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# Learning on experience on projects

24/05/2016

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Confidential  Restricted  Public  Internal



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# 1. Tractebel (Engie)

## Who we are

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- TE is an Engineering company (4400 people), ~600 in nuclear
- Nuclear main activities:
  - Plant Operation Support projects of the 7 Belgian reactors and internationally (Eskom, Borssele, Ringhals...)
  - New Build projects (NUGEN, SINOP, PALLAS...)
  - Decommissioning & Dismantling as well as Waste Management
- Projects range from fuel and accident studies to full EPC-M projects from prefeasibility to commissioning

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# 1. Tractebel (Engie)

## Examples of Nuclear Plant Operational support projects

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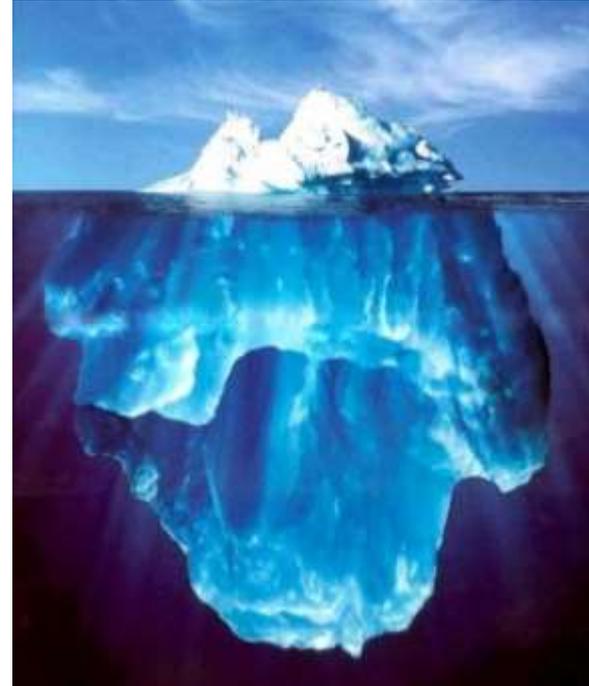
- Small projects: various studies and replacement, I&C, polar crane, pumps etc...
- Large study projects: PSR, stress test studies, Fire Hazard Analysis, reactor vessel hydrogen defaults CNT2/KCD3, detailed design in civil engineering...
- Large projects: Safety injection pumps replacement, fire detection replacement, fire piping replacement, Barsebäck strainers...
- Very large projects: steam generator replacement, anti-flooding facility, LTO projects (second level electrical building...), containment filtered venting systems (CFVS), vessel cover head replacement...

## 2. Introduction (1)

- Purpose of the presentation:
  - show how Tractebel seeks to be a learning organization through projects by capitalizing on Return On Experience (REX)
- Context
  - We do projects and projects are unique (vs production or maintenance where actions are more repetitive).
  - Documentation and utilization of REX is not a spontaneous process because stress and focus is on finalizing the project
  - The experienced generations are leaving and we must make sure we capitalize on their experience
  - Arrival a many newcomers
  - Young generations are willing to see diversity >> less stability than before
  - The company must rely on the group rather that on individuals to ensure perenity of knowledge

## 2. Introduction (2)

- Difficulties: be a learning organization:
  - is mostly a matter of human behaviour and it is a question of company culture, not everything can be written in procedures
  - It takes time and it has a cost. It requires to step back from normal operation
  - Requires to stimulate reporting of issues (transparency) >> admitting an error isn't always rewarding



Procedures

Behaviour

# 3. Process

## Empowerment of the process:

- Supervision by executives
- Take time for root cause analyses
- Take time to conduct action plans to update assets

Creation of a REX repository:  
(TE-REX database)

We must guarantee structural improvement of assets (tools, procedures, methods, mindsets, behaviours, prerequisites....) >> **corrective and preventive actions**

3. There is a **punctual action** to fix issues, if any raised, in order to finish the job. QA system guarantees all issues are treated systematically (ex: NCR, client complaints...) >> **curative actions**

Enrich and facilitate flow with NEW observation channels:

- REX one page-note

2. ... a flow of **observations** is produced (After Action Reviews, End of Project Reports, failures, successes, errors, experience, feedback from client, complaints, audits findings, non-conformities...)



