2013 CRUG Conference
Input from Plants
Agenda

• Plant environment and challenges
• Applications
• Effectiveness of composites
• Acceptance / Limitations
CRUG membership includes pipeline companies, refinery and chemical plants, composite manufacturers & distributors, regulators, service companies, test labs, and consultants.

CRUG’s purpose is to promote the proper use of composite materials to structurally repair pipelines, piping and other pressure containing equipment subject to industry accepted standards.
Application Challenges

• Challenges
  – High pressures
  – Elevated temperatures
  – Numerous process services
  – Piping configurations
  – Hoop stress concerns vs. leak containment
  – Corrosive environments
Applications

• Straight Pipe

• Anticipated life of repair
  – Until next TAR
  • Months to years

• Many opportunities exist as a result of pipe inspections (PSM) and concern for pipe conditions (rusted, thin wall, leaking, etc.)
Applications

• Concentric reducer
  – 24x14x24
    • Cracks with active leakage
    • Hydrocarbon service
    • Under vacuum
    • Operating at 280°F continuous
      – 330°F intermittent
• Anticipated life of repair
  – 9 months
• Special applications due to piping configuration and operating conditions
Applications

- Column / Tower applications
  - Exhibiting Structural concerns due to corrosive services
  - Operating at ~300°F
  - Design to 315 psi
  - Code repair required
  - Anticipated repair life > 1 year
Special Considerations

- NDE performed of equipment
- Analysis of NDE information
  - FEA
- Engineered composite repair proposed and performed
- Code repair review and approval required
Effectiveness of Composites

• Composites have improved tremendously over the years.
  – Originally plant requests were to apply bonder or fiberglass wraps
  – No formal review and approval processes were performed

• Composites are much more sophisticated
  – Research into formulas, tensile strength testing and sound engineering practices

• Composites are most effective when properly designed, engineered and applied following manufacture’s specifications for specific applications

• Cleanliness is next to Godliness and is critical for an effective composite application.
Acceptance / Limitations

• An engineered repair method
  – Insure that calculations and installation processes are provided.
  – Must follow composite manufacture’s instructions

• Developing standards (PCC2)
  – Training
  – Engineering practices

• Must have an effective wall thickness
  – Intended for pipe wall support
  – Not intended to create pressure boundaries

• Must perform proper surface preparation
  – NACE 2 finish or better

• Composites are not the “silver bullet”
  – Use within manufacturers’ recommendations
Questions