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Atlas Database Version 2.5

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Presentation Outline

- Design review – Version 2.5
- New PWSCC morphology quantification in the Atlas database
- Use of NDE response information in the Atlas database and in PINC for reliability quantification
- Demonstration

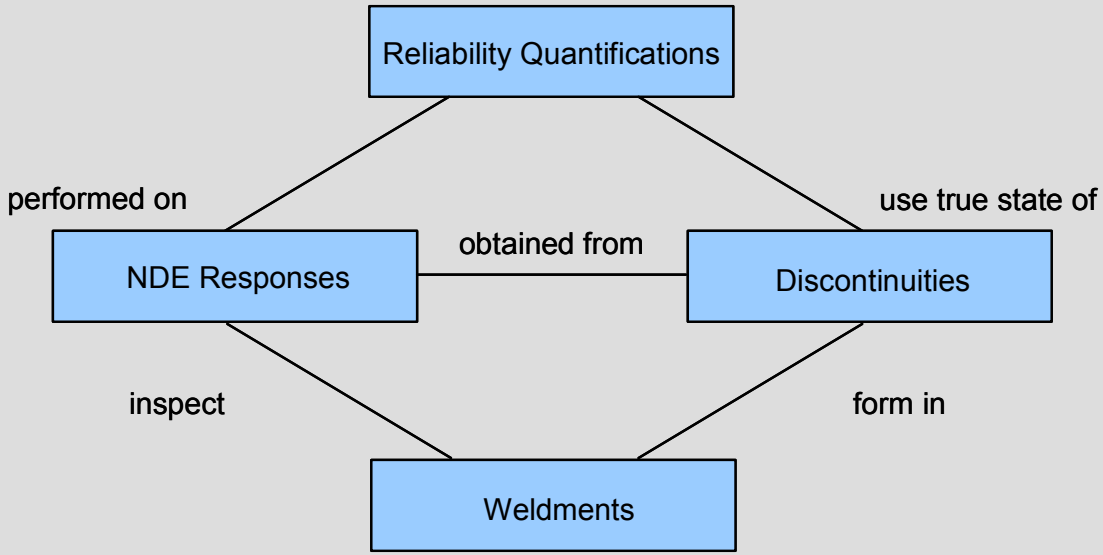
PINC Atlas – PWSCC/NDE Relational Database

Design – Problem Statement

- NDE relational database design problem: *How can large volumes of NDE data be stored and used in NDE effectiveness calculations?*
- Solution employed in the PINC Atlas:
  - *Store high-level information in tables for important results (an estimate of NDE effectiveness or an inspection of a crack)*
  - *Allow such records to reference collections of spreadsheets, documents, pictures, and presentations*
  - *Link to large volumes of data. Extract data to spreadsheets. Use spreadsheets, not query languages, for calculations.*

