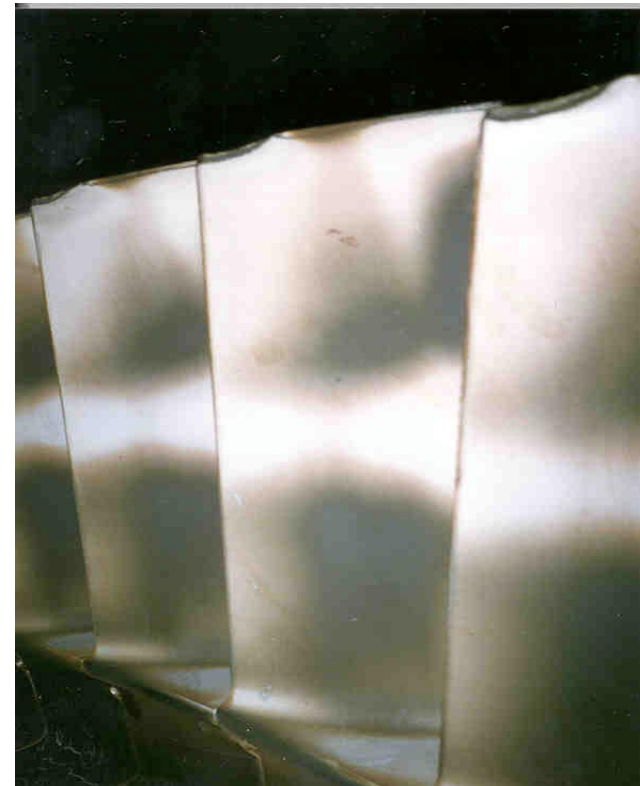




# ***New project: TINTELL***

**Interval inspection for determination condition  
of first row of nozzles and blades**

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# TINTELL

- TINTELL to prefend this:



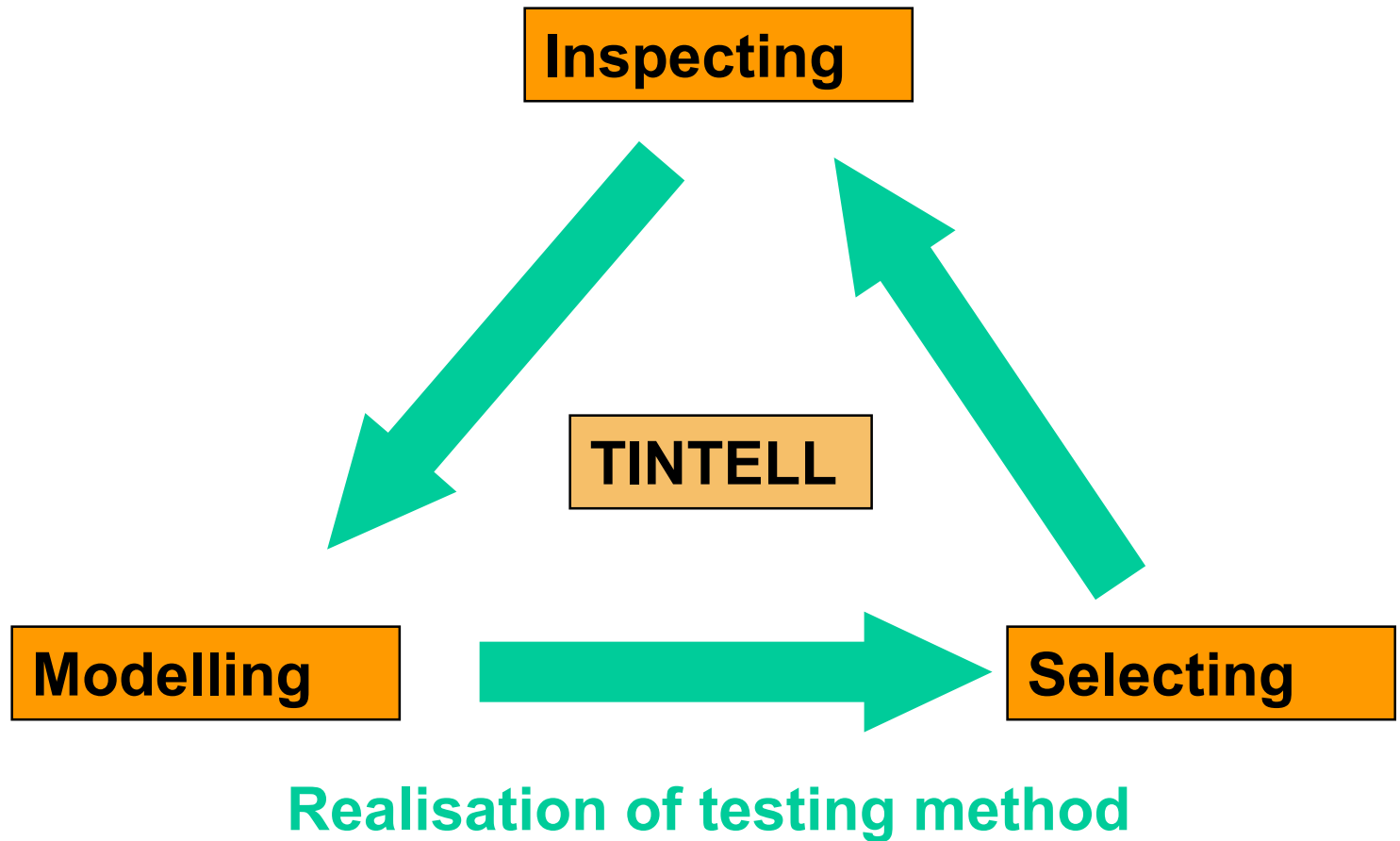
# *TINTELL: Interval inspection for determination condition of first row of nozzles and blades*

