GTI’s Asset Lifecycle Tracking Program

> Northeast Gas Association’s
  Spring Operations Conference
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  Gas Technology Institute
GTI Overview

> Not-for-profit research, with 70 year history

> Facilities
  – 18 acre campus near Chicago
  – 200,000 ft², 28 specialized labs
  – Offices in AL, CA, MA, PA, TX, Wash DC

> Staff of 250

> Market opportunities are creating substantial growth

> 1,200 patents; 500 products
Our Sponsors
Discussion Topics

1. Asset Tracking and Traceability
   — Industry Codes and Standards to facilitate asset tracking and traceability

2. Asset Lifecycle Tracking Program
   — Suite of hardware and software tools to facilitate geospatial asset tracking
Business Drivers - Asset Lifecycle Tracking

> Distribution Integrity Management
  ─ Know Your System
> Pipeline Integrity Management
  ─ Traceable, Verifiable and Complete
> Facilitate Regulatory Compliance
> Excavation Damage Prevention
> Reduce Operational Risk
Tracking and Traceability

> Program Objective

- Develop a series of algorithms with a set of unique identifiers which can effectively provide the necessary tracking and traceability information for various components within the gas distribution systems (plastic and metallic systems)

  > Phase I: Develop standardized protocols and proposed verbiage to be integrated within applicable industry standards and specifications

  > Phase II: Implementation strategies and technologies aimed at facilitating data handling and information exchange (store room to field operations)
Tracking and Traceability

> To date, all program objectives have been successfully achieved!

- A standardized classification has been established using base-62 encoding system
- Methodology has been integrated within stand-alone ASTM specification – ASTM F2897-11
- Web based application has been developed
# Tracking and Traceability Example

<table>
<thead>
<tr>
<th>Character Number</th>
<th>Source</th>
<th>Description of Information</th>
<th>Character</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><a href="http://www.componentid.org">www.componentid.org</a></td>
<td>Name of component manufacturer</td>
<td>A</td>
<td>Corresponds to list on <a href="http://www.componentid.org">www.componentid.org</a></td>
</tr>
<tr>
<td>2</td>
<td><a href="http://www.componentid.org">www.componentid.org</a></td>
<td>Manufacturer’s lot code</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Component</td>
<td>Information which can help ascertain relevant traceability information upon request</td>
<td>5</td>
<td>Corresponds to the mfg lot number input of 1234567</td>
</tr>
<tr>
<td>4</td>
<td>Component</td>
<td></td>
<td>b</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Component</td>
<td></td>
<td>a</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Component</td>
<td></td>
<td>n</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Component production date code per 5.3</td>
<td>Date of manufacture of given component</td>
<td>0</td>
<td>Corresponds to production date of 1/4/2010</td>
</tr>
<tr>
<td>8</td>
<td>Component production date code per 5.3</td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Component production date code per 5.3</td>
<td></td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Component material type per Table 3</td>
<td>Material used for component</td>
<td>B</td>
<td>PE 2708</td>
</tr>
<tr>
<td>11</td>
<td>Component Type per Table 4</td>
<td>Component type</td>
<td>8</td>
<td>Electrofusion tapping tee with a stab outlet</td>
</tr>
<tr>
<td>12</td>
<td>Component Type per Table 4</td>
<td></td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Component size per 5.6</td>
<td>Component size</td>
<td>2</td>
<td>Corresponds to size code of 2” IPS SDR11 x 1” IPS SDR11</td>
</tr>
<tr>
<td>14</td>
<td>Component size per 5.6</td>
<td></td>
<td>m</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Component size per 5.6</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td><a href="http://www.componentid.org">www.componentid.org</a></td>
<td>Reserved for future use</td>
<td>0</td>
<td>Default value</td>
</tr>
</tbody>
</table>

**Standardized format and specified number of digits**
Asset Tracking

> Format for 16-digit code

<table>
<thead>
<tr>
<th>Data</th>
<th>Number of Character(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component manufacturer</td>
<td>2</td>
</tr>
<tr>
<td>Component manufacturer’s lot code</td>
<td>4</td>
</tr>
<tr>
<td>Component production date</td>
<td>3</td>
</tr>
<tr>
<td>Component material</td>
<td>1</td>
</tr>
<tr>
<td>Component type</td>
<td>2</td>
</tr>
<tr>
<td>Component size</td>
<td>3</td>
</tr>
<tr>
<td>Reserved^B</td>
<td>1</td>
</tr>
</tbody>
</table>

To prevent duplication in 2-digit component manufacturer code, a web based registry has been developed

> www.componentid.org
Asset Tracking

> Several manufacturers have already started to label pipe and fittings with 16-digit bar code, including:
  – DuraLine / Polypipe
  – RW Lyall

> Many others are engaged …
  – Continental
  – Central Plastics
  – Elster Perfection
  – Gas Breaker / UMAC
  – Kerotest
  – Performance Pipe
  – Etc.
“Guidance Document” for Tracking and Traceability

Purchasing Specification Guidelines for Marking PE Gas System Components

> Practical guidance
  – Marking techniques
  – Marking format
  – Readability
  – Durability
  – Placement
  – Quality Control

> Final Draft March 2013
Asset Tracking – Next Challenges

> Initiated projects to develop standardized classification systems for:
  - Meters and Regulators
  - Transmission Systems
  - Fusion Data Capture
Next Steps – Standardized Fusion Data Capture

> Standardizing the output / capture of fusion parameter data (butt fusions, saddle fusions, and electrofusions)

> Industry standard for the content, format and encoding mechanism of fusion records

> Also, initiating OQ “smart cards” to document who is making the fusions and status of training
Asset Lifecycle Tracking Program

> Objective - develop technologies, workflows and processes to implement a lifecycle asset tracking and traceability system

> Create an architecture that provides . . .

