The Role of Mobile Apps in NDT Management

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NanoArk’s Core Competency
NanoArk specializes in providing robust and efficient solutions for the Non Destructive Testing Marketspace

We have digitized over 20 Million Industrial Radiographs
Certs and Reports - Where are they kept?

Inspection Reports and Certification records are all paper records.
Need for Management Information Systems in NDT

• NDT managers are:
  – Always on the move
  – Are often in fire-fighting mode
  – Would appreciate any tools that would increase their efficiency and productivity
The New Wave of NDT Managers are always connected

Monthly Mobile App Usage in the U.S.
Mobile app usage by Android and iPhone users in the United States, by Age (Q4 2013)

- Time Spent per Month (HH:MM)
- Apps Used per Month

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Time Spent</th>
<th>Apps Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-24</td>
<td>37:06</td>
<td>28.0</td>
</tr>
<tr>
<td>25-34</td>
<td>35:40</td>
<td>29.5</td>
</tr>
<tr>
<td>35-44</td>
<td>33:57</td>
<td>29.3</td>
</tr>
<tr>
<td>45-54</td>
<td>25:26</td>
<td>25.8</td>
</tr>
<tr>
<td>55+</td>
<td>21:21</td>
<td>22.0</td>
</tr>
</tbody>
</table>

Source: Nielsen, statista
NDT Apps in Play Store-
To-date focus has primarily been educational
Introducing ECert!
ECERT Functionality

- Lightweight backend database – two options
  - Using open-source components such as Mongo DB
  - SQL based such as MS SQL
- Modules for management of
  - Certification
  - Examination
  - Performance
  - Quality
- Authentication, Authorization, and Accountability
- Role-based access control
- Notification system providing e-mail notification of upcoming events
- Administrator functions allowing policy setup, growth of question bank, management of personnel, etc.
- Reports – user generated
ECERT SOFTWARE
HIGH LEVEL SYSTEM DIAGRAM

ECERT

USER INTERFACE

DATABASE
- Parts Data
- Employee Data
- Exam History
- Certification Status
- Question Bank
- Company Policies

ACCESS CONTROL LIST
RULES LIST

BACKEND FUNCTIONS
- Authentication, Authorization, Accountability
- Certification
- Performance
- Part Yield
- Other
- Sampling

ALTERNATE AUTHENTICATION DATABASE
Salient Features of ECERT

- Lightweight database system
- Modules for certification, examination, performance, and quality
- Automated system
  - Keeps track of certification status
  - Provides alerts about upcoming certifications, including eye exams
- History of individual inspectors
  - Performance of Level 2 inspectors
    - Productivity and Quality metrics
  - Certifications achieved and current state
- Tracking of first-time yield for parts
  - By plant with upper and lower control limits
    - Daily, Weekly, Total
    - Part number / bar code, accept/reject rate
- Tracking by NDT method
  - Productivity by person
  - Productivity by plant
- Maintains question bank with answer source
  - Allows additions to grow question bank
- Generates new exams
  - Using sampling that will limit commonality with previous exams to 20% or less
  - Using rules specified by RL3
- Maintains exam results for all personnel
  - Maintains written practices
- Allows easy user interaction as well as report generation
- Email Notification
- Controlled access
  - Access controls based on two perspectives
    - By plant/facility
    - By business unit
Applications for ECert

Case 1: Eye Cert not renewed for inspectors on a timely fashion can be expensive

Case 2: Certification not renewed on a timely fashion resulted in lot of rework.
Applications for ECert

Case 3: Aerospace casting company- RL3 is called at the last minute for renewing certs for plant inspectors

RL3 requirements
- Keep track of all personnel’s certification status and when next certification is due
- Reminder sent to personnel 3 or 6 months prior to certification exam that it is coming up
- Create examinations by choosing questions from data bank in the prescribed quantities for general (20%) and specialized (80%)
- Ensure no more than 20% of previously asked questions are included in exam
The Need for ECERT

• Management of NDT certifications and exam generation
  – Standardized approach across multiple industries
  – Flexibility to be focused within one industry or company

• Tracking of inspector performance and part quality
  – Performance level of inspector over date range
  – Part rework history and first time yield

