AMR's History

- Founded in 1975 by Robert Graf with his invention of the pilotless ground monitor for the underground and surface mining industries
- Company has since grown into Monitoring, Control and Automation Specialists serving the Mining, Aggregates, and Water and Wastewater Industries
- Two sides to our Business
  - Manufacture of AMR's Mining Equipment Product Line
  - Systems Integration

Company History contd.

AMR's two sister companies provide complete system level integration to AMR

- East River Metals, Inc.
  - Custom sheet metal fabrication
- Custom Manufacturing Services, Inc.
  - Surface mount and through-hole PCB assembly
  - Cable and harness assembly
  - Electro-mechanical assembly
  - Custom sheet metal fabrication
  - Finishing and silk-screening

- 3 facilities
  - 125K sq. ft. total manufacturing space
- ISO 9001-certified

Finn Power Punch Press

CMS I: Princeton, WV

CMS II: Princeton, WV

AMR Product and Service Offerings

Monitoring and Control Mining Equipment

– Ground Monitors

- Underground and surface mine equipment is generally electrically powered and have trailing cables running to the machine from a power center or substation.
- Such equipment includes: continuous miners, haulage, draglines, roof bolters, etc.
- Ground monitors send a signal through the trailing cable's ground wire to ensure the ground wire is intact at all times.
- This prevents the frame of the equipment from becoming electrically charged and possibly shocking a miner.
- Used in both high and low voltage applications

Ground Monitors

GM-200

GM -250

GM -300

AMR Product and Service Offerings

- Monitoring and Control for Mining Equipment

“Little Speedy” Speed Sensor

Tip Switches

Belt Master 4000

Battery Indicator - 850

CD-710

AMR Product and Service Offerings

- Monitoring and Control for Mining Equipment
  - CB Series
    - System comprised of control unit, vacuum contactors, fuses, and CTs
    - Replaces traditional molded case breakers in power centers
    - Increases safety and functionality and reduces downtime:
      - Remotely controlled by MC-4000 system
      - Adjustable trip settings
      - Trending and fault history
      - Long useful life
      - Equipment protection and maintenance

CB-PRO Family

Atmospheric Monitoring System

MC-2000 System (1987)

- 4 – 20mA Sensors
- Slow Baud Rate
- Multiple Pairs of Wire
- Proprietary Master Station

MC – 2000 Family

MC-4000 System (1992)

- Windows Operating Environment
  w/ OPC Connectivity
- Addressable Sensors
- 38.4 K Baud Rate
- Alarm Inhibiting During
  Calibration
- Auto Zero & Span Calibration
  w/ Automatic Reporting

MC-4011

MC-4025

MC-4020

MC-4210

MC-4231

Surface Software

- Smart Repeater / Splitters
  - Regenerates data line communications signal
  - Allows Master Station operator to remove 28 VDC power from and/or disable communications to the output ports (Important for troubleshooting)
  - Line measurements for voltage and current draw
  - Transmit and Receive LED's on all ports simplifies troubleshooting

    - Smart Repeater Controls available at Master Station
      - Enable/Disable communications with three output ports
      - Reset Comm Port Error Count
      - Apply / Remove DC power to / from three output ports
      - Kill Remote when powered from MC-4020

