TESCO's AMI Specific Products and Services

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Pre-AMI Meter Operations

Common Features and Common Sources of Concern

- Fewer meter techs in the field and in the shop than there were 25 years ago

- Fewer field checks and site verifications due to lack of personnel, lack of experience, and lack of expertise

- Significantly more features under glass in every AMR and AMI system being considered or being deployed

- Metering losses starting to be identified "by accident" as opposed to being "by design"

The Pendulum Starts to Move

- Meter Operations. Prior to deployment many larger utilities take an attitude of "this is only metering – how hard can that be?" Over the course of deployment Meter Operations gains a stature and a respect from the rest of the organization that was not previously accorded them – even if this is only begrudging respect.

- New tests for AMI meters (e.g. communication, disconnect) are identified.

- The complexity and issues around high revenue metering are at least acknowledged by the rest of the organization.

- Tests which have not been performed in years are suddenly back in vogue.

- Knowledge is KING. Other Operational Groups are beginning to come to Metering for their information and metering is starting to lead as a result of this information.

The New Realities

- Electro-Mechanical Meters typically lasted 30 years and more. Electronic AMI meters are typically envisioned to have a life span of 15 years and given the pace of technology advances in metering are not expected to last much longer than this.

- This means entire systems are envisioned to be exchanged every 15 years or so. In the interim the meter population and communication network inherent in the infrastructure for each utility must be maintained.

- Meter communication and meter data management are becoming as important to metering operations as meter accuracy.

- Firmware upgrades, firmware stability and cyber security are becoming increasingly important to metering departments.

- Meters are being replaced at a far faster pace than meter sockets, bringing hot socket issues to the forefront

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Meter Services Are Still Understaffed

We automated so we no longer need as many people in metering!!

Right?

WRONG!!!!!!

TESCO Offerings to Assist as You Plan and Prepare for an AMI Deployment

- Experienced AMI Engineers to assist in the project planning

- Review meter shop preparedness and layout based on role defined for the Meter Shop by the planning team

- Detailed planning and protocols for Meter First Article/Certification

- Assist in executing this plan and these tests – on site or remote

- Equipment for executing this plan and these tests

- Meter Asset Management and Meter Services related software with interfaces to CIS and billing and any third-party deployment company

- Provide lab equipment for AMI specific or meter certification specific testing or provide the testing as a service

Helping with the Planning

- Experienced AMI Engineers who have been heavily involved in several deployments
  - Clearly identifying and communicating the responsibilities of the Utility, meter provider, communication system provider and the third-party deployment vendor
  - Schedule creation and resource planning
  - Certification testing and analysis
  - First Article and Certification protocols

- Review meter shop preparedness and layout based on role defined for the Meter Shop by the planning team

Pre-Deployment Testing

- Meter Shop Equipment for executing this plan and these tests

    - Meter Qualification Boards

    - Multi-Position test boards

    - Meter Programming stations

    - Specialized lab equipment and set ups for certification testing

        - Hot Socket Simulators

        - ANSI test set-ups

    - Communication testing equipment

    - Meter Farms
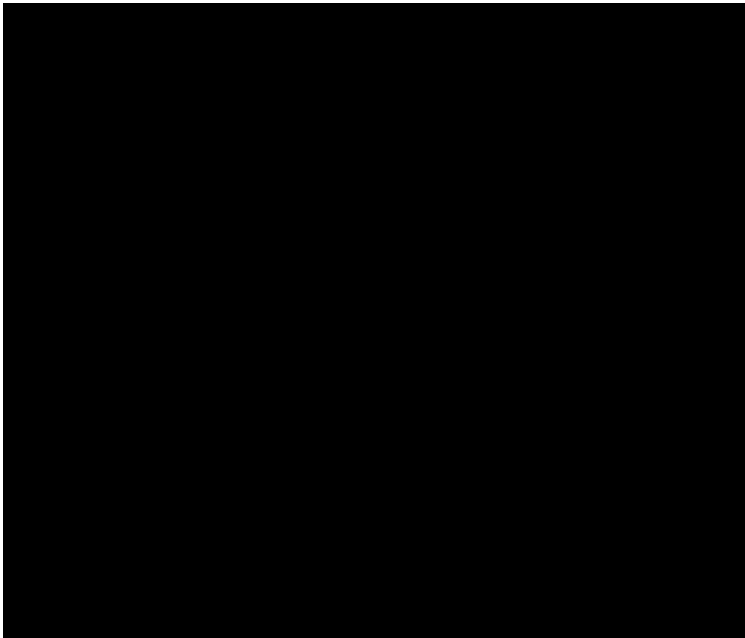
- Assist in performing this testing on-site or remote

