TESCO Meter Manager

Tools to Help You More Efficiently Manage Your Meter Department

Agenda

- Introductions

- Overview of TESCO and Meter Manager

- Meter Manager Presentation

- Questions

TESCO Meter Manager Overview

- TESCO
  - Has been involved with metering for more than 100 years
  - Focuses solely on the needs of metering, with a wide range of software, test equipment, and tools

- Meter Manager
  - Is the result of more than 20 years of experience creating software for electric and gas utilities
  - Has been designed from the ground up to meet your needs not only today, but in the future
  - Is built with state-of-art tools and modern software architecture
  - Continues to grow, with new and expanded features, all of which are made available to all of our customers

Software Team

- Kevin Tory, Manager of Software Development
- Christine Tory, Senior Software Architect
- Bill Troutman, Senior Project Manager
- J.B. Jones, Business Analyst, Implementation Specialist
- Joe Puffenbarger, Training & Support Manager
- Software development staff
  - 3 team leaders
  - 12 developers
  - 3 software testers
- TESCO has over 125 employees in total
- TESCO sales staff act as a liaison, maintaining regular contact with the customer and with the software team

Meter Life Cycle

- New Meter Purchase
  - Purchase Order
  - Vendor File
  - Meter Receiving
  - Acceptance Testing
  - Device Creation in Customer System of Record
  - Device Release to Stock
- Used Meter Processing
  - Meter Check-in
  - Meter Testing
  - Device Restocking

Meter Life Cycle (continued)

- Asset Management
  - Track Inventory within shops / warehouses / storerooms, down to the container and/or shelf
  - Track Inventory to the person or truck
    - Meters are assigned to the person / truck
    - As meters are set, they are removed from inventory
    - Used meters are tracked from removal to meter shop
    - Physical inventory counts may be performed at any time
- Quality management
  - Detailed analysis of meter performance
  - In-service random sample and periodic test plans
  - Full RMA tracking

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Creating New Device Records

- Usually records are created from vendor files
  - Standard industry format vendor files are supported
  - Any documented format will be supported without extra cost
  - Records typically include AMR/AMI module information and factory test results
- Individual records may be created interactively for a single meter
- Ranges of sequential serial numbered devices can be added
- Mass creation of meters with or without attached devices may be done by entering the attributes and then scanning the meters and modules

File   Go   View   User: **Test**

Purchase Orders x

◉ PO # [   ]   ◉ Search   [Find] [Clear]

☐ Expected Arrival   ☐ Ordered

from [▦] Status ☐ Partially Shipped

to [▦]   ☐ Shipped

Search for and display existing POs

PO # ▲	Supplier	Status	Order Date	Expected Ship Date	Expected A...

Purchase Orders   Count: 0

PO # [   ]   Order Date [▦]

Supplier [▼]   Expected Ship Date [▦]

Status [▼]   Expected Arrival Date [▦]

Order Lines | Attachments

Order Lines   Count: 0

Manufacturer [▼]

Model [   ]

Catalog # [   ]

Line # [0]

Item # [▼]

Unit cost [0.00]

Qty [0]

Line #	Item	Description	Qty	Cost

Vendor File | Shipment

Vendor Files

Release	Filename	Date Created	Qty	Date Loaded

Add Devices [x]

Model [T ▾]

Configuration [▾]

Type [   ]

Group [   ]

Manufacturer [   ]

Manufacturer Model [   ]   Catalog # [   ]

Description [   ]

Form [   ]   Phase [   ]   Class [   ]

Voltage [   ]   Amps [   ]   Wires [   ]   Kh [   ]

Dials [ ]   Multiplier [   ]   Register Ratio [   ]

Read Group [▾]   Program Id [▾]

Read Types

[▪] KYZ   [▪] Bi Directional   Comm [   ]

TOU [▪]   AEP Test Code [   ]   Num Elements [   ]

[Next]   [Cancel]

Avoiding Duplicate Records

- **Open ranges of serial numbers can be found**
  When choosing serial numbers for an order of new meters, the system can find a range of available unique numbers, or just verify your intended range, as needed

- **Uniqueness may be enforced**
  By default Meter Manager will enforce unique serial numbers within a manufacturer for both meters and attached devices, such as AMR/AMI modules. System-wide uniqueness may be enforced for any particular type of device, such as requiring unique serial numbers for all AMI modules.