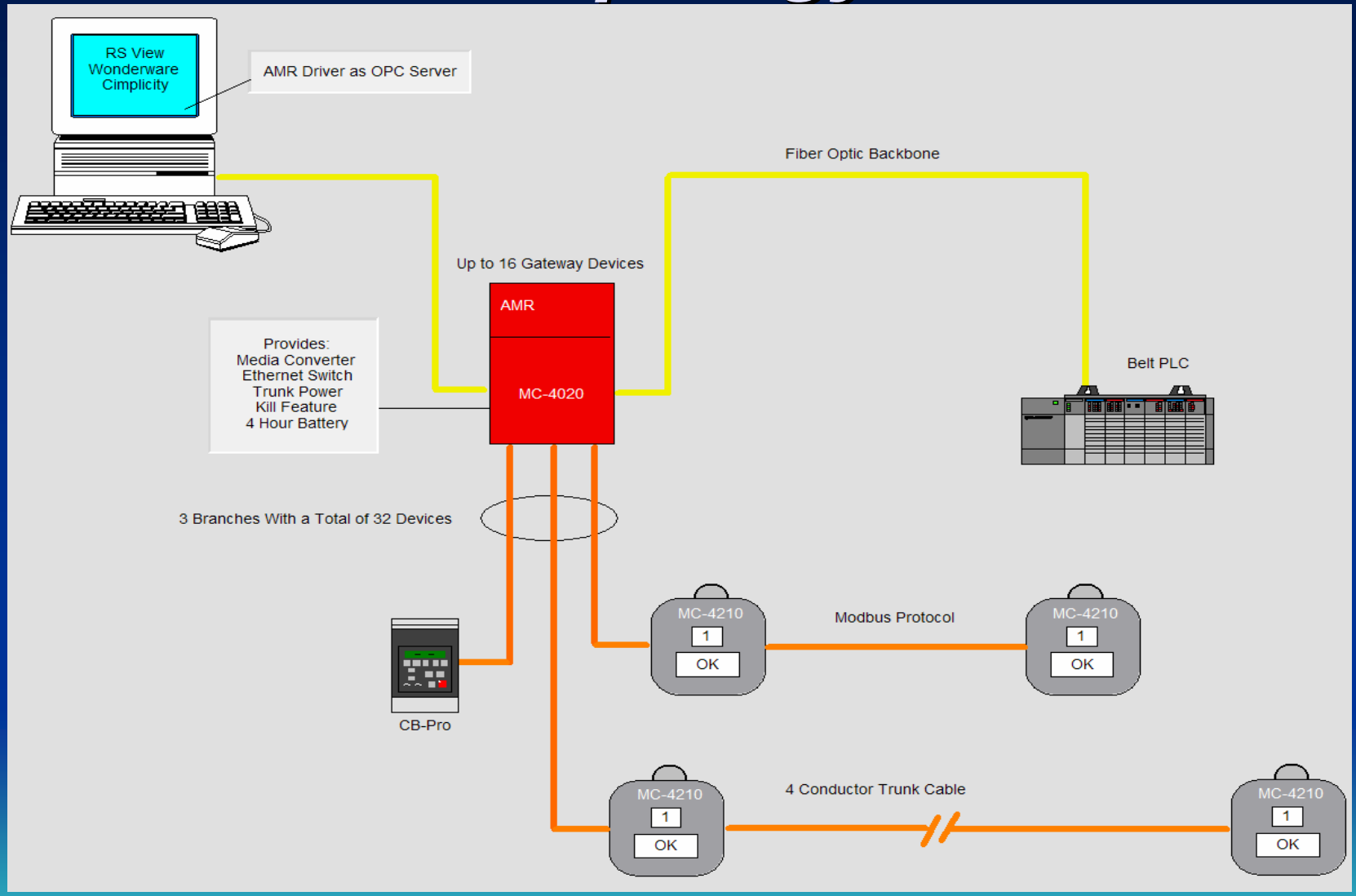
- Sensor Self Testing
  - Open/Shorted Cell
  - Electronics Fault
  - Memory Fault
  - Watchdog
  - All Malfunctions Reported to Surface

Ethernet Based Gas Monitoring

Technology For The Future

As technology changes in the mining industry, we at AMR strive to satisfy the needs of the growing industry. Our new Ethernet-based Mine Wide Monitoring System applies the latest in technology available today. Utilizing a fiber optic backbone and our Modbus Gateway Remote Stations, gas/belt monitoring has never been easier.