4. Avoid that jobs are planned with "static" assets

5. Continuously improved "dynamic" assets

1. While doing the job (projects, studies, site works etc.) ...

## Inform/educate about REX:

- Case studies review in team meetings
- REX larger meetings

## 3. Tools: REX one-page note

REX N51 #



### Facts

- Quick description of the facts
- History
- Good or bad experience

### REX to implement

- A short analysis of the fact
- Main causes
- Proposition of main actions and findings
- Opportunities

### Purpose

- Stimulate the organisation to bring up as many topics as possible by lowering the barriers: REX one-page note is a simple template that can be used by anybody on their initiative anytime
- Trigger the REX process : REX one-page note is a first document that makes sure the process is launched
- Inform colleagues at a glance about the experience

### 3. Tools: TE-REX repository

Te-REX + ☰ 🔍 📄 ✉️ Polet Gauthier

Hello Gauthier, you entered the Tractebel Engineering tool for reporting, managing and consulting our return of experience. This tool concentrates our lessons learned, gathered during the execution of our activities of all kind in any kind of domain or discipline...

Help yourself while helping others!

+ Report a Te-REX item

☰ My pending Te-REX items

🔍 Consult a Te-REX item

#### Purpose

- Structure and classify REX items
- Ensure the follow-up of the process: root cause analysis, action plans...
- Search and retrieve REX items

# 3. Tools: TE-REX repository (input screens)

## Report a Te-REX item

**Project Data** \* Indicates:

**Project \***

**Submitted by \***

**Company & Organization \***

- 
- 
- 

**Function in project \***

**Geographic area**

**Country**

### Lesson Learned

Approach the item classification and item contents as seen from the point of view of the problem or the avoided problem, not from the solution or cause.

**Date Submitted \***

**Item classification \***

**Title \***

**Description \***

**Causes \***

**Identified lessons & action \***

**Attachments**

**Confidential**

# 3. Tools: TE-REX repository (search screen)

Te-REX Polet Gauthier

### Consult a Te-REX item

Search criteria combination type

Search Type  AND (search matching all of the criteria)  
 OR (search matching any of the criteria)

Fields with random word search

Title

Description

Causes

Identified lessons & action

User comments

Fields with search on values

Project

Project Client

Submitted by

Company & Organisation

Geographic area

Country

Item ID number

Date submitted after  before

Date last consultation after  before

Item classification

# 3. Tools: TE-REX repository (result screens)

Consult a Te-REX item

Export results to Excel

Back to search

Search Results (101)

Item ID	Title	Identified lessons & action	Project Name
000015	HRBG economiser design error - Too low design pressure	Three main lessons identified: - Assure in the specifications, if included in our scope, a minimum document list and logical sequence for the supply of documents; - Assure in the specifications, if	ROSELECTRA COPP SOLVAY ROSIGNANO
000016	BT Last Stage Blade damage - bad condenser design	Principal lessons learned: - Improve Return of EXperience on encountered problems - Elaborate checklists with "minimum questions to ask oneself" to assist the engineers in their job for design review	ROSELECTRA COPP SOLVAY ROSIGNANO
000024	Turbine table grouting; grouting of generator when not yet aligned	Description of the work to be done has to be more clear, including also, if applicable, work that may not be done. The grouted sleeves have been drilled from the bottom with a diameter slightly small	OSBD - COAL FIRED POWER PLANT WILHELMHAVEN UNIT 1
000034	Inadequate procedure & template for work permit system	- Start a project with an operational work permit system that is applicable for erection and commissioning. - Make sure the contractors are informed of this procedure and methodology in order to avoid	ELECTRABEL - COAL FIRED POWER PLANT ROTTERDAM UNIT 1
000035	Air Blowing for water and steam systems cleaning during the realization of a new electrical plant (Rosselectra)	- Design : boroscopic inspection nozzles shall be foreseen to inspect HRBG collectors (in particular superheater and reheater which are not flushed before blowing). - Delivery and storage : the Air	ROSELECTRA COPP SOLVAY ROSIGNANO
000040	COPP Rotterdam Commissioning - First Filling of Ammonia Tank	Lesson learned: Before first filling of an ammonia tank (and other aqueous chemical solutions), the gas creation and	EBL NEDERLAND - COPP ROTTERDAM T&M

Project Data

Project ROSELECTRA COPP SOLVAY ROSIGNANO  
More information...

