



SUPPLY CHAIN QUALITY SURVEILLANCE AND RISK MANAGEMENT IN THE HYDROPOWER INDUSTRY

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INSPECTEAM Hydro

HYDROPOWER QUALITY EXPERTS

QUALITY SURVEILLANCE, INSPECTION, TESTING & EXPEDITING SERVICES

1 INTRODUCTION

Process of purchasing critical Components for hydroelectric power plants:

- Pressure parts
- Rotors
- Valves
- Etc.



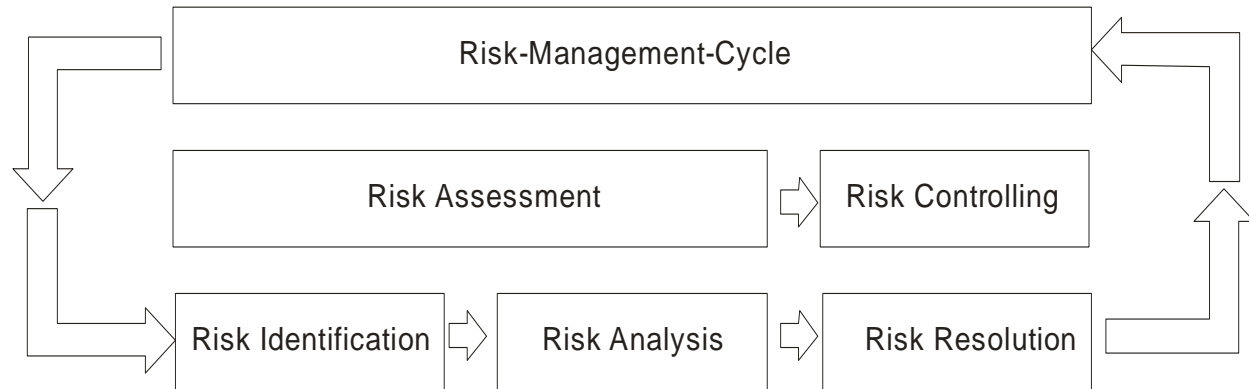
Supply Chain Risk Management (SCRM)

Continuous Quality Surveillance Scheme (CQSS)

REDUCTION OF POOR QUALITY AND RISK

2

RISK MANAGEMENT



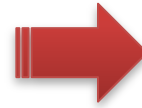
Process of the Risk-Management-Cycle



3 SUPPLY CHAIN RISK MANAGEMENT (SCRM)

Objectives:

Implementation of strategies to manage both **every day** and **exceptional risk** along the supply chain based on continuous risk assessment



**Identify
RISKS**

**Take
ACTIONS**



3 SUPPLY CHAIN RISK MANAGEMENT (SCRM)

Identify RISKS

Usual risks for hydropower supplies:

- **delivery delays.**
- manufacturing **errors and modifications** required on components to allow assembling with defective parts.
- **re-engineering and re-design** for suppliers and customers, following the detection of **non-quality in a late stage of fabrication.**
- risk to **safety.**



3 SUPPLY CHAIN RISK MANAGEMENT (SCRM)

**Take
ACTIONS**

- Risks that are constantly present
→ **WRITE SYSTEMATIC ACTION PLANS FOR EACH PRODUCT PURCHASED**
- Risks that are related to specific or unusual situations
→ **BASED ON LIKELIHOOD AND IMPACT, PLAN COUNTERMEASURES PROVIDING NECESSARY RESOURCES AND ACTIONS**