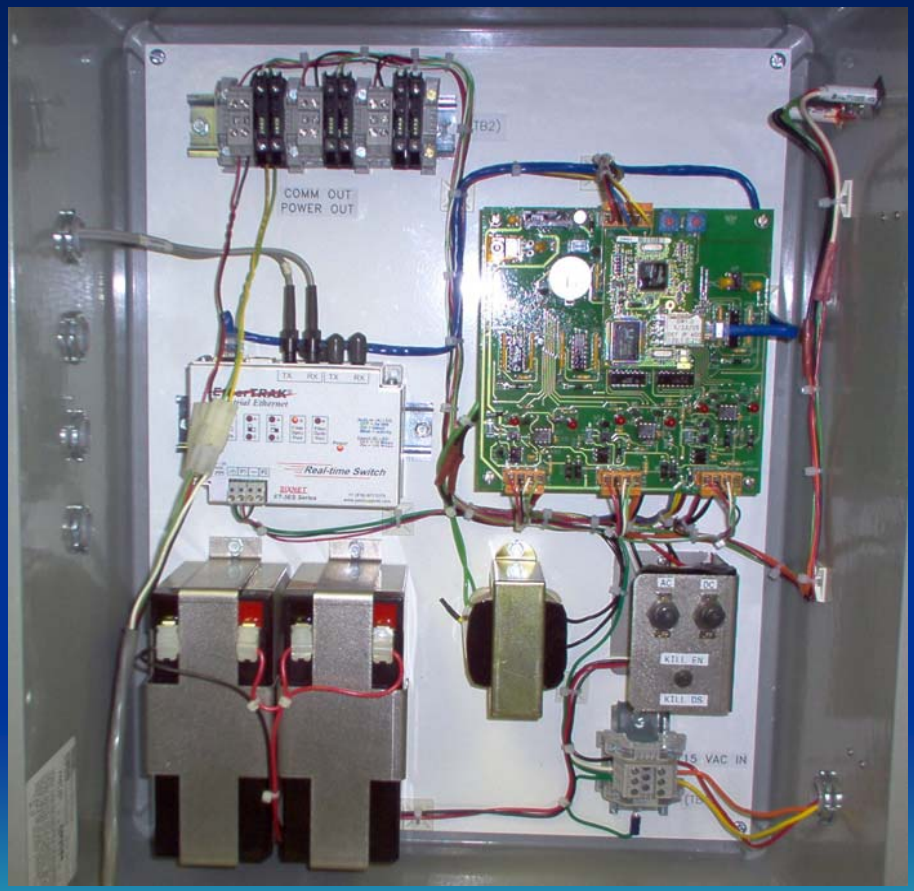
Topology


RS View
Wonderware
Cimplicity
AMR Driver as OPC Server
Fiber Optic Backbone
Up to 16 Gateway Devices
AMR
MC-4020
Provides:
Media Converter
Ethernet Switch
Trunk Power
Kill Feature
4 Hour Battery
Belt PLC
3 Branches With a Total of 32 Devices
MC-4210
1
OK
Modbus Protocol
MC-4210
1
OK
CB-Pro
MC-4210
1
OK
4 Conductor Trunk Cable
MC-4210
1
OK

Hardware

- Gateway Remote Station: MC-4020-ET
- Multimode fiber optic media converter
- RJ-45 Ethernet interface
- Three Modbus data ports to drive the four conductor copper trunk cable
- Available diagnostic information for each port such as: cable open/short, current draw, bias, and peak-to-peak voltage levels
- Battery-backed power supply for the required 4 hours
- Built-in remote kill feature with manual reset

Gateway w/Battery Backup

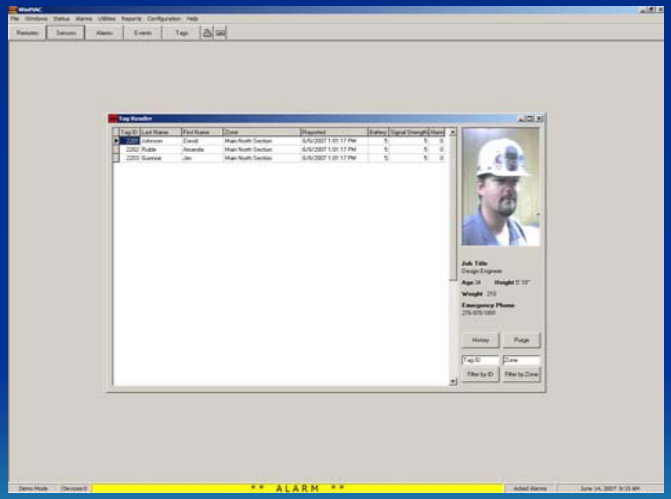


Integrated Tagging System

- Mine Net System
  - Mine Net will be available on AMR's Mine Monitoring System on both twisted pair copper (RS-485) and fiber Ethernet
  - Provides location, direction, and relative distance
- Smart Reader
  - Addressable Smart Readers feature up to 4 antenna inputs to cover multiple zones and ranges
  - Provides system with Tag, message, and receiver information allowing tracking and triangulation
  - Non-volatile memory of all Tag data for post-power down retrieval
  - Status LED's on front panel
  - Battery backup option
  - Optional hand controller allows local communication, control, and interrogation

Integrated Tagging System (cont.)

- Active Net Tag
  - Lightweight, ultra-durable, inexpensive Tags allow operation for 2-3 years
  - Provides ID, battery level, temperature, and message code



AMS Safety Aspects

- Detection Before Fire Begins
- Automatic Alarm Activation to Working Sections
- Real-time Measurement of Other Gases (i.e. O2, CH4, Hydrogen Nullifying, Diesel Discriminating)
- Seal and Return Monitoring

AMS Future for Safety

- System Maintenance is Critical
- Specialized Installation and Maintenance Personnel
- MSHA System Performance Requirements