• Statistics at several levels
  – Company wide
  – Plant level
  – Method level

• Archival of all critical information
  – Examination results including written submissions
  – Part review results
Admin Module (Settings & Tools)

NDE Certification and Quality Management System

Roles and Permissions | User Management | Examination Management | Certification Management | Quality Management | Performance Management | Company Information | Other Admin Functions
---|---|---|---|---|---|---|---
Company Information
Name | ABC Castings
Address | 6605 Waterfront Ave Providence, NY 12345 U.S.A.
Telephone | (xxx) xxx-xxxx
Fax | (xxx) xxx-xxxx
Website | www.abcccastings.com

Company Logo
Add Logo
Delete Logo

Point Of Contact Information
Name | Tom F. ABCCastings
Designation | Vice President, Human Resources
Telephone | (xxx) xxx-xxxx
FAX | (xxx) xxx-xxxx
Email | tomf@abcccastings.com

Italics indicate examples of values that can be provided
Admin Module (Settings and Tools)

NDE Certification and Quality Management System

Settings and Tools

Roles and Permissions | User Management | Examination Management | Certification Management | Quality Management | Performance Management | Company Information | Other Admin Functions
---|---|---|---|---|---|---|---

Question Bank

Add New Question

Edit Question

Delete Question

Manual Upload | Bulk Upload

Exam Part

Basic
 Specific
 Specific
 Specific

Exam Sub Part

Magnetic Particle
 Penetrant
 Ultrasonic
 Other

Question Details

Upload Question

Answer

Q1Q1Q1 01
 Opt A Opt B Opt C Opt D
 0404 B
Admin Module (Settings and Tools)

NDE Certification and Quality Management System

Roles and Permissions | User Management | Examination Management | Certification Management | Quality Management | Performance Management | Company Information | Other Admin Functions
---|---|---|---|---|---|---|---

Question Bank

Add New Question
- Manual Upload
- Bulk Upload

Edit Question
- Exam Part
  - Basic
  - Specific
- Exam Sub Part
  - Magnetic Particle
  - Penetrant

Delete Question
- Upload File
  - c:/users/....

List of questions for bulk upload

<table>
<thead>
<tr>
<th>Question</th>
<th>Opt A</th>
<th>Opt B</th>
<th>Opt C</th>
<th>Opt D</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1Q1</td>
<td>01</td>
<td>011</td>
<td>012</td>
<td>013</td>
<td>B</td>
</tr>
<tr>
<td>Q2Q2</td>
<td>02</td>
<td>021</td>
<td>022</td>
<td>023</td>
<td>024</td>
</tr>
<tr>
<td>Q3Q3</td>
<td>03</td>
<td>031</td>
<td>032</td>
<td>033</td>
<td>034</td>
</tr>
<tr>
<td>Q4Q4</td>
<td>04</td>
<td>041</td>
<td>042</td>
<td>043</td>
<td>044</td>
</tr>
<tr>
<td>Q5Q5</td>
<td>05</td>
<td>051</td>
<td>052</td>
<td>053</td>
<td>054</td>
</tr>
<tr>
<td>Employee Details</td>
<td>Status Details</td>
<td>Certification Policy Details</td>
<td>Dashboards</td>
<td>Reports</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>----------------</td>
<td>-------------------------------</td>
<td>------------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td><strong>Employee ID</strong></td>
<td>12345</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Employee Name</strong></td>
<td>Adam W. Smith</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Education Level</strong></td>
<td>Masters</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Inspector Level</strong></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>NDT Method</strong></td>
<td>Radiology</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Plant / Location</strong></td>
<td>Plant A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Last Eye Exam Date</strong></td>
<td>10/15/2014</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Validity of Eye Exam Results</strong></td>
<td>2 years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Next Eye Exam Date</strong></td>
<td>10/15/2016</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Certified for Customers</strong></td>
<td>Rolls Royce, Pratt Whitney, Boeing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Match against Emp ID; flag if mismatch observed.
### NDE Certification and Quality Management System