Meter Qualification Boards

Hot Socket Simulator

Double click box to view video

Preparing to Track
Meter Asset Management Software

- **Traditional information**

  - Meter Number

  - Meter Type

  - Meter Form

  - Manufacturer

  - Date of purchase

  - Date of install

  - Location installed

- **Non-Traditional information**

  - Firmware version

  - Location (after receipt and prior to installation)

  - Disconnect serial number

  - Communications device serial number

  - Firmware version for the Communication device

  - Routers, repeaters, collectors and other devices installed as part of the communication system for the meters

TESCO Service Offerings to Assist During an AMI Deployment

- Experienced AMI Engineers to assist on site and remotely during deployment

- Additional on-site or remote Meter Techs to assist in handling the bump in work due to the deployment

- Develop Functional Test and Acceptance testing protocols

- Assist on-site or remotely in performing Functional Tests and acceptance tests for new AMI meters

- Assist in processing RMA and warranty meters on site or as a service

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AMI Services – Cross Dock/Warehousing/Functional Testing/ Sample Testing

AMI Services – Meter Retirement

AMI Services – Meter Reprogramming

TESCO Equipment and Software Offerings to Assist during an AMI Deployment

Shop equipment

- Meter Qualification Boards
- Multi-Position Meter tests boards
- Communication testing stations
- Programming stations
- Receiving stations
- Shipping stations
- Meter Farms
- Training Stations and Rooms
- Meter Manager Software

Field equipment

- Hot Socket gap Indicators
- Socket Safety Clips
- CT Ratio and Burden testers
- Mesh signal strength indicators
- RF Indicators
- Meter Manager Software

Meter Qualification Boards

Why do AMI meters fail?

Looking back at various deployments – what are the chief causes to reject meter shipments?

Meter functional test failures including but not limited to;

- Incorrect firmware

- Bad settings

- Alarms and errors that do not clear

- Communication test failures

- Bad tables

- Failed disconnect switches

Meter Qualification Boards

Shop Testing

- Accuracy testing

- Meter Communications Performance

- Software and firmware verification

- Setting verification

- Functional testing

- Disconnect/reconnect Functionality
and as left setting

Field Inspection of Sockets
Best Practices

- Example field check list
  - Gaps in meter socket jaws
  - Discoloration of one jaw vs. the other three
  - Signs of melted or deformed plastic on meter base
  - Pitting of either meter blade or socket jaw
  - Loss of tension in meter socket jaws
  - Check condition of wire insulation and connections to meter jaws
  - Check the overall condition of the box, socket, meter, and how they attach to each other and the building
  - Look for signs of tampering
  - Look for signs of water or debris inside of the meter can