- **Devices may be renumbered**
  Because MM uses its own unique key, if a device is renumbered, all related data is preserved.

Meter Acceptance Testing

- Sample Test
  - Any Work Order type may be assigned via configuration
  - Selection meters may be manual, random, or random by box
    - User selects meters (pseudo random)
    - System selects boxes (random boxes)
    - System selects meters (completely random, rarely used)
  - ANSI Z1.4, Z1.9, MIL-STD-105E, or fixed percentage may be used
  - Work Orders are generated, which will include whatever functional and accuracy testing you require for both the meter and any included AMR/AMI modules
  - Multiple testers can complete the required testing
  - The current status of the sample is always visible

Sample Testing x

☑ All   Status Quarantined ▾

☐ PO [   ]   Sample Batch [   ]   [Find]

Sample Batches   Count: 0

Sample Batch	PO	Qty	Status

For each device model received within the shipment, a batch is created. We can see what shipments have not yet been sampled when we create a new sample batch.

Line Item	Release	Date Received	Qty	Receive Batch

Samples Tests

Date Created	Sample Type	Sample Size	Passed	# Tested	# Failed

Samples   Count: 0

Date Created [   ] ▦
Sample Type   [   ] ▾
Sample Size   [0]
Passed   [   ]
Tested   [0]
Failed   [0]

Meter Manager's MAM Capabilities

- Handles many different device types, including AMI modules, HAN devices, load control devices, and user-defined device types.

- Tracks ancillary devices embedded in the meter, each with its own serial #, hardware version, and firmware version are tracked, including permanent components, factory exchangeable components, and utility exchangeable components.

- Cradle to grave tracking of all devices, including tracking down to the truck or person

- Extensive warranty and RMA functionality, including separate warranties for ancillary devices, if applicable

Meter Manager's MAM Capabilities

- Precise control of workflow, including any number of tasks performed at any number of steps

- Firmware tracking, including integration with head end systems. Meter Manager prevents devices with obsolete firmware from being shipped.

- Quality management functions, including tracking occurrences of specific defects

- All testing activity, including functional testing as well as accuracy testing, is stored together in Meter Manager

- Meter Manager will integrate with manufacturers' AMI software, either using UI automation to run the software and screen-scrape the results, or though APIs when available.

Control of Work Flow

- The tasks performed on a device, and the order in which they are completed, are controlled by Work Flows, Work Flow Steps, and Tasks

- Consider this example requirement: New meters, either 100% or a sample, are put on a multi-position qualification board, have their firmware version verified, are tested for network communication, and then a remote service switch test is done. With this done, the meters are tested on a test board, with an accuracy test, and a demand test if the meter has a demand display.

- Here is the work flow for this example

Work Flow Example: New AMI Meter

- Step 1: Functional Testing
  - Task 1: Verify firmware, display check
  - Task 2: Register meters on network, verify communication
  - Task 3: Test Remote Service Switch (if present)
- Step 2: Metrology Testing
  - Task 1: Do accuracy testing, with appropriate test sequence
  - Task 2: Do reverse test (NEM meter only)
  - Task 3: Do demand test (demand meter only)
- In this example we have created two Work Flow steps, with multiple tasks for each one.

Tasks

- Tasks are any activity performed on a device
- Tasks are self-aware, and can determine if they are applicable.
  - If a remote service switch test is part of a Work Flow, it will only be presented when the meter actually has a remote service switch
  - A gas meter test could include an ERT ping and read verification, if the meter has an ERT
- Optional Tasks may be added to Work Flow Step
  - If you make a Demand test an optional task on the Accuracy Test step, a user could run a demand test if desired, when the meter has demand
  - If it is a required task, it will always be presented to the user when applicable

Controlling Stocking Meters

- All mandatory tasks must be completed for a meter to be restocked
- If optional tasks have been added, they must also be completed or deleted.
- All tasks that have a pass/fail criteria must pass
- For accuracy tests, each meter, based on type, can be assigned different accuracy limits. Within each limit, three levels are defined:
    - Utility: This is your internal criteria for passing used meters
    - Regulatory: This is your commission's criteria, and is used primarily for reports
    - New: This is your internal criteria for accepting new meters