Lesson Learned

**Item ID** 000015  
**Date submitted** 15/02/2006  
**Date last consultation** 17/05/2016  
**Item classification** Technical, Engineering, System & basic engineering, Mechanical  
**Title** HRBG economiser design error - Too low design pressure  
**Description** The COPP of ROSELECTRA is a 400MW single shaft plant built by Ansaldo Energia. During the design review of the water steam cycle it was discovered that the design pressure of the economizer was lower than the pressure supplied by the Boiler Feed Water pump @ minimum flow.  
 The HRBG has 3 sub-critical pressure levels, each with their own economizer. The HP economizer is fed from the BFW pumps and the drum level control valve is installed after the economizer. The design pressure of the economizer was chosen 10% higher as the operational pressure @ nominal load. The BFW pump gave a pressure @ minimum flow that was considerable higher as this resulting design pressure for the economizer.  
 During first start-up of the BFW pump the safety valve (10% flow) would have opened instantly and remain open, the pressure in the economizer would have risen above the design value and the economizer would more than probably have been damaged. The engineering of the system was re-done and the design for the system was adapted. As the economizer was already manufactured and the as-built situation was just suitable for the absolute minimum allowable design pressure, the manufacturer (Ansaldo Caldele) was allowed to continue. Further adjustments were made to increase the minimum flow of the BFW pump and to permanently evacuate water to the steam drum as from the start of the GT.  
 The problem was detected after manufacturing completion as the documentation of the HRBG design was withheld from the OE.  
**Causes**  
 Main causes:  
 - lack of knowledge of the boiler manufacturer on the operation of his equipment;  
 - lack of verification of the EPC contractor on the integration of the different equipment in complete design;  
 - Bad verification of the interfaces and interface conditions by the appointed NoBo of both the boiler manufacturer and the EPC contractor.  
**Identified lessons & action**  
 Three main lessons identified:  
 - Assure in the specifications, if included in our scope, a minimum document list and logical sequence for the supply of documents;  
 - Assure in the specifications, if included in our scope, a mechanism to eliminate such problems during design: ex. obligation to perform a complete interface compatibility study for all possible load cases between systems and/or packages, minimum design requirements for equipment or parts...;  
 - Assure verification of the design values on interfaces and inside packages during the design review  
 More information...

Total consultations: 55

Comments on item

# Example

## Client complaint on deliverable

### REX process:

- Launch TE-REX database process
- Root cause analysis

### Structural action (corrective)

- Technical team: define standard contents for “Functional Analysis”
- Project management team: update the contract review check-list to make sure technical team and client are challenged on a clear agreement on the content before signing a contract

Archive action plan documents and summary on TE-REX database

### Analysis

- Quality isn't quite the highest but is still acceptable
- Level of detail is lower than expected by Client because deliverable doesn't allow writing operation procedure straight forward:
  - “Functional Analysis” doesn't have a standard table of contents >> misunderstanding on contents
  - Contract review process missed it

### Punctual action (curative)

- Propose fair Change Order on the project live up with to Client expectations (additional deliverable)

Project Manager issues REX one-page note

Client (NPP) claims on deliverable

- Quality
- Level of detail



### Assets

- No template for “Functional Analysis”
- Contract review check-list

### Updated assets

- Template for “Functional Analysis”
- Updated contract review check-list

Technical team writes deliverable called “Functional Analysis” in the contract

Presentation case study in team meetings in project management and technical teams

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## 5. Conclusions (1)

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- Important features:

- Curative actions are completed more “naturally” whereas corrective and preventive actions are less rewarding on the short term
- We deal with human behaviour:
  - Not everything can be written in procedures: it is a question of company culture: time and energy must be put in change management
  - Sound REX management has a cost in time if we want it to be effective. We must step back from normal operation which is not always easy

## 5. Conclusions (2)

- Main achievements:
  - We are aware of the challenge: be a learning organization is vital and urgent in order to avoid important loss of knowledge
  - We stimulate a bigger flow of new items by giving everyone an easy reporting tool (one-page note)
  - We developed of a structured database that allows classifying and retrieving REX items and following up action plans (TE-REX database)

## 5. Conclusions (3)

- Outlook – remaining challenges

- Most of the behavioural and cultural change is still ahead of us, every member of the organisation has a role to play.
- Empowerment, leadership and promotion of the process must be strengthened even more (committees, more formal framework?)
- Bringing up of new items must still be encouraged. We must work on the image of reporting a problem.
- Root cause analyses must still be more promoted and encouraged