Hot Socket Gap Indicator / Socket Safety Clips
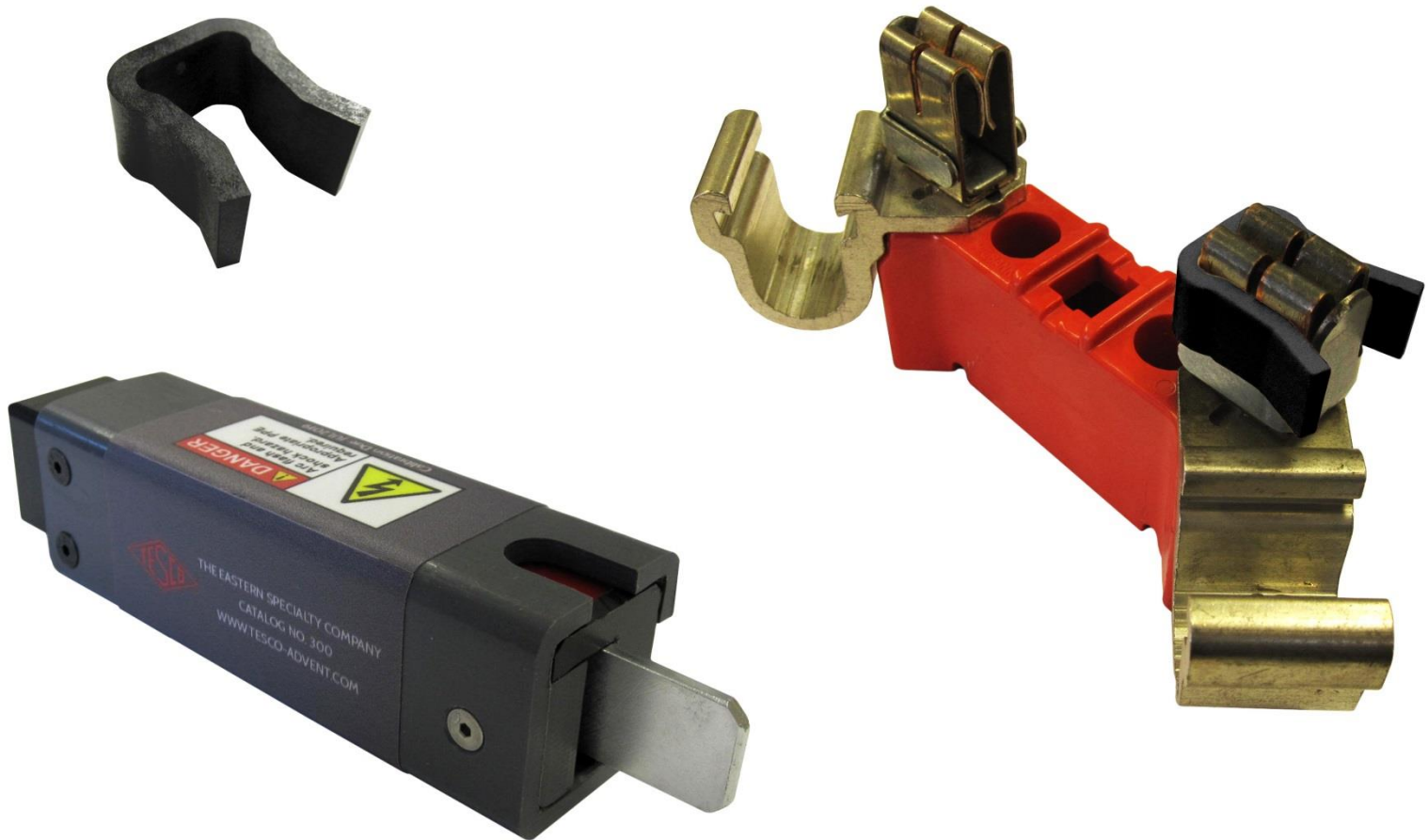
Who Sees Hot Sockets?

- Most AMI deployments utilize third party contractors to handle residential and some self contained non-2S services.

- After to or prior to AMI deployments, utility personnel typically see these sockets

- Transformer rated meters typically handled by the meter service department of the utility

- Hot socket concerns with lever by-pass sockets used on 3-phase meters are extremely rare

What can be done once a hot socket is identified?

- Easiest resolution is to replace the damaged jaw.

- **Never** try and repair a damaged jaw. The tension in the damaged jaw will not return simply by taking a pair of pliers and closing the jaw tighter.

- Either the entire box should be replaced or the damaged jaw (assuming the wiring and other jaws are deemed safe through the rest of the inspection.)