#### Certification Module – Inspector Setup 2

<table>
<thead>
<tr>
<th>Employee Details</th>
<th>Status Details</th>
<th>Certification Policy Details</th>
<th>Dashboards</th>
<th>Reports</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Status</strong></th>
<th><strong>Current</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Status Grant Date</strong></td>
<td><strong>08/06/2014</strong></td>
</tr>
<tr>
<td><strong>Status Validity</strong></td>
<td><strong>3 years</strong></td>
</tr>
<tr>
<td><strong>Status Expiration Date</strong></td>
<td><strong>08/05/2017</strong></td>
</tr>
<tr>
<td><strong>Last Exam Date</strong></td>
<td><strong>07/24/2014</strong></td>
</tr>
<tr>
<td><strong>Last Exam Result</strong></td>
<td><strong>Pass</strong></td>
</tr>
</tbody>
</table>

#### Score

<table>
<thead>
<tr>
<th>Basic</th>
<th>Specific</th>
</tr>
</thead>
<tbody>
<tr>
<td>xx</td>
<td>xx</td>
</tr>
<tr>
<td>General</td>
<td>Practical</td>
</tr>
<tr>
<td>xx</td>
<td>xx</td>
</tr>
<tr>
<td>Method</td>
<td>Composite</td>
</tr>
<tr>
<td>xx</td>
<td>xx</td>
</tr>
</tbody>
</table>

#### Settings and Tools

- **Edit**
- **Save**
- **Cancel**
## Certification Module - 5

NDE Certification and Quality Management System

**Certification Module – Dashboards – Certification Summary**

<table>
<thead>
<tr>
<th>Employee Name</th>
<th>Plant Name</th>
<th>Method</th>
<th>Level</th>
<th>Status</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adam W. Smith</td>
<td>Plant 1</td>
<td>Radiography</td>
<td>3</td>
<td>Current</td>
<td></td>
</tr>
<tr>
<td>Evelyn Jones</td>
<td>Plant 1</td>
<td>Radiography</td>
<td>2</td>
<td>Renew soon</td>
<td></td>
</tr>
<tr>
<td>John E. Smith</td>
<td>Plant 2</td>
<td>Ultrasound</td>
<td>3</td>
<td>Current</td>
<td></td>
</tr>
<tr>
<td>Wiley E. Coyote</td>
<td>Plant 3</td>
<td>Eddy Current</td>
<td>2</td>
<td>Renew Now</td>
<td></td>
</tr>
</tbody>
</table>

**Employee Details**

- **Total Plants**: 16
- **Total Current**: 18
- **Total Renew Soon**: 03
- **Total Renew Now**: 01
- **Total Eye Exam Due**: 01

**Status Details**

- **Export**
- **Cancel**
<table>
<thead>
<tr>
<th>Examination ID</th>
<th>ABCC_Exam_2014_01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generated By</td>
<td>Michael W. Green</td>
</tr>
<tr>
<td>Generated On</td>
<td>10/15/2016</td>
</tr>
<tr>
<td>Dispensed On</td>
<td>10/15/2016</td>
</tr>
<tr>
<td>Dispensed At</td>
<td>Plant A</td>
</tr>
</tbody>
</table>

Exam Components:
- Basic
- General
- Method
- Specific
- Practical

Questions:
- Question 001
- Question 002
- Question 003
- Question 004
- Question 005
- Question 006
- Question 007
- Question 008

Options:
- Edit
- Save
- Print
- Cancel
Examination Module - 2

Examination Module – Update Question Bank

<table>
<thead>
<tr>
<th>Generate Examination</th>
<th>Add New Questions</th>
<th>Examination Policy Details</th>
<th>Dashboards</th>
<th>Reports</th>
</tr>
</thead>
</table>

**Exam Part**: Method

**Exam Sub Part**: Radiology

**Reason for new question**

**Add to Question Bank**: Yes

**Reason for not adding to Question Bank**

**Question Type**
- Multiple Choice
- Essay
- Practical

<table>
<thead>
<tr>
<th>Question Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question</td>
</tr>
<tr>
<td>Option A</td>
</tr>
<tr>
<td>Option B</td>
</tr>
<tr>
<td>Option C</td>
</tr>
<tr>
<td>Option D</td>
</tr>
</tbody>
</table>

**Answer**

---

Logged in as Admin

[Image of dashboard interface with options to generate examination, add new questions, examine policy details, dashboards, and reports.]

