

 Institut de Recherche en Génie Civil et Mécanique
 UNIVERSITE DE NANTES

2nd Transnational Workshop duratiNET

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DURATI NET project presentation to UK and Irish end users

**Ashby Lecture Room, The Queen's University of Belfast
Northern Ireland, United Kingdom,**

Steel maintenance and repair
by F. Schoefs
Institute for Research in Civil and Mechanical Engineering (GeM)
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 European Union
 Investing in our common future
 ATLANTIC AREA
 Transnational Programme

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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

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Case of suspension-bridges : why ?

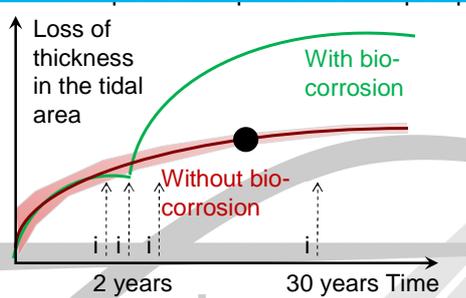
The corrosion process in cables is very hard to model because :

- 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

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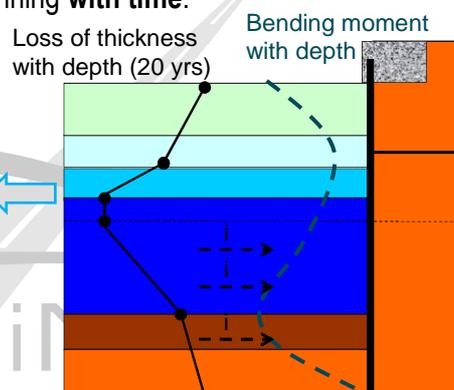
Why ageing models are required ?

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



But difficult to inspect : what it seen ?

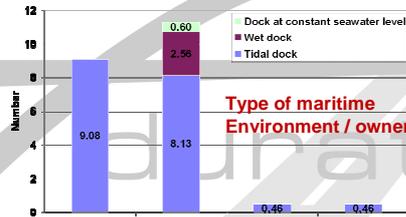
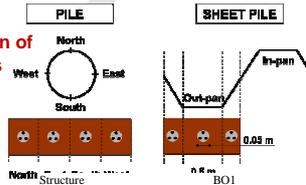
- to optimize inspection and repair planning **with space**.



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



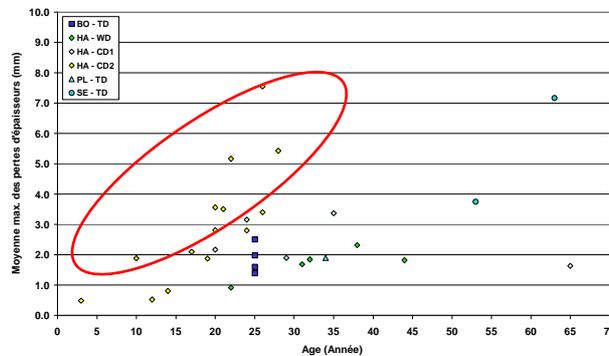
Chemical characteristics

Parameter	BO1			HA7d & HA8b		
	Mean	Min	Max	Mean	Min	Max
Temperature (°C)	7.2	19.5		13.7		8.1
pH	20.7			8.0		7.7
Conductivity (mS/cm)	7.8	8.1		8.1		46.8
Salinity (g/l)	8.5			37.2	41.4	50.5
O2 (mg/l)	25.4			32.9	31.5	33.7
SM* (mg/l)	11.2	8.7		23.9	27.7	6.4
	8.3	9.9		4.7	11.0	17.7
		3.3		15.0		

French experience

- Model are emerging (Medachs & Gerom projects)

Moyenne max. des pertes d'épaisseurs en fonction de l'âge des ouvrages - ZI



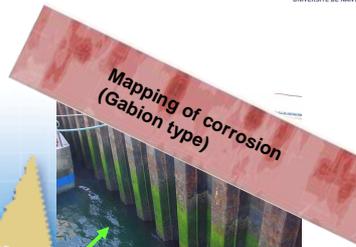
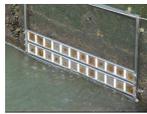
To be made : objectives of Duratinet

- 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 (in link with WG2)

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Complete the knowledge :
specimens on site (documented)

- ★ Corrosion rate
- ★ Data analysis (residual thickness – ROC)



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 ...

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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 $D(d(xi)) < 0$	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

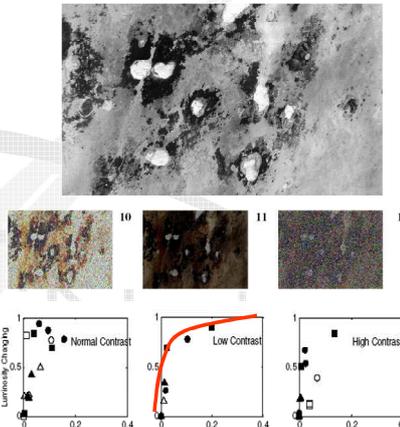
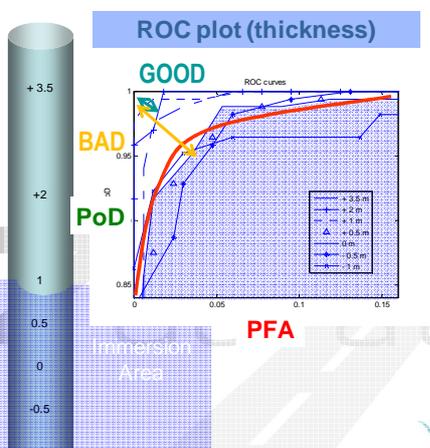
- Share Practices and data in the Atlantic area
- Provide guide-lines based on risk analysis in view to optimize the number of measurement at each inspection and the number of inspection
- Provide guide-lines based on risk analysis for the maintenance (painting) NEW : feedback is essential (documented) : 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 !

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