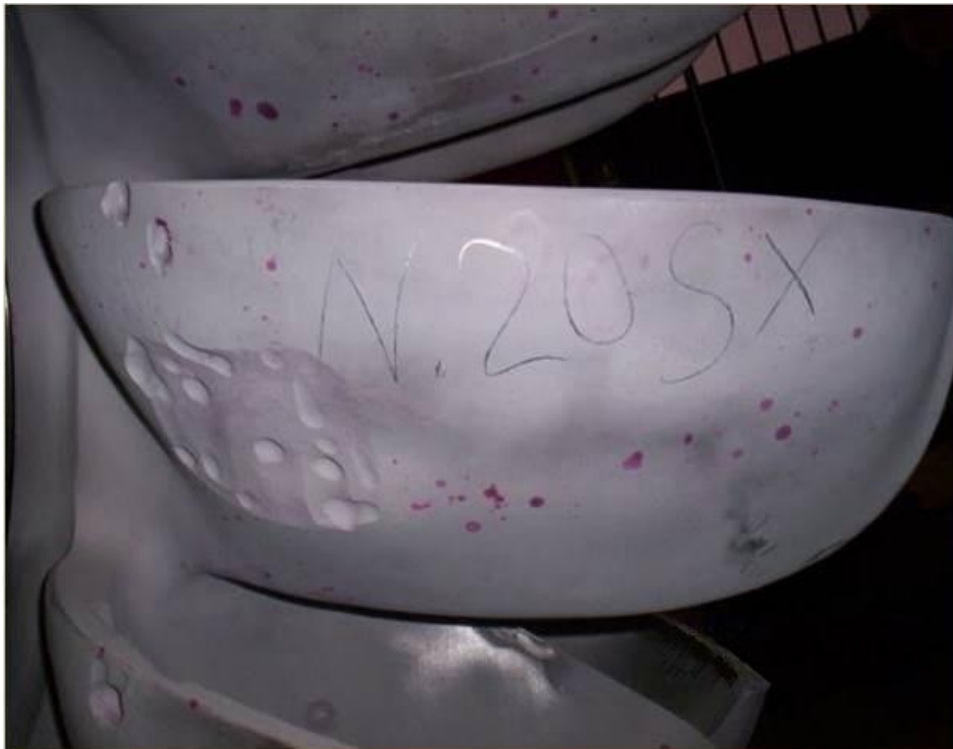


3 SUPPLY CHAIN RISK MANAGEMENT (SCRM)

Take ACTIONS

- Communication of the strategies put in place to all parties involved
 - **Pre-Inspection-Meeting (PIM)**
 - **Continuous exchange of information**
- Sharing risk-related knowledge and experiences
 - **Inspection & Test Plan (ITP)**
 - **Lessons learnt**
 - **Clear instructions**

3 EXAMPLES OF DEFECTS DETECTED DURING MANUFACTURING



Example of
excavation of
**DEFECTS ON A
CAST PELTON
RUNNER**

3 EXAMPLES OF DEFECTS DETECTED DURING MANUFACTURING



Example of **POOR WELD PREPARATION AND OF POOR QUALITY WELD ON A ROTARY VALVE**

3 EXAMPLES OF DEFECTS DETECTED DURING MANUFACTURING



Example of defects on **KAPLAN TURBINE BLADE** detected by means of Liquid Penetrant examination

3 EXAMPLES OF DEFECTS DETECTED DURING MANUFACTURING



Example of defects on **FRANCIS TURBINE STAY RINGS**:
cracks detected in structural welding by means
of Magnetic Particle examination

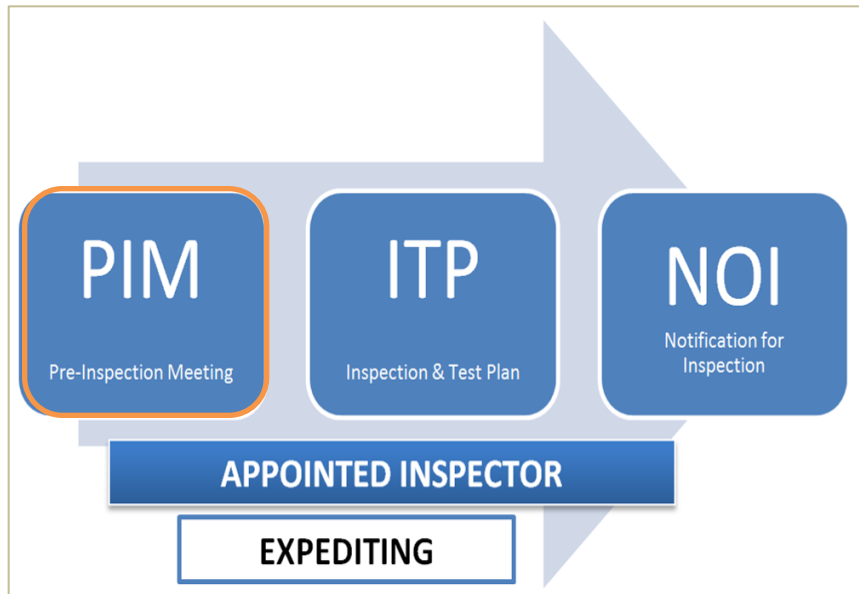
4 CONTINUOUS QUALITY SURVEILLANCE SCHEME (CQSS)

