DURATI NET project presentation to portuguese end users"

Steel maintenance and repair
by *F. Schoefs*
Institute for Research in Civil and Mechanical Engineering (GeM)
University of Nantes, France


 European Union
 Investing in our common future

 ATLANTIC AREA
 Transnational Programme

duratiNet 1ST Transnational Workshop
Lisboa- LNEC, 19th February 2009

Case of harbour structures : why ?

The corrosion process is very hard to model because :

- It is affected by a lot of time-variant and space-dependent factors :
Temperature, Dissolved Oxygen, Salinity, Tide level, Suspended materials (bio-corrosion), pollution, water flow/waves, abrasive materials.
- Only few on-site measurements are available and not always well documented (context).
- On-site measurements are costly and difficult to realize.

→ Need to gather data in a well documented data base

Sheet-piles wall



On-pile wharf



 ATLANTIC AREA
Transnational Programme

Case of suspension-bridges : why ?

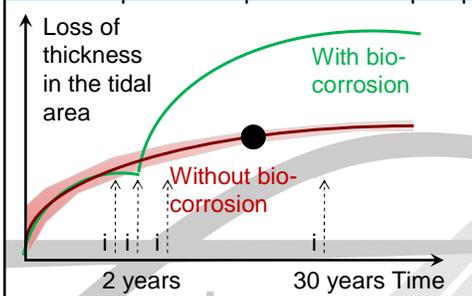
The corrosion process in cables is very hard to model because :

- It is affected by a lot of time-variant and space-dependent factors :
Temperature, Wind, Humidity.
 - The number of fibers in cables is huge.
 - On-site measurements are costly and difficult to realize.
- Need to gather data in a well documented data base

duratiNet

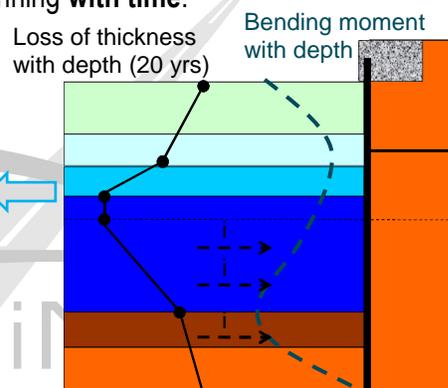
Why ageing models are required ?

- to optimize inspection and repair planning **with time**.



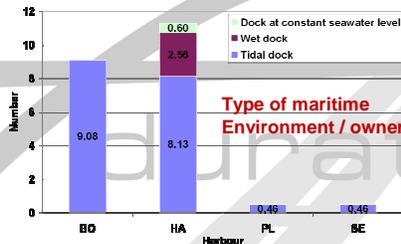
But difficult to inspect : what it seen ?

- to optimize inspection and repair planning **with space**.

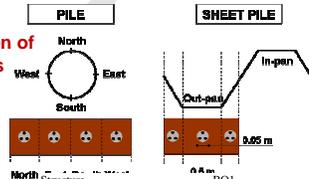


French experience

- Guidelines are published by the government (not rules), but too expensive ← feedback of owners
- Data are available (100 000 measurements)
- The data base is now documented



Nb and location of measurements

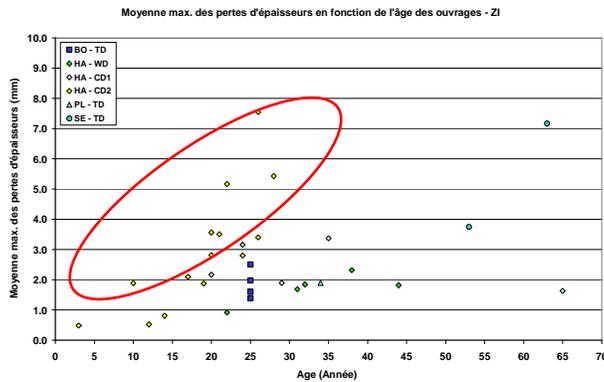


Chemical characteristics

Parameter	BO1			HA7d & HA8b		
	Mean	Min	Max	Mean	Min	Max
Temperature (°C)	7.2	19.5		13.7	13.3	8.1
	20.7					
pH	7.8	8.1		8.1	8.0	7.7
	8.5					
Conductivity (mS/cm)	37.2		49.0	46.8	50.5	
	33.7		41.4	31.5	33.7	
Salinity (g/l)	25.4		23.9	27.7		
	11.2		8.7	6.4		
O2 (mg/l)	11.2	8.7		6.9	11.0	
	9.9	4.7		17.7		
SM* (mg/l)	8.3	3.3	15.0			