AMI Services – Meter Reprogramming

AMI Services – RMA Processing

AMI Services – RMA Processing

TESCO Offerings to Assist After the AMI Team Declares Victory (Post-Deployment)

- Equipment to help manage your AMI Population

- Software to help track your AMI meters, firmware and accessories

- On-going RMA and warranty processing

- Test equipment to assist in the new focus on more frequent inspection of commercial and industrial accounts

- Equipment to deal with safety concerns identified at the meter

- Services to assist an over burdened Meter Service Department

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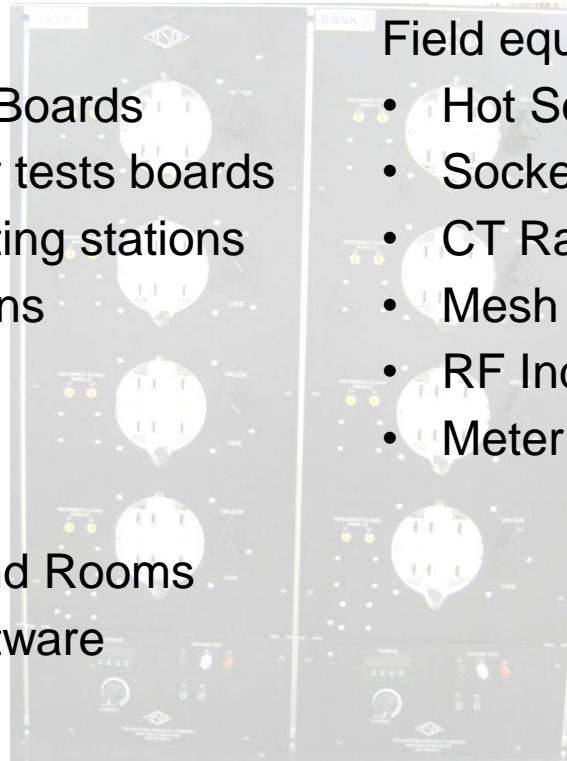
Post AMI Services – Meter Reprogramming

Post AMI Services – RMA Processing

New or Expanded Roles for Metering Departments of All Sizes

- Responsible for either reviewing ANSI Tests or even performing some of these ANSI Tests

- Perform Meter Functionality testing on new and returned AMI meters

- Register and communication module energy measurement comparison

- Disconnect/Reconnect Functionality

- Outage Performance

- Meter Communications Performance

- Consumer safety and combating real and perceived issues

- Near continuous research into the "next" technology and the next deployment

Post-Deployment Needs

- Once deployment is complete the certification and acceptance testing does not stop

- Everyone understands the importance of acceptance testing, but future generations of a smart meter also require certification testing

- New software and firmware needs to be tested and compared against the performance of older generations

- New hardware must be tested and compared to older generations.

- Firmware upgrades need to be checked

- New head end systems or IT protocols need to be tested against a large group of meters before going live

Meter Farms

Meter Farms

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Meter Farms

Real Life Examples of Change Management in Action

- Issues in the system not the components – what is the definition of a meter and when did the meter change?
  - Meter and communication device interface

- Feature Creep – every manufacturer wants to differentiate themselves – sometimes this works in unanticipated ways
  - Recovery from power outages
  - Short and long demand periods

- But we only changed….lessons we should have learned from Microsoft
  - Over the air upgrades

- Thank Goodness for test plans – right?
  - Half closed disconnect devices
  - Disconnect devices of unknown state
  - Meters with incorrect firmware

Summary

- The focus is on far more than accuracy

- The meter man of the future knows not only metering but they are communication experts and are involved with handling, reporting and analyzing far more customer and system data

- There are fewer "routine jobs" in the field and many of the standard tasks are no longer required. This will lead to fewer classifications of meter techs going forward and the need for a more highly trained tech.

- Each Utility must take a far more active role as part of checking, certifying, and rechecking the functionality of their meters.

- Metering will be in a near constant cycle of looking for the next technology, evaluating those technologies, planning for deploying these technologies, and cleaning up the aftermath of the deployment of these technologies.

- TESCO is here to help. We have people, equipment, knowledge and solutions.

Questions and Discussion

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