Tracking Device Inventory

- Every device is tracked at every location, with the full history of all inventory events
- Devices may be in containers, which can be pallets, gaylords, bins, etc.
- The entire contents of a container may be moved, shipped, retired, or returned to manufacturer in a single step
- Unlimited inventory locations are supported
- An inventory location may have areas within it
- Inventory areas may be mapped
- Every shelf/floor location may be marked on the map

File   Go   View

User: **Supervis**

Item Search [x]   Internal Moves [x]

Device [   ]   [Find]   [Clear]   ☑ Meters Only   ☑ Show All Tests

Count: 1

Location	[ ] [...]
Receive Batch	[ ]
Company #	[ ] Manufacturer # [ ]
Barcode #	[ ]
Type	[ ]
Group	[ ]
Manufacturer	[ ]
Manufacturer Model	[ ] Catalog # [ ]
Description	[ ]

Tests   Count: 0

Test Type	Status	Source	Test Date	Due Date	Requested By	Tester	

Pass / Fail Limits

- **Multiple sets of pass / fail limits may be defined**
  Each set of electric limits includes:

  - Separate electric values for full load, light load, and weighted average

  - Separate gas values for full, check, differential

  - Threshold to display a warning (results in yellow)

  - Threshold for failure

  - Separate thresholds for internal, regulatory, and new meter acceptance

- Any device model may be assigned any pass / fail limit

Electric Test Limits [x]

Limit Name	
Limit for Mechanical	
Limit for Solid State	

Electric Test Limits   **Count: 2**

Regulatory   New   Utility

	HL			LL			WA		
Warning limit:		to			to			99.50	to	100.50
Fail limit:		to			to			98.00	to	102.00
Fail on:								Avg		

AMI Module Tracking and Testing

- **Testing of AMI modules is supported**
Each type of device may have its own test with its own data elements.

- **AMI Module results may be manually entered, imported, or fully integrated**
TESCO is currently integrating Silver Spring AMI testing directly into MM, and supports other AMI devices

- **UI Automation allows MM to execute Windows-based software from AMI vendors automatically without user input**
MM can run vendor software, make the required entries, and then extract and store the results.

Testing Remote Service Switch

- **Remote Service Switches are a supported device** They can be integrated into the meter or on a separate collar

- **Pass/fail testing is supported, with test load documented, and optionally with multiple tests at different loads**

- **Remote Service Switch testing can be done at the accuracy test board, or on a multi-meter board, as required.**

- **Currently the results of the test are entered manually, but automated results support will be added if a test board supports it.**

RMA and Warranty Tracking

- Each manufacturer may have any number of different warranties on different products, or warranties may change for new purchases.

- Warranties may be based on date purchased, date received, or date installed, as applicable

- Warranties can apply to any type of device, including meters, AMI modules, ERTs, CTs, VTs, etc.

- Meter Manager knows which devices are under warranty

- The warranty for a specific set of existing devices may be extended

RMA and Warranty Tracking

- Failed devices under warranty are added to an RMA queue, and usually placed in a specific container

- Batches of devices are shipped back to the manufacturer as volume dictates

- Meters may be repaired and returned, returned with no problem found, or credit issued

- If the manufacturer denies the warranty claim (perhaps due to physical damage, for example) this too may be tracked

- If credit has been issued for a defective meter, and the same meter is received as part of another purchase, the system recognizes and handles this scenario

Meter Tests

- In Meter Manager, Work Orders describe the test classification, and point to a set of work steps and tasks to be performed.

- Work Orders are user-defined and can be created to match your existing test classifications

- When required, As-Left results may be added for reads and tests

- Each device model can be associated with an accuracy criteria record, and each record has values for Utility, Regulatory, and New Meter limits (described earlier)

- Notes, pictures, and files may be attached to a test

Tests for Existing Meters (cont)

- Normally all tasks for a test must be completed in order to complete the test. If a meter fails, the test may be aborted and the reason for failure selected.

- Meter Manager tracks device warranties, and failed devices may be added to the RMA process.

