

RÉHABILITATION DE CONDUITES D'EAU POTABLE

Water Main Rehabilitation



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Brian Thorogood, P.E., Dir. général



Ville de Waterloo, Ont. – Rue Albert – Juillet 2015



Objectif: Démonstration de la méthode de réhabilitation Tomahawk.

Longueur: 100 mètres, diamètre: 150 mm

To demonstrate Tomahawk cleaning and airborne lining process to potential applicators and municipal customers. To validate performance of cleaning and lining as part of joint R&D project.



Technique de réhabilitation développée en partenariat



Mise en contexte - conduites d'eau potable

La corrosion: *un défi commun*

Réduit:

- Qualité de l'eau
- Capacité hydraulique
- Intégrité structurale
- Durée de vie utile

• Augmente:

- Fuites et bris
- Plaintes des usagers
- Coûts d'entretien



Méthode Tomahawk™

Procédé aérodynamique

Méthode brevetée Tomahawk™
(unité d'injection)

Camion vacuum standard

Jusqu'à 140 mètres
entre deux excavations

Le méthode Tomahawk™ renouvelle les conduites d'eau potable désuètes avec l'aide d'abrasifs projetés par un flux d'air à haut volume et à basse pression sans utiliser d'eau.

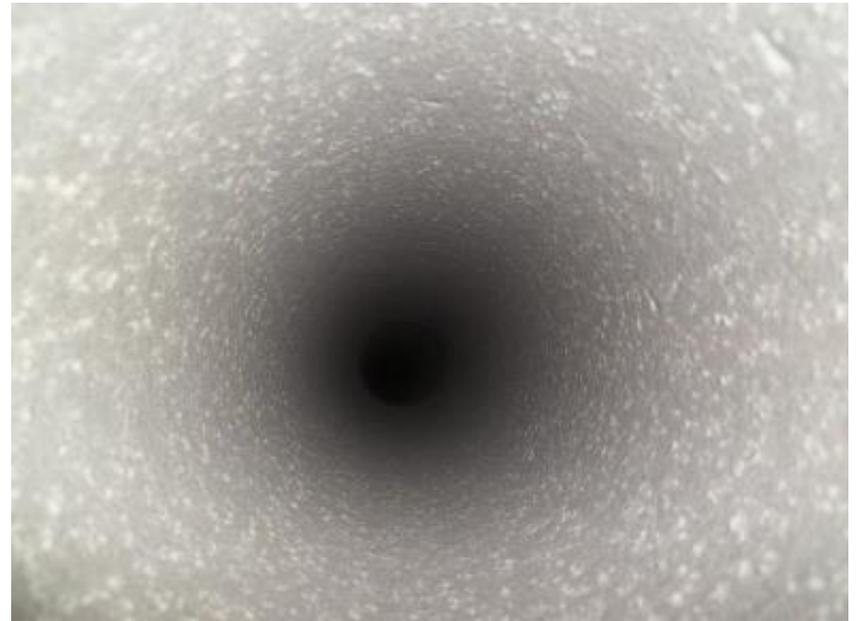
Aspiration

Injection

Excavation

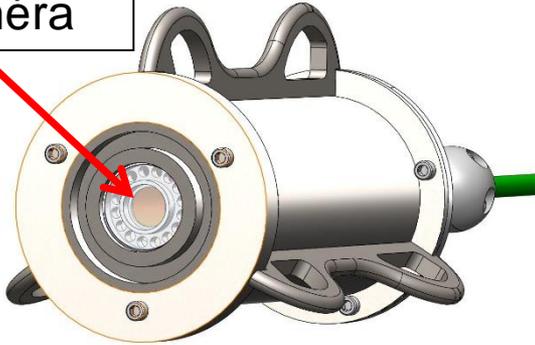
- ✓ Procédé **sans eau**, sans poussière
- ✓ Technique sans tranchée
- ✓ 100mm à 300mm
- ✓ Rapide (retour du service en 24 hrs)
- ✓ Réseau temporaire optionnel

