

# Automatic Setup Generation Software for UT Inspection of Engine Discs

**General Requirements**

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**Advanced Solutions for the  
Ultrasonic Inspection World**



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# Executive Summary

- Business goal: Reduce setup engineering time, improve repeatability, strengthen OEM compliance
- Key outputs: **Techsheet + Inspection Plan Base + UT Settings + Patch Plan + Block/Tooling selection**
- Scope: MRO / Production + OEM spec families (GE/RR/PW)
- Deliverable: Software for generation of the setups, suitable for import into SM's CSI software
- Development phases:
  - Phase 1 MROs
  - Phase 2 Production
  - Phase 3 Self learning capabilities



# Problem Statement and Current Pain Points

- Verity of OEM requirements
- Manual setup generation is slow and expert-dependent
- Limited availability of expert-level personnel – especially in MRO's
- Inconsistent patching, UT parameter selection, and block/tooling choices
- Difficulty maintaining compliance across OEM spec changes and part revisions
- Audit burden: proving “why this plan and these settings” is time-consuming



# Objectives and Success Metrics

## Objectives:

- Software capable to generate all relevant information for establishing of UT inspection of the parts ( tech sheets, probes, blocks, etc.)
- Software capable part inspection setups suitable for import into ScanMaster's CSI software

## Success Metrics:

- Engineering cycle time reduction (e.g., days → hours including validations)
- First-pass acceptance rate at FAT/SAT / internal validation
- Reduction of nonconformities related to documentation/configuration
- Full traceability: Part Rev → Spec Rev → Plan/Settings → Evidence/Approval



# Phase Strategy: MRO First, Production Second

## Phase 1 (MRO) characteristics

Higher variability: part condition, repairs, mixed pedigree

Lower volume, higher engineering involvement

Limited up to none availability of qualified UT personnel

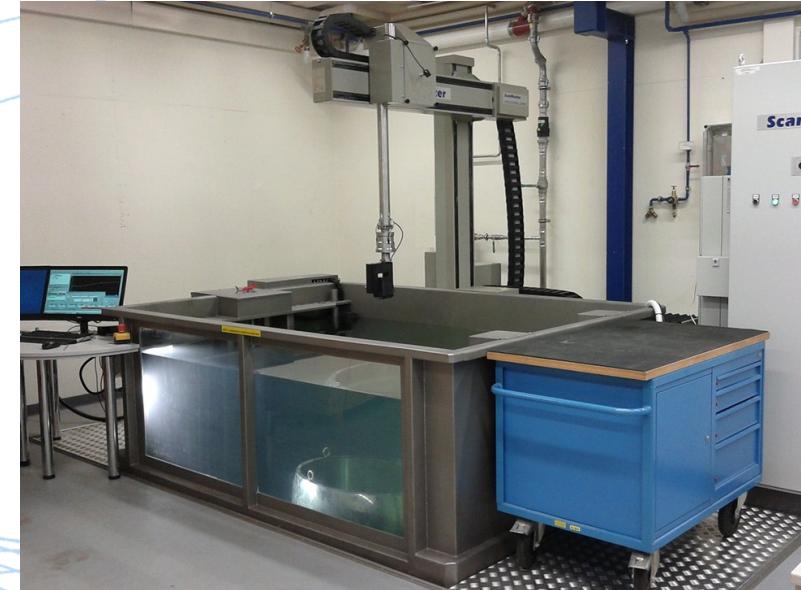
Focus: Simplicity, robust documentation + operator guidance + fast iteration

## Phase 2 (Production) characteristics

Higher volume, standardization, automation and throughput

Strong integration to MES/PLM and strict version control

Focus: stability, performance, locked-down configuration



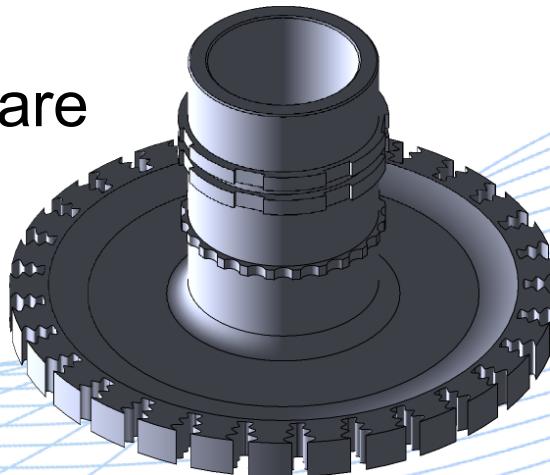
# What the Software Must Consume

## Input Data:

- Part(s) definition: CAD/mesh or parametric model, datums, surfaces, critical zones
- OEM specifications: inspection coverage rules, transducer types, calibration rules