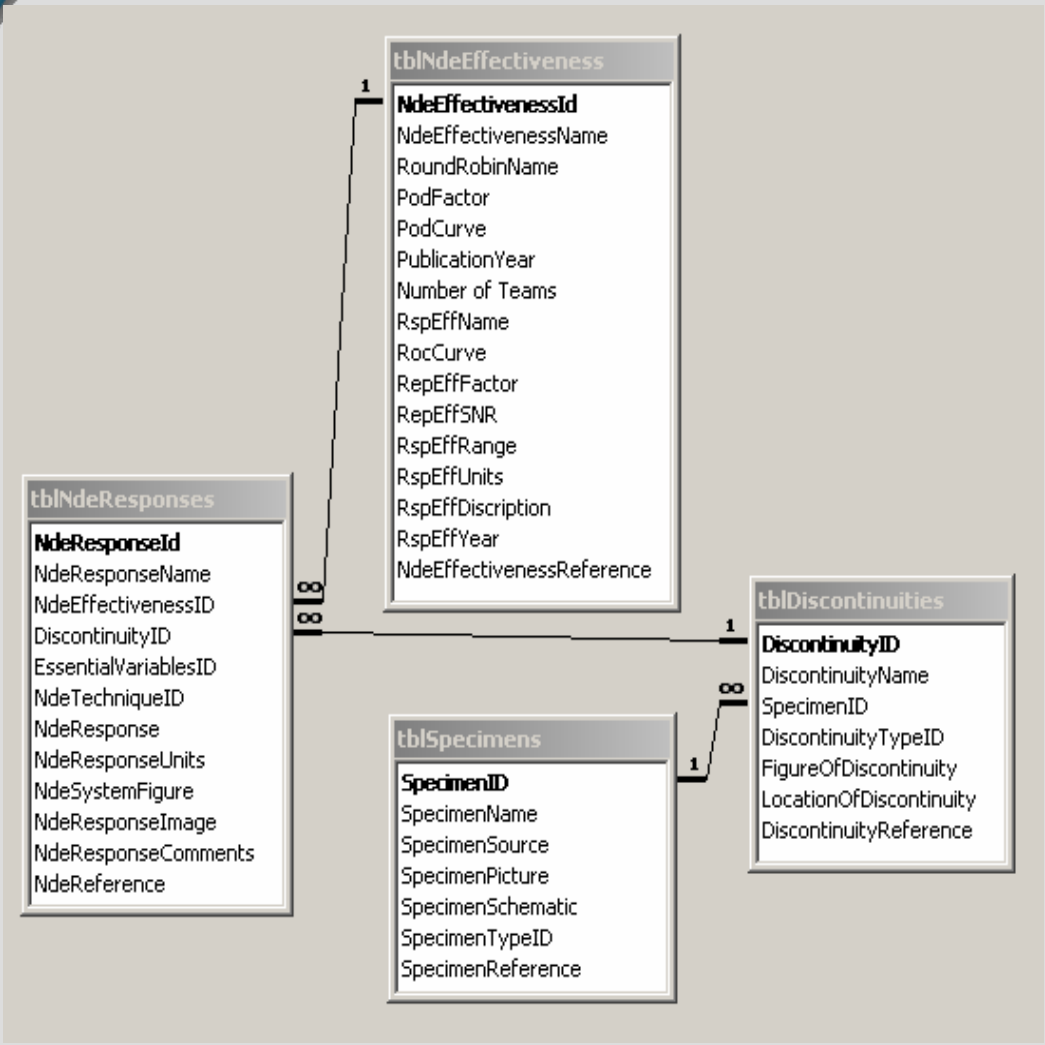
PINC Atlas – PWSCC/NDE Relational Database

Design – 4 Sub-Databases



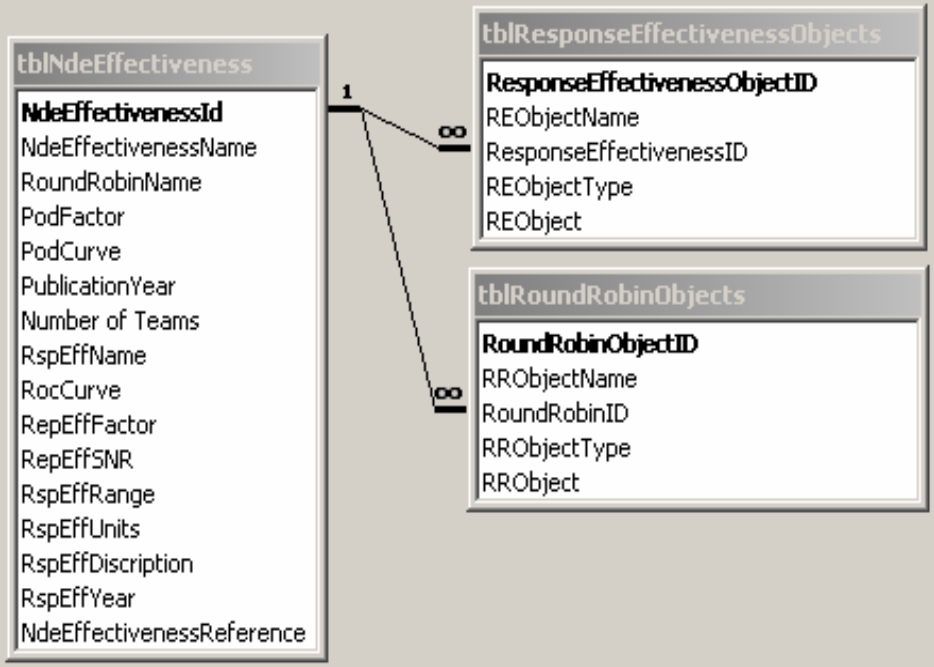
- 4 sub-databases
- Major relations connect information
- User interfaces for filtering and selection
- Emphasis on NDE effectiveness