Vidéo : Nettoyage



Le Scout

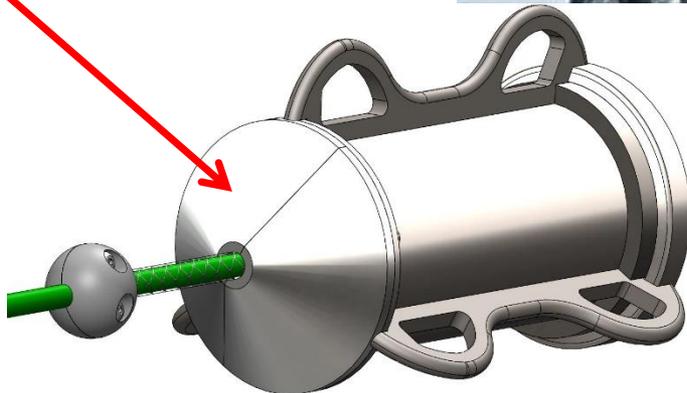
Caméra



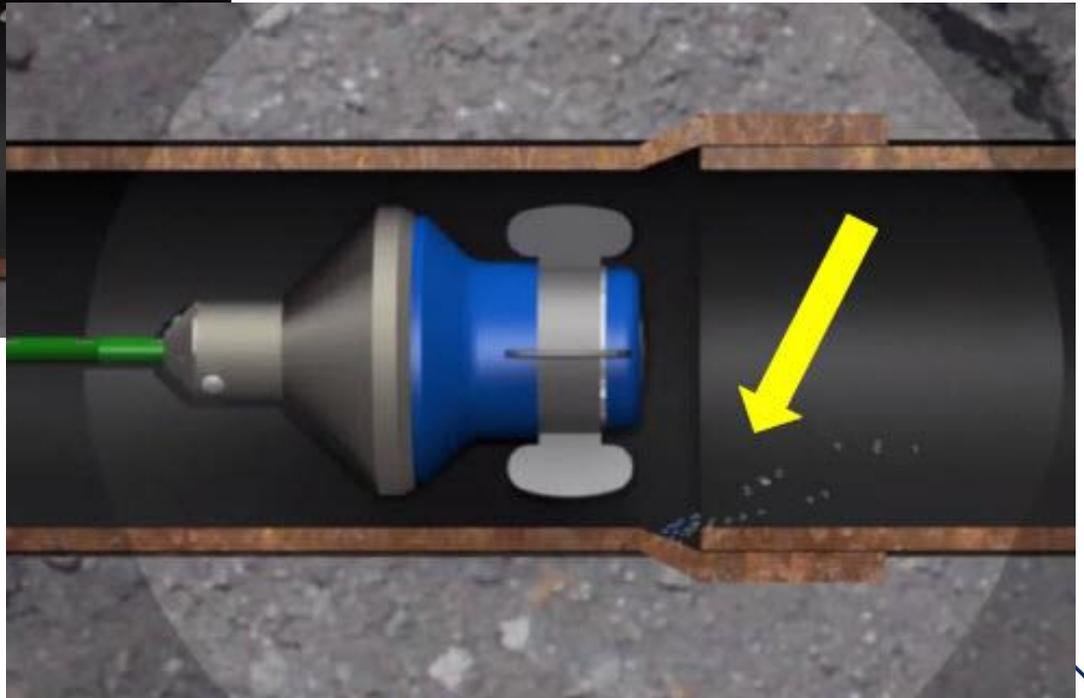
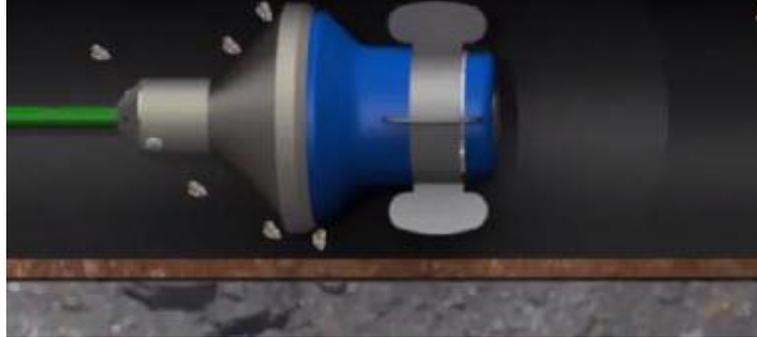
Insertion des abrasifs

Insertion du Scout

Déflecteur des abrasifs



Finition dans la conduite



Défecteur

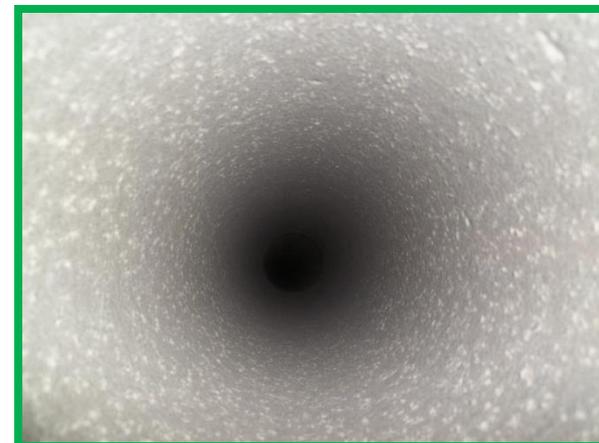
AVANT