CONTINUOUS QUALITY SURVEILLANCE SCHEME
is a philosophy of follow-up of
manufacturing oriented to quality



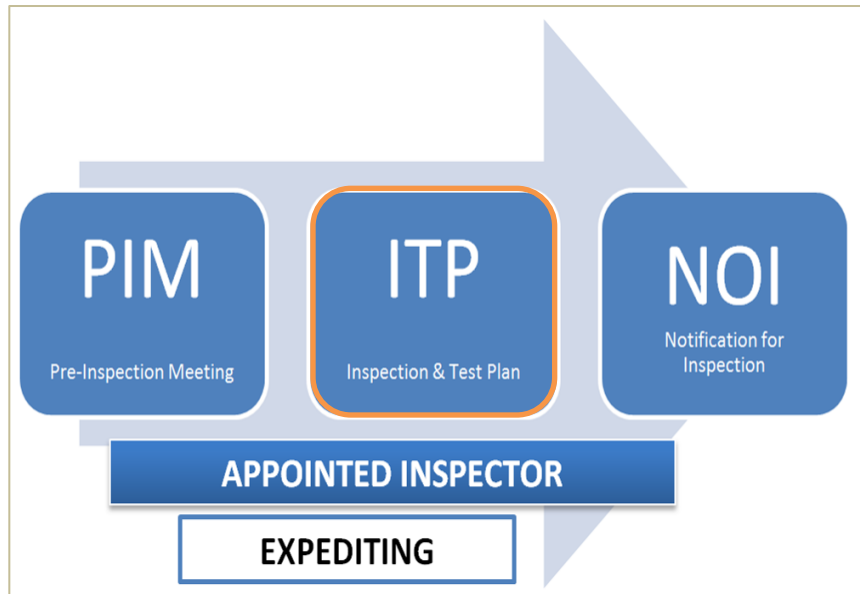
APPLIED TO THE MANUFACTURING OF
MECHANICAL AND ELECTRICAL
COMPONENTS FOR HYDROELECTRIC
POWER PLANTS

4 CONTINUOUS QUALITY SURVEILLANCE SCHEME (CQSS)



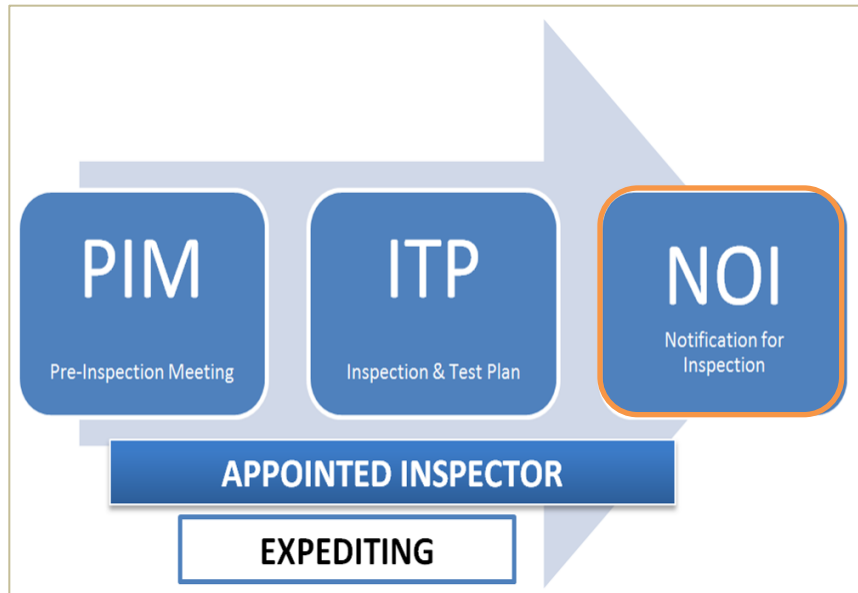
The **Pre-Inspection Meeting (PIM)** is a point of **clarification of all the technical and quality aspects** for all the subjects involved in the project (client, contractor, supplier and inspection agency), and **allows the communication of the level of risk identified to all parties involved.**

4 CONTINUOUS QUALITY SURVEILLANCE SCHEME (CQSS)



The **Inspection & Test Plan (ITP)** is one of the most valuable results of a Supply Chain Risk Assessment. It is a document for quality control defining all the inspections and tests required during the construction process. This allows the formalisation of **surveillance during the whole production process**, until completion and delivery.

