

Challenges in Monitoring of Cooling Towers and Industrial Chimneys

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Present state

- Cooling towers and industrial chimneys reaching *service life* (about 40 y.)
- **Present monitoring systems** for concrete, masonry and steel structures:
 - cracking, spalling of concrete cover, carbonation depth,
 - corrosion,
 - irreversible deformation, differential settlements of foundations
- Structures divided into **components**: outside and inside surfaces of shell, columns, supports of cooling system, inspection galleries
- **Available data** provided by a power producer:
 - monitoring data for the last ten years (each two years),
 - monitoring and repair costs,
 - estimates of **failure consequences**.



Challenges

- How could we learn from *monitoring of similar structures*?

Group of cooling towers, structures in a power plant.

- Is the selection of observed *deterioration processes, damage indicators and threshold values* adequate?

Correlations between cracking, carbonation and corrosion progress?
Threshold values reflecting optimal maintenance plans?

- What is the most *appropriate method for monitoring*?

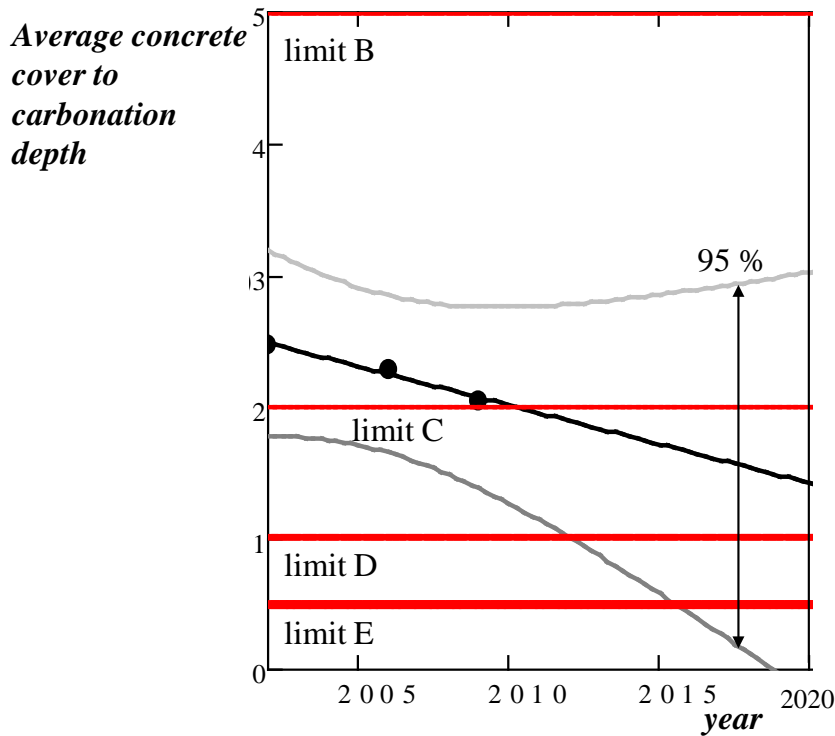
Balance between related costs, uncertainty in outcomes and required precision.

- How many *observations at a point in time* are to be recommended for components with considerably different extents?

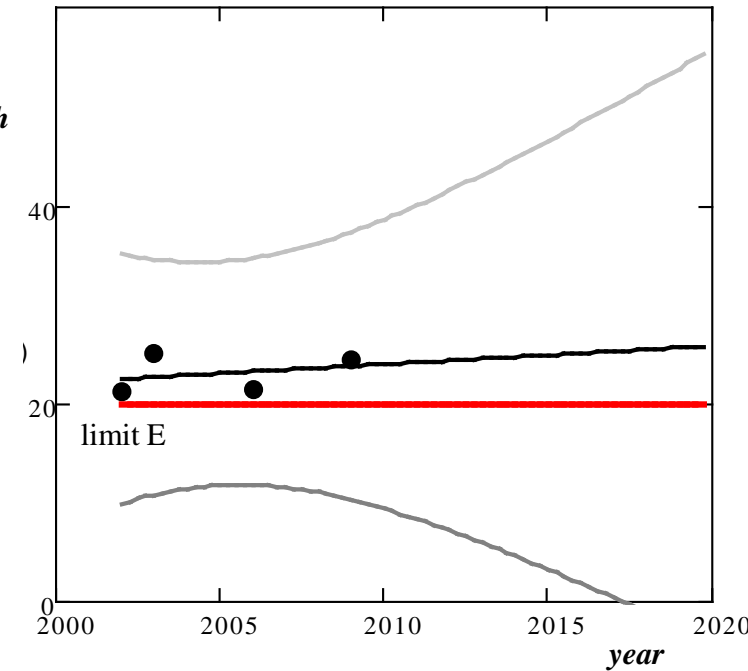
Spatial variability – outside surface of shell divided into several zones, within each of these tens of places being monitored.

Challenges

- What is an optimal time *interval between measurements* of different types of degradation processes?



concrete strength (MPa)



- *SHM and methods for structural performance* could be combined by Bayesian updating.

First developments with the Action – compiling input data?

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Thank you for your attention.