Canadian Gas Association

Association canadienne du gaz

Keyhole Technology

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Field Manager

Engineering Operations Support

Enbridge Gas Distribution

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Engineer – Codes & Standards

Design Engineering

Gaz Métro

gti

Enbridge Current Keyhole Status

- In 2012 Enbridge completed its Cast Iron Removal project.
- For the past few years leading up to this huge accomplishment Enbridge only used Keyhole tools for ***Anode/test point installations.*** Prior to this we utilized keyhole for numerous low pressure cast iron work. Since this work was no longer required, our Keyhole program took a back seat and almost faded out completely.
- In early 2012, Enbridge/CrWall/Kravitch Machine Co and Ontario Excavac teamed up together.
- We created an aggressive plan to revitalize our Keyhole program.

C.R. Wall & Co. Inc.

WALL

ENBRIDGE

ONTARIO EXCAVAC

YOURS TO DISCOVER

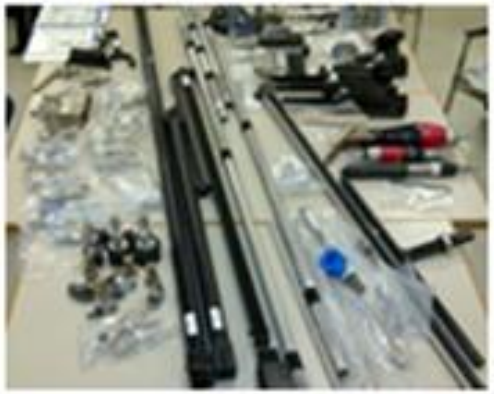
Gas Water Tools

Kravitch Machine Co.

gti

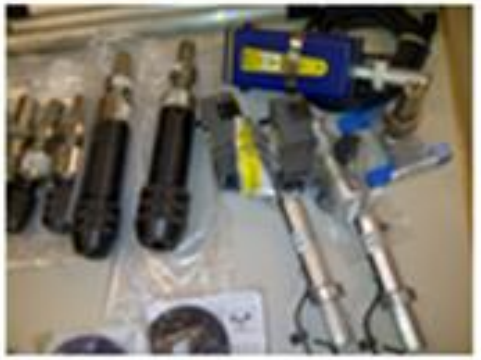
Keyhole Program Implementation Plan

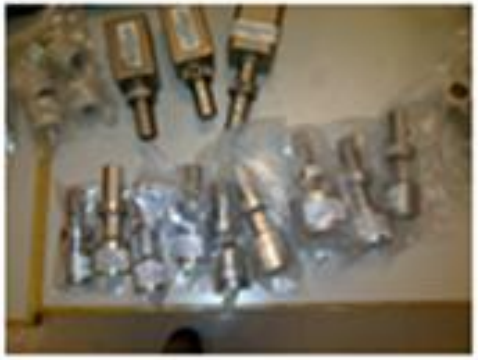
- Establish working agreement with Kravitch Machine Co. and CrWall.
  - Identify Enbridge's current needs (completed Q2 2012)
  - Design and create universal tooling system within outlined budget (completed Q2 2012)
  - Inventoried all Enbridge Keyhole vehicle's and removed all "home made" and any additional tools from previous years programs. (completed Q2 2012)
  - Confirm number of kits and target roll out dates. (completed Q3 2012)
  - Create any applicable procedures and training packages for roll out. (completed Q3 2012)
  - 6 Kits delivered to Operations (completed Q1 2013)
  - Set future objectives for additional tooling functions
    - ½"PE COAM using perfection stab fittings (currently testing)
    - Gas indicator and camera inspection (currently testing)



Current Keyhole Applications

- Anode and test point installations
- Valve Grease Stem/Buttonhead Repairs and installations
- PE Cap repair and replacements
- CVT, NBT and all other below ground threaded cap or plug repair
- Abandon service sectionalizing
- PE ½" COAM with perfection caps (currently being field tested)
- More advance tools for investigation purposes (ie: long handle camera's, lights, gas indicators, pipe to soil readers)





Keyhole Service Line Disconnect and Abandonment Program - Implementation Plan

- Establish working agreement with Kravitch Machine Co. / C.R.Wall / ADE Excavation.
  - Identify Gaz Métro's current needs (completed Q2 2013)
  - Design and create universal tooling system for ¾" PE Service line abandonment using electro fusion fittings (completed Q3 2013)
  - Realize laboratory/field testing (completed Q4 2013)
  - Determine savings and benefits (In progress)
  - Create a procedure and training packages (to be done)
  - Implementation and crew training (to be done)

GazMétro life in blue

C.R. Wall & Co. Inc. SINCE 1981 WALL

LE GROUPE ADE AQUA DRAIN EXCAVATION

Gas Water Tools Kravitch Machine Co.

Keyhole Service Line Disconnect and Abandonment Program – Main steps

A- Pipe locating

B- Coring saw - 24 in

C- 24 in Core removal

D- HydroVac

E- PE Pipe cutting

F- PE Pipe scrapping

Keyhole Service Line Disconnect and Abandonment Program – Main steps

G- PE Pipe cleaning

H- Electrofusion

I- PE Ending cap

J- Bonding material

K- Coring reinstatement

L- Finished repair

Keyhole Service Line Disconnect and Abandonment Program – Savings & Benefits

- Savings (based on field tests – municipal road)
  - 30% cost saving (including contractor costs)
  - Additional savings expected when workers become familiar with the process

- Benefits
  - Cost savings
  - Improves Worker Safety
  - Reduce Delay and Public Inconvenience
  - Reduce Greenhouse Gas Emissions
  - Improve Pavement/Road Integrity and Appearance
  - Improve Relationships with Municipal Jurisdictions

Keyhole Future objectives for additional tooling functions

- 1-1/4” and 2” PE service line disconnects
- Aldyl A cap repair and replacement
- PE service line installation/replacements

Issues/needs

- Communication with municipalities and other utilities
- Development of a communication plan