French experience

- Model are emerging (Medachs & Gerom projects)

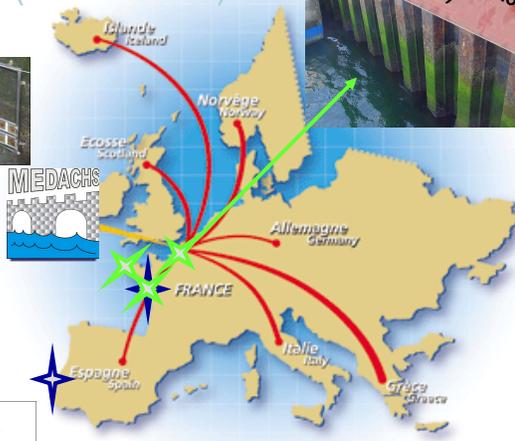


To be made : objectives of Duratinet

- Share Practices and data in the Atlantic area
- Provide guide-lines based on risk analysis in view to optimize the number of measurements at each inspection time and the number of inspections

duratiNet

Complete the knowledge : specimens on site (documented)



To be made : objectives of Duratinet

- Share Practices and data in the Atlantic area
- Provide guide-lines based on risk analysis in view to optimize the number of measurements at each inspection time and the number of inspections
- Provide guide-lines based on risk analysis for the maintenance (painting) **NEW** : feedback is essential (if documented) : environmental conditions during painting works / type of product ...

duratiNet

Results of Medachs project



- rank 5 main coating products performance

-----	: Bad
-----	: Medium
-----	: Good

Zinc polyurethane Mono-component + mixed resin
« polyurethane + hydrocarbon »

	Epoxy coating			Epoxy-polyamide or polyester coating + flakeglass		Zinc polyurethane Mono-component + mixed resin « polyurethane + hydrocarbon »
Limit States $D(d(x_i)) < 0$	Paint 1	Paint 2	Paint 3	Paint 4	Paint 5	
Fixing (4 months)	Paint 1	Paint 2	Paint 3	Paint 4	Paint 5	
Visual aspect (10 months)	Paint 1	Paint 2	Paint 3	Paint 4	Paint 5	
Porosity (10 months)	Paint 1	Paint 2	Paint 3	Paint 4	Paint 5	

Pb : head of pile



To be made : objectives of Duratinet

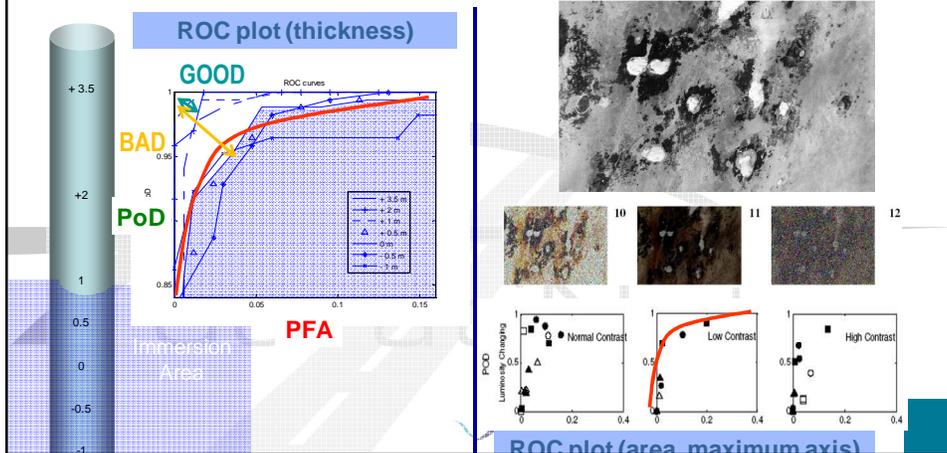
- Share Practices and data in the Atlantic area
- Provide guide-lines based on risk analysis in view to optimize the number of measurement at each inspection and the number of inspection
- Provide guide-lines based on risk analysis for the maintenance (painting) NEW : feedback is essential (documented) : environmental conditions during painting works / type of product ...
- Provide data base for measurement of NDT tool performance on site.
Developp the use of connex data : video-tapes before painting. **NEW**

Results of Medachs project



Uniform corrosion
(from data in Brest, Nantes, Boulogne)

Localized corrosion
Theoretical work



To be made : objectives of Duratinet

The ESSENTIAL role of end-users :

- Maintenance policy (repair during winter for touristic equipments)
- Feedack about products/protocols (complicated or not)
- Benchmark structures with real stakes.

Thank you !

duratiNet