PINC Atlas – PWSCC/NDE Relational Database
Design – Main Table Relationships



- 4 main tables
- 1 for each sub-database
- 3 relationships connect the 4 main tables
- "∞" symbol interpreted as "many"

PINC Atlas – PWSCC/NDE Relational Database
Design – Collections of Objects



- Main tables have supporting collections
- NDE effectiveness main table has:

  Response effectiveness collection – and-

  Round robin test collection

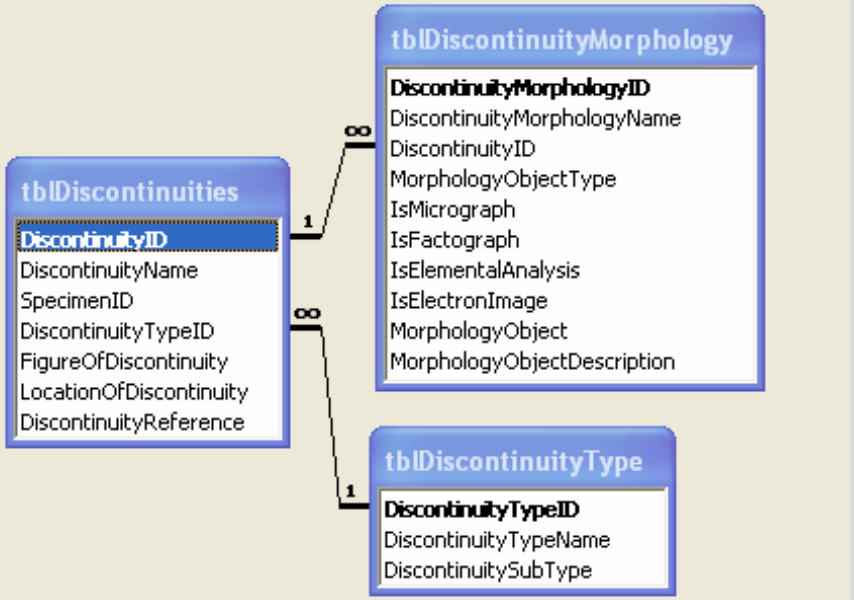
PINC Atlas – PWSCC/NDE Relational Database

PWSCC Morphology

- NA 2 PWSCC Shows:
  - Short, radial, discontinuous crack on the wetted surface
  - Long, radial, discontinuous crack beneath the surface
  - Multiple cracks on the machined buttering-to-annulus interface
- Database Design for Crack Morphology Quantification
- Example Viewing Form for Morphology Information