[Options to edit, save, print, and cancel are present.]
## Performance Module - 1

### NDE Certification and Quality Management System

#### Performance Module – Performance Setup 1

<table>
<thead>
<tr>
<th>Inspector Review Details</th>
<th>Customer Review Details</th>
<th>Performance Policy Details</th>
<th>Dashboards</th>
<th>Reports</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inspector Name</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adam W. Smith</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Performance Period Start Date</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10/15/2016</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Performance Period End Date</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10/15/2016</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>No. of Parts Reviewed</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>273</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>No. of Parts Passed</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>254</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **No. of Rework 0**
  - Parts Reviewed: 245
- **No. of Rework 1**
  - Parts Reviewed: 22
- **No. of Rework 2**
  - Parts Reviewed: 6
- **Performance Level**: 92%

Logged in as Admin

---

**Inspector Name**: Adam W. Smith

**Performance Period Start Date**: 10/15/2016

**Performance Period End Date**: 10/15/2016

**No. of Parts Reviewed**: 273

**No. of Parts Passed**: 254

**Performance Level**: 92%

**Edit**

**Save**

**Cancel**
## Part Inspection Information

<table>
<thead>
<tr>
<th>Customer Name</th>
<th>Part Name</th>
<th>Part No.</th>
<th>No. Reviewed</th>
<th>Review Method</th>
<th>Analysis Confirmed</th>
<th>Percent Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rolls Royce</td>
<td>Part xxx</td>
<td>xxxxxx</td>
<td>xxx</td>
<td>Radiology</td>
<td>xxz</td>
<td>96</td>
</tr>
<tr>
<td>RR Blades</td>
<td>Part yyy</td>
<td>yyyyy</td>
<td>yyy</td>
<td>Ultrasound</td>
<td>yyy</td>
<td>100</td>
</tr>
</tbody>
</table>

The table above shows the inspection details for parts reviewed by Rolls Royce and RR Blades. The review methods used were Radiology and Ultrasound, with respective analysis confirmed results of xxz and yyy, and percent correct results of 96 and 100.
### Performance Module – Dashboards – Rework Summary

**NDE Certification and Quality Management System**

Logged in as Admin

<table>
<thead>
<tr>
<th>Part Details</th>
<th>Plant Details</th>
<th>Quality Policy Details</th>
<th>Dashboards</th>
<th>Reports</th>
</tr>
</thead>
</table>

- **Total Plants**: 16
- **Total Components**: xxx
- **Total Sub Assemblies**: xxx
- **Overall Average 1st Time Yield**: xx%
- **Total Assemblies**: xx

#### Part Name Details

<table>
<thead>
<tr>
<th>Part Name</th>
<th>Plant Name</th>
<th>Part Type</th>
<th>Part ID</th>
<th>1st Time Yield</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aileron</td>
<td>Plant 1</td>
<td>Component</td>
<td>12350</td>
<td>95%</td>
<td></td>
</tr>
<tr>
<td>Elevator</td>
<td>Plant 1</td>
<td>Sub Assy 5</td>
<td>12355</td>
<td>97%</td>
<td></td>
</tr>
<tr>
<td>Blade</td>
<td>Plant 2</td>
<td>Component</td>
<td>25620</td>
<td>90%</td>
<td></td>
</tr>
<tr>
<td>Blade Assembly 1</td>
<td>Plant 2</td>
<td>Sub Assy 3</td>
<td>25623</td>
<td>85%</td>
<td></td>
</tr>
</tbody>
</table>
Integration of ECert with Document Management Tools

- We are working with our partners Aycan NDT to incorporate Certification into their NDT data storage and management software.
Secure digital image library

- Index all types of images for fast searching
- Archive CR, DR, UT scans together
- Assure image integrity
Import multiple sources

- Import dcm, tiff, jpeg
- Import reports with original scan images
Share images easily and securely

- Provide encrypted access to colleagues or customers
- Improve inspection turnaround time
Documenting

> Custom report forms
> Take measurements directly into forms
> Reports available in field and office
Documenting

> Verify certifications before final report sign-off
> Audit trail on sign-offs
Thank you!