- **Aim:** Realisation of testing method for first row of blades at 'closed' (without dismantling pressure housing) gas turbine
- **Co-funders:** Dutch electricity production sector + Ministry of Econ. Affairs
- **Main executers:**
  - Dutch electricity production sector
  - KEMA
  - ABB
  - Elbar
  - NRG





# *TINTELL: Interval inspection for determination condition of first row of nozzles and blades*





# TINTELL; the challenge

- **The challenge for users:** less independent of the OEM:



- less costs for maintenance and repair
- less dependant of binding requirements of OEM
- user can play a more important role in the decision making process of replacement or reconditioning of blades



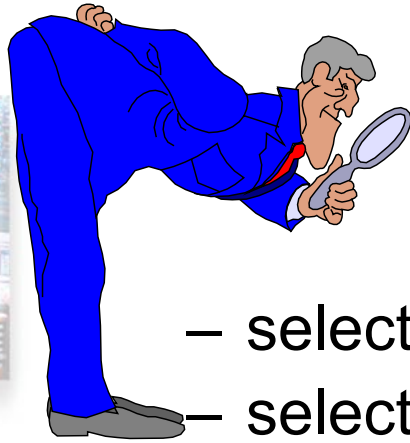
# ***TINTELL; background***

- **Current situation: control process is poor / has shortcomings:**
  - great spread in material properties
  - insufficient knowledge operating temperatures
  - too much spread tolerances at fabrication
- **Consequence:**
  - Life time expectation based on most bad samples in general (too much conservatism!)



# *TINTELL; the method (1)*

## Method for testing blades:



- selection of blades
- selection of locations on blades
- measurements
- decisions
- to give a prognosis
- adaptation repair strategy and/or operation



## ***TINTELL; the method (2)***

- **Selection methods for blades:**
  - temperature measurement (pyrometry)







## ***TINTELL; the method (3)***

- **Selection methods for location:**
  - numerical model  
(Ansys, Flotran)
  - (endoscopy)
  - (experience)





## ***TINTELL; the method (4)***

- **Inspection methods (measurements):**

- strain
- coating condition
- (endoscopy)
- (dye)
- (...)

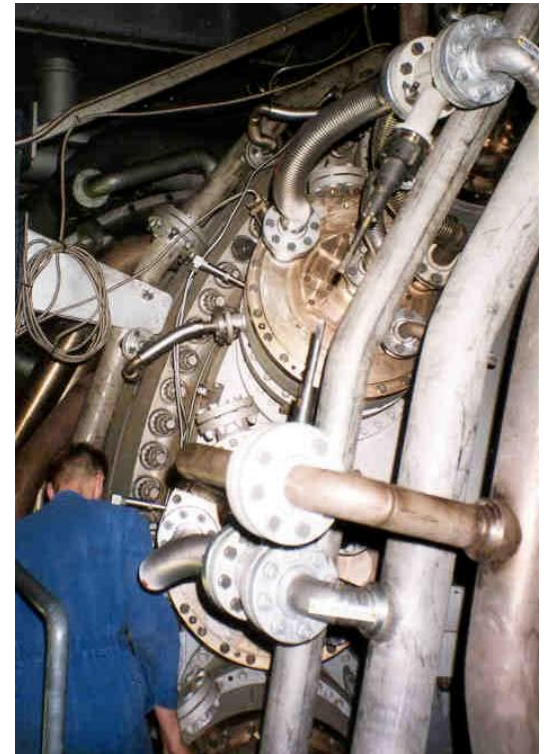


- Measured parameters will be used for model verification and will be related to life time parameters



# *TINTELL; the method (5)*

- **Decision making process:**
  - make of degradation models
  - getting degradation data
  - make criteria
  - risk analysis
  - make a procedure





# *TINTELL; the method (6)*

- **Prognosis:**

- estimate future operation
- numerical modelling of operation
- determination of degradation
- compare degradation with criteria





# ***TINTELL; the method for nozzles (7)***

- **Method for testing nozzles:**
  - make empirical model for crack dimension in nozzles as function of starts/stops/trips
  - measurements of crack dimension(s)
  - determine parameters for empirical model
  - determine criteria
  - make procedure