PINC Atlas – PWSCC/NDE Relational Database

PWSCC Morphology – Database Design

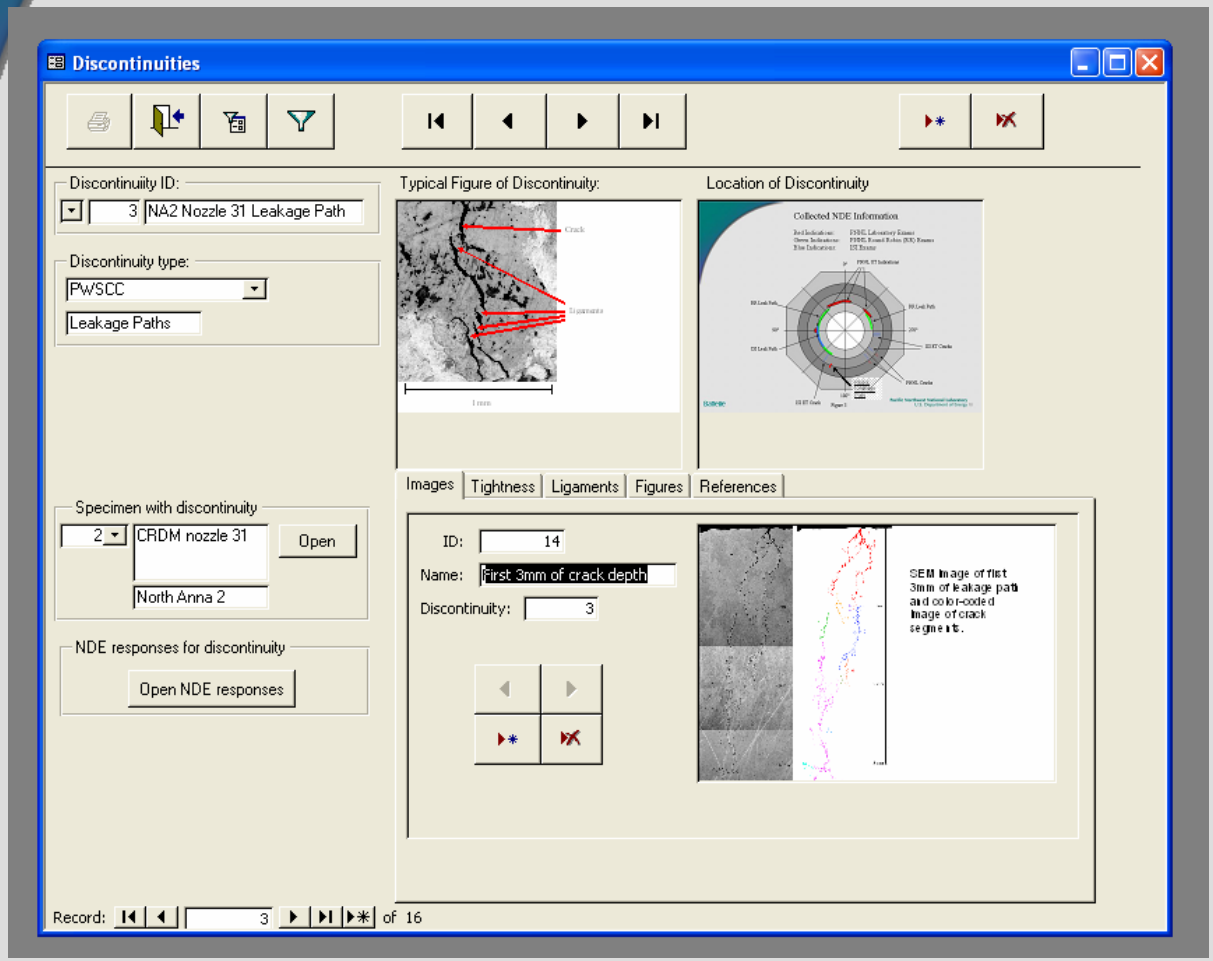


- Discontinuity can have a collection of morphology objects
- Objects include: tightness and ligaments quantifications

tblDiscontinuityMorphology : Table

	Field Name	Data Type	Description
🔑	DiscontinuityMorphologyID	Number	primary key to this table (tblDiscontinuityMorphology)
▶	DiscontinuityMorphologyName	Text	short name for this discontinuity morphology object
	DiscontinuityID	Number	foreign key to tblDiscontinuities
	MorphologyObjectType	Number	object type: image, tightness quantification, figure, etc.
	IsMicrograph	Yes/No	is the image a micrograph
	IsFactograph	Yes/No	is the image a fractograph
	IsElementalAnalysis	Yes/No	is the image from EDAX
	IsElectronImage	Yes/No	is the image from SEM
	MorphologyObject	OLE Obje	Image, figure, or morphology quantification
	MorphologyObjectDescription	Text	description of morphology object

PINC Atlas – PWSCC/NDE Relational Database
PWSCC Morphology – Viewing Form



- A leakage path record has been added
- Tightness and ligament quantifications are available
- Ligaments include metal bridging of the surface and across the crack face

PINC Atlas – PWSCC/NDE Relational Database

NDE Response Information

- Calibrated Eddy Current Response Distributions are being added to the Atlas database.
  - From PWSCC in nozzle 31 from NA 2
  - From manufactured cracks
  - From EDM notches
  - From fabrication flaws
- Additional calibrated responses sought from field degradation
- Some response information will be gathered in the round robin of manufactured cracks
- Response Distributions are important in detection theory