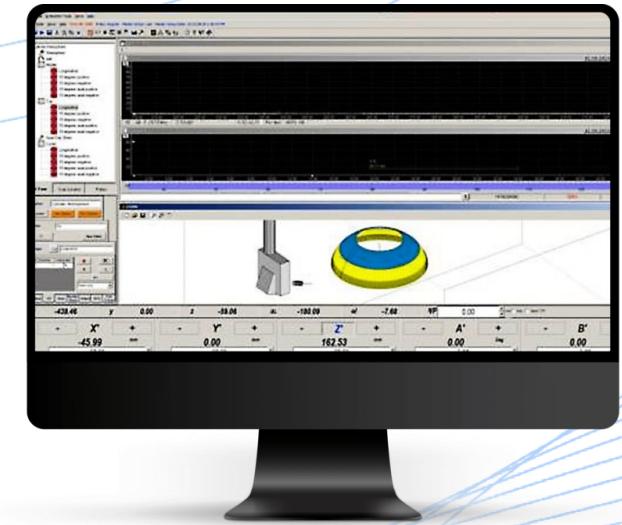
## Configurable options:

- Internal standards: naming conventions, templates, station capabilities
- Equipment constraints: scanner kinematics, probe/tool limits, tank/fixture limits
- Library data: blocks, wedges, probes, holders, cable sets, software features



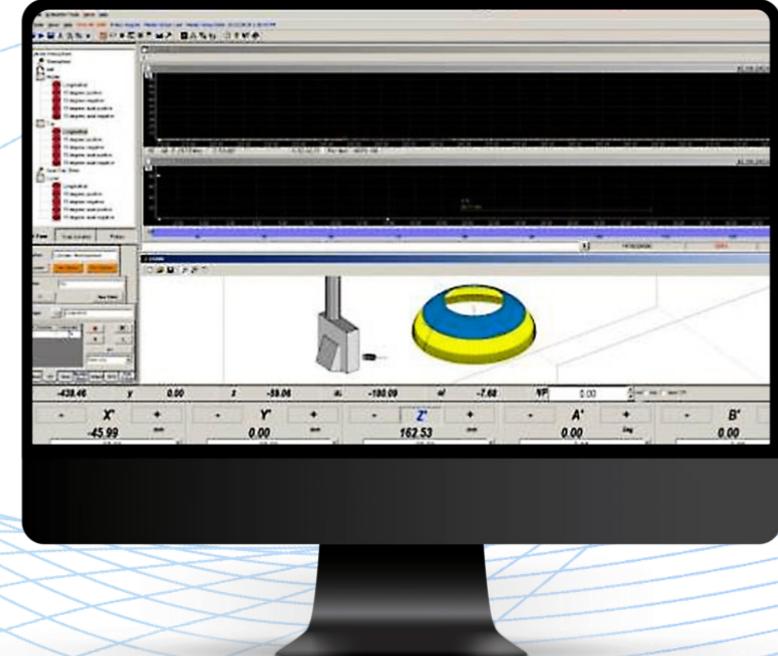
# Functional Requirements: Planning Engine

- Automatic identification of scan surfaces and “inspectable” regions
- Patch generation logic:
  - Patch sizing constraints, overlap, edge handling, exclusions
  - Rules for transitions between surfaces and blend radii
  - Scan path generation per patch:
  - Raster/spiral strategy selection by surface type
  - Index/step size rules and speed constraints
- Coverage validation:
  - Coverage map, unscanned gaps detection, minimum dwell, incidence constraints



# Functional Requirements: UT Configuration Rules

- OEM/customer rule sets per program (GE vs RR vs PW)
- Probes Parameter derivation:
  - frequency/aperture, focus depth ranges, angle sets
- Calibration and verification:
  - Required reference blocks, temperature checks, DAC/TCG instructions
  - Periodic checks and acceptance thresholds (as rules, not free text)



# Functional Requirements: Block / Tooling Selection

- Block library management:
  - block type, geometry, serial, status, calibration validity dates
- Rule-based selection:
  - which blocks required for which part/surface/program
  - substitution rules if preferred block unavailable
- Output in techsheet:
  - exact block IDs (or block family + allowed options), setup sequence



# Functional Requirements: Tech sheet Generation

- Template-driven tech sheet generation (per OEM + per site + per machine)
- Embedded diagrams:
  - Patch map snapshots, scan direction arrows, datum references
- Operator instructions:
  - Step-by-step setup + calibration + run + checklists
- Export formats:
  - PDF for controlled release; optional DOCX for engineering drafts
- Language support if required (English baseline; optional site language)

# Non-Functional Requirements

- Performance:
  - Setup generation time targets by part complexity – less than one hour of interactive process
- Reliability:
  - Deterministic outputs – POD
- Cybersecurity:
  - User authentication, role-based access, secure audit logs
- Compliance:
  - Controlled document generation, retention, traceability (audit readiness)
- Usability:
  - Guided workflow, minimal expert-only steps, operator-friendly outputs

# Desired time frame

- Phase 1:
  - Pilot for 2-4 parts PW Mid of 2026
  - Beta - End of 2026
  - Final version -Mid of 2027
- Phase 2:
  - Mid-End of 2028

# Thank you.

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