- Devices may be retired after a failed or a successful test

- Only devices that have been tested successfully may be stocked

Item Search [X]   Meter Test [X]

| LED | ⬤ Turn Voltage On | ⬤ Turn Current On | Reset Device | Complete Test | Close |

- 053193339
- Test
- Work Orders
- 📝 Notes
- 📷 Photos
- ☑ Tasks
  - ⭕ Reads
  - ⭕ Test Sequence

053193339

Type	GE311I	Setup Code	1N				
Form	2S	Volts	240	Amps	30.0	Phase	1	Wires	3
Kh	1						

Test

Test Date 20/06/2014   Tested by Supervisor   Test Type [▼]

Work Orders

Type Office Test

Due Date 20/07/2014

Type	Due Date	Status	Requested by
Office Test	07/20/2014	Pending	Supervisor

Notes

Photos

Reads

| AF |

KWH [   ]

Test Sequence

Test Sequence SF SF SP SL SL

| AF |

Start	[ ]	End	[ ]	Board	[ ]		Run
WA	[ ]				
SF	[ ]	AFL	[ ]	APF	[ ]
SP	[ ]	BFL	[ ]	BPF	[ ]
SL	[ ]	CFL	[ ]	CPF	[ ]

Mesh [▪]   Seal [▪]

Item Search [x]

Device [ ] [Find] [Clear] ☑ Meters Only ☑ Show All Tests

Count: 1

Field	Value
Location	
Receive Batch	
Company #	Manufacturer #
Barcode #	
Type	
Group	
Manufacturer	
Manufacturer Model	Catalog #
Description	

Tests   Count: 0

Test Type	Status	Source	Test Date	Due Date	Requested By	Tester

Item Search [x]

Device [   ] [Find] [Clear] ☑ Meters Only ☑ Show All Tests

Count: 1

Location	[ ] [...]
Receive Batch	[ ]
Company #	[ ] Manufacturer # [ ]
Barcode #	[ ]
Type	[ ]
Group	[ ]
Manufacturer	[ ]
Manufacturer Model	[ ] Catalog # [ ]
Description	[ ]

Tests   Count: 0

Test Type	Status	Source	Test Date	Due Date	Requested By	Tester

Associating Devices

- Meter Manager can track any associated devices, including AMI and AMR modules

- A complete history of associations is maintained

- Modules may be disassociated and retired or restocked

- In a single step, a defective AMI module may be disassociated from a meter and placed into RMA processing, and a new module associated with the meter

- Meter Manager checks if the firmware version of a meter is current when a meter is checked in, and when it is checked out. If integrated with vendor software, the reported firmware version can be captured. Manual firmware checks may be added to the work flow.

Updating Device Information

- Test Records may be imported from files. This is typically used for third party meter tests.

- Mass retirements may be done in a single step.

Reporting

- Reports definitions are stored in the database, allowing new reports to be added without code changes

- Titles and report parameters can be changed, and default values can be stored

- Reports can be exported to PDF or XLS files

- As part of the requirement analysis process, typically 30 to 40 reports are identified as required, and are made available. In many cases an existing report is sufficient, while sometimes a modified version is needed, or an entirely new report

- Users can design their own reports and add them to Meter Manager for other users

File   Go   View   User: **Superuser**

Run Report x

Year [2010   ▾]   Report Type [_____▾]   Report [_____▾]   [Preview]