PINC Atlas – PWSCC/NDE Relational Database

NDE Response Information

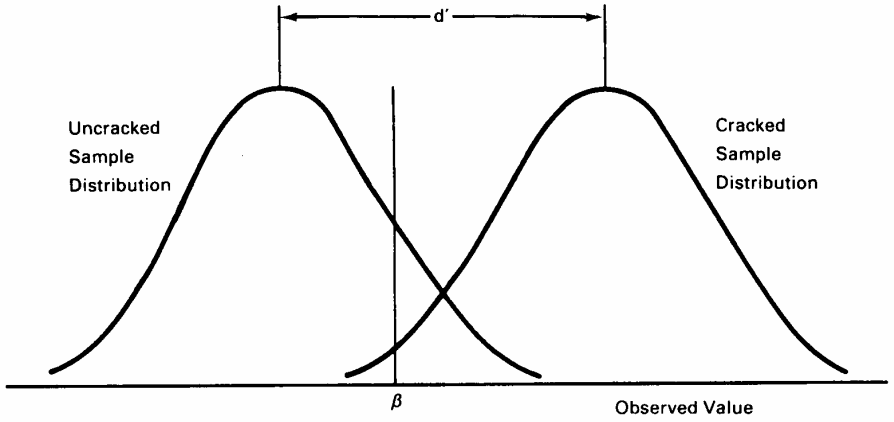
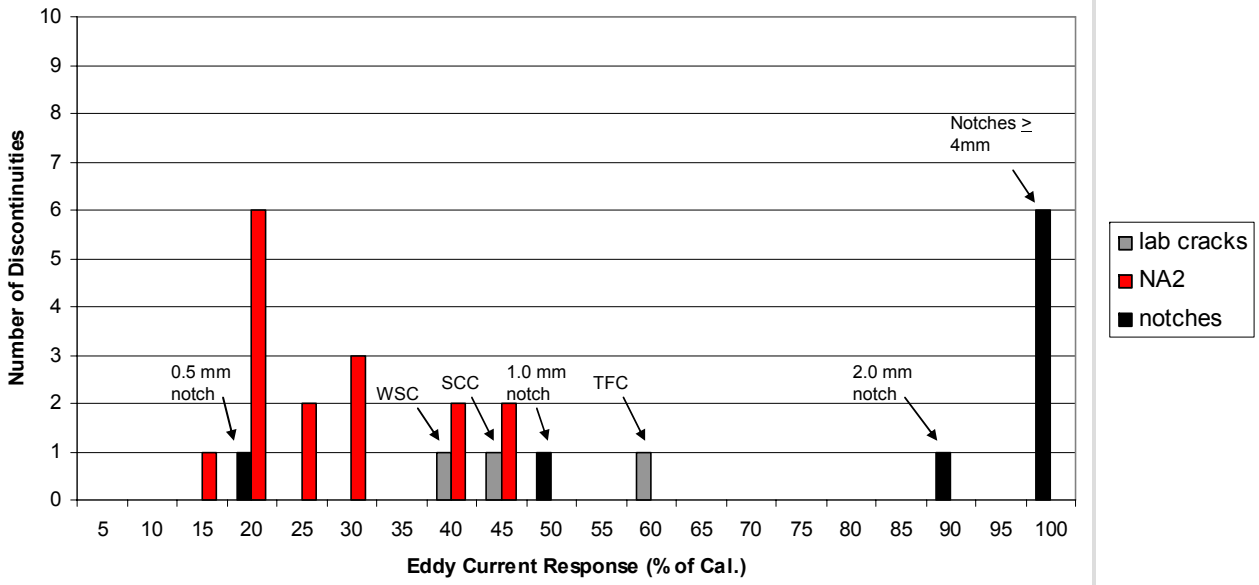


FIGURE 4-3. Two Distributions of Test Results with One Decision Criterion Added: d' and β are Measures of Accuracy and the Position of the Decision Criterion Where the Distributions are Normal and of Signal Variance



- Detection theory uses noise and signal distributions
- For detection of degradation, fabrication conditions are noise
- Distribution of PWSCC and manufactured crack indications shown in bottom chart
- Distribution of fabrication flaw indications is being determined

Summary

- The design of the PINC Atlas database was reviewed.
- The addition of crack morphology quantification to the Atlas database was described.
- The usefulness of calibrated NDE response distributions was presented.
- A short demonstration of the Atlas database is next.