4 CONTINUOUS QUALITY SURVEILLANCE SCHEME (CQSS)



Referring to the points of inspection reported on the ITP, the Vendor is responsible for notifying the scheduled inspection dates to all the subjects involved (Client, End Client if any and Inspection Agency) by means of a **NOTIFICATION FOR INSPECTION**.

In the **N.O.I.** it's mandatory to indicate the kind of control, applicable ITP line, date and duration of the forecasted activity and all the information required to carry out inspection activities in compliance with the ITP.

4 CONTINUOUS QUALITY SURVEILLANCE SCHEME (CQSS) ON THE FIELD

Inspection agency: back-office personnel who **add a remarkable value to the inspector's work**, who can be focused on the mere in-field surveillance activities.

Inspectors: eye of the Client at the manufacturer's premises; They are technical engineers who physically carry out the Quality Surveillance during the manufacturing of the products in the manufacturer's plant.
The inspectors shall possess a **remarkable experience** in the manufacturing of **hydropower components** and also in the testing techniques.



4 EXAMPLES OF QUALITY CONTROL DURING MANUFACTURING

How can inspection agencies help?



Dimensional check of **BOLTING FOR TURBINE COVERS**

4 EXAMPLES OF QUALITY CONTROL DURING MANUFACTURING



Dimensional check of **TURBINE SHAFTS AND COVERS** against manufacturing drawings

4 EXAMPLES OF QUALITY CONTROL DURING MANUFACTURING



Non-destructive examination by LIQUID PENETRANT on a PELTON RUNNER according to CCH70-3

4 EXAMPLES OF QUALITY CONTROL DURING MANUFACTURING



Witness of the **Rotating Speed Measurement** during some motor's testing

4 EXAMPLES OF QUALITY CONTROL DURING MANUFACTURING

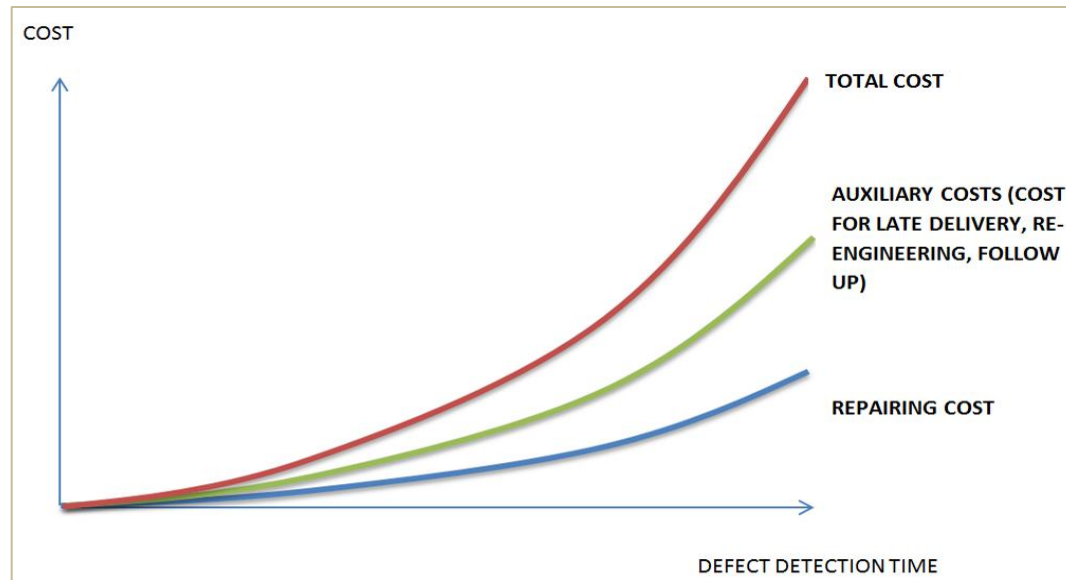


Example of **CONTROL PANEL** where a faulty situation is detected with immediate shut-down

5

CONCLUSIONS

Reducing the costs of **Poor Quality** through **proper Risk Management** and the **CQSS**:



Companies using the above methods of work have reported **significant improvements** in their supply chain efficiencies.



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THANK YOU FOR YOUR ATTENTION!



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