  ─ Low cost data collection devices
  ─ Simple software
  ─ Access to up-to-date facilities information
  ─ Real-time data submittal from the field
  ─ Minimal back-office processing
Current Applications

- Exposed pipe surveys
- Marker ball installations (RFID tags)
- HCA field data capture
- CP readings
- One-call tickets (electronic white lining)
- Excavation encroachment monitoring
- Asset Lifecycle Tracking
Asset Lifecycle Tracking

> GTI’s Component Technology
  - Tablet device with GIS-based data collection software
  - High accuracy GPS receiver
  - Application to convert barcode into asset attributes to auto populate the GIS
  - Barcode scanner

> Pilot projects
  - NiSource, Integrys
Asset Lifecycle Tracking

> Automates the entire data collection process for documenting new installations

> In less than one minute . . .

- Read, decrypt barcode on gas feature (ASTM F2897) and create gas GIS feature (main, service, valve, fitting, CP feature, etc.).
- Populated gas asset attribute information (material type, batch number, etc. from ASTM F2897)
- Additional asset information automatically added to asset record from predefined job/work order
- Define asset position geospatially using decimeter quality real time GPS
- Post asset to version of asset system in GIS
<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BarcodeID</td>
<td>17282A52</td>
</tr>
<tr>
<td>Creation User</td>
<td>3gis</td>
</tr>
<tr>
<td>Date Created</td>
<td>5/8/2012</td>
</tr>
<tr>
<td>Diameter</td>
<td>2</td>
</tr>
<tr>
<td>Enabled</td>
<td>True</td>
</tr>
<tr>
<td>ManfBatchNum</td>
<td>17209AC</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Thrall Distribution</td>
</tr>
<tr>
<td>Material</td>
<td>Plastic PE</td>
</tr>
<tr>
<td>Nominal Diameter Units</td>
<td>Inch</td>
</tr>
<tr>
<td>SHAPE.len</td>
<td>126.166246</td>
</tr>
<tr>
<td>Status</td>
<td>Active</td>
</tr>
<tr>
<td>Type</td>
<td>Plastic PE</td>
</tr>
</tbody>
</table>
High Accuracy GPS

> Integrated external high accuracy GPS receivers with tablet computers

- Sub-foot quality data in real time
- Real-time post processing via satellite or IP correction services
- Gas assets directly inserted into the GIS (with controls)
- Integrated receivers, so far . . .

  > Navcom
  > Geneq
  > Trimble
GPS Data Collection and Process Workflow

**Existing**

1. Collect GPS Data
2. Hand Enter Asset Definition
3. Bring Hardware Back to the Office
4. Download Data
5. Post Process Data
6. Integrate Data into GIS System of Record

**New**

1. Create Gas Asset in field
2. Post to GIS Version
3. Integrate Asset into GIS System of Record
Eliminate Manual Data Entry for New Installations

- Precision Asset location (GPS)
- Asset Attribute Data
- Fusion Parameter Data
- GIS-Enabled Software on Tablets and Smart Phones
- GIS or Other Back-office Database
Overview of Geneq vs. NavCom Receivers

Receivers match each other in performance specifications:
- GPS, GLONASS Satellites
- 10 cm accuracy with correction network
- Rugged, water proof/resistant
- Communications options (Bluetooth, RS-232, USB)

> NavCom SF-3040

> Geneq SX Blue III-L
Overview of Geneq vs. NavCom Receivers

Performance is similar, but there is variance in:

<table>
<thead>
<tr>
<th>Geneq SX Blue III-L</th>
<th>NavCom SF-3040</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Weight</td>
<td>• Battery replaceability</td>
</tr>
<tr>
<td>• Dimensions</td>
<td>• Correction network</td>
</tr>
<tr>
<td>• Form factor</td>
<td>• IP-based correction</td>
</tr>
<tr>
<td>1.14 lbs (receiver)/0.36 lbs (antenna)</td>
<td>3.2 lbs</td>
</tr>
<tr>
<td>5.57” x 3.15” x 2.22” (receiver)</td>
<td>8” diameter x 4.36” tall</td>
</tr>
<tr>
<td>0.86” H x 2.6” D (antenna)</td>
<td>Pole-mounted</td>
</tr>
<tr>
<td>Receiver mounts to any location on pole. Antenna on pole,</td>
<td></td>
</tr>
<tr>
<td>or in hat.</td>
<td>2 hot-swappable batteries</td>
</tr>
<tr>
<td>Field-replaceable battery</td>
<td>StarFire Correction Network</td>
</tr>
<tr>
<td>OmniStar Correction Network</td>
<td></td>
</tr>
</tbody>
</table>
GTI is a company that solves important energy changes, a company that truly has...

…“the Energy to Lead”

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