ⓥ Parameters

Ad hoc Reporting

- TESCO simultaneously provides exceptional ad hoc reporting and reduces the need for it
- Meter Manager utilizes the Telerik Report Generator.
- The Telerik Report Generator comes in two versions, a developer version and an end-user version
- TESCO uses the developer version for built-in reports, while users build reports with the end-user version
- Reports created by end-users can be integrated into Meter Manager and run by other users, if desired
- Other tools may also be used against the SQL db
- An example of a report being built from scratch follows
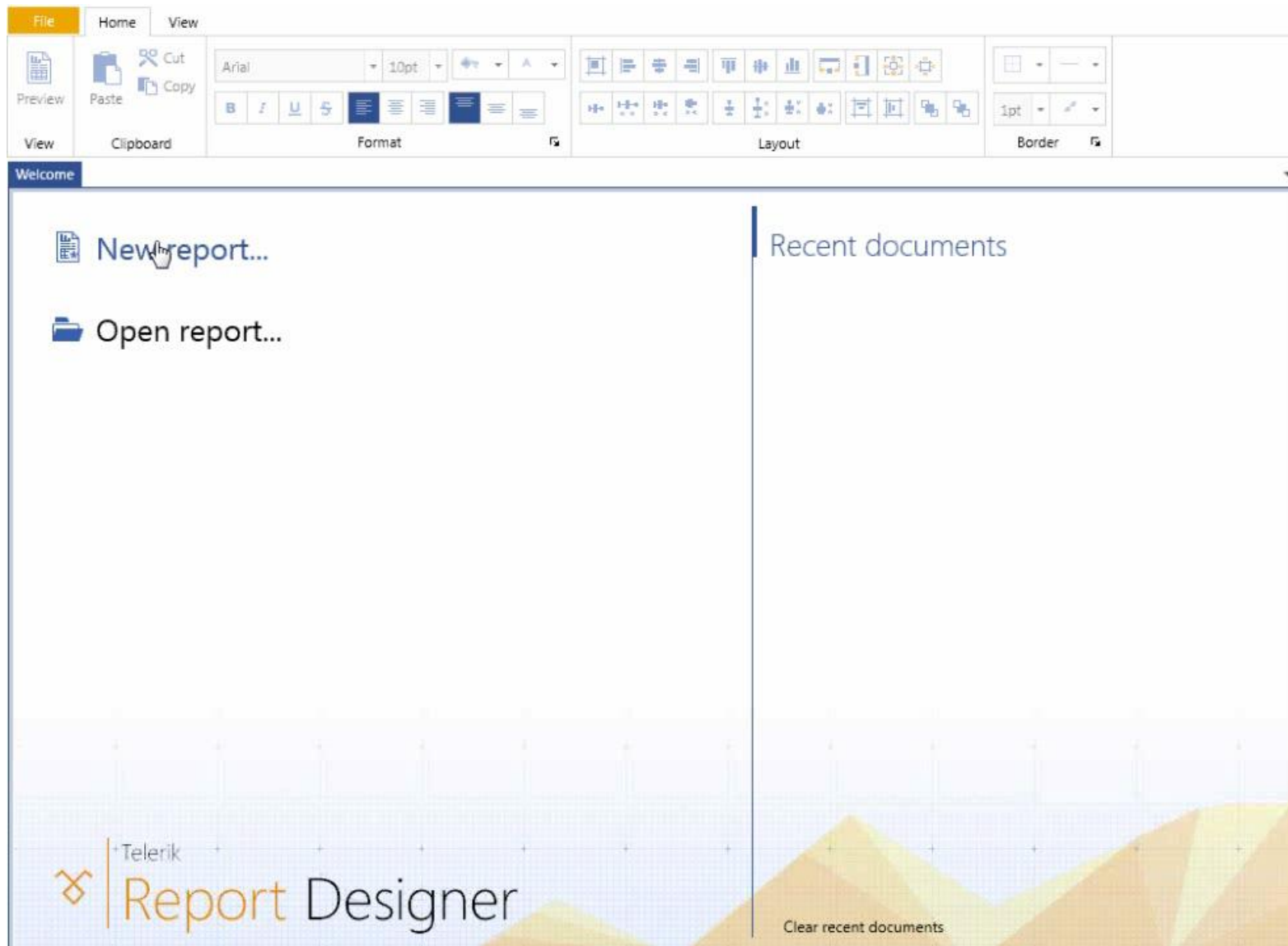
Meter Manager Touch Points

- TESCO uses the same code for all the base functionality of Meter Manager for all customers

- Integration with your other systems is custom developed, without customizing Meter Manager itself

- Touch Points are places where integration with other systems are possible or where some custom processing might be needed for a particular utility

- Touch Points are "black boxes" to the main application, and interact in carefully defined ways, eliminating the need to customize Meter Manager itself.

Meter Manager Software Architecture

- Modern 3-tier application, with software client, application server, and database layer
- Two clients available, native Windows WPF and browser-based client using Microsoft Silverlight
- Core users typically run native app, rest of the utility use the browser application - UI is identical
- Role-based security, logins may be integrated with Active Directory
- Database does not need to be accessible to users
- Powerful end-user report generator is included, using the same engine as the built-in reports
- User-designed reports may be seamlessly added to the application with full security

Our Deployment Process

- During the initial phase, we try to learn as much as we can about your operation and your needs.

- We want to observe all the tasks being performed in your shop, and understand how best to utilize Meter Manager in your environment.

- We work with key stake-holders to define what is required.

- Typically we add functionality during this process as we learn more about your operation and how we can best integrate Meter Manager into it

- This new functionality is almost always without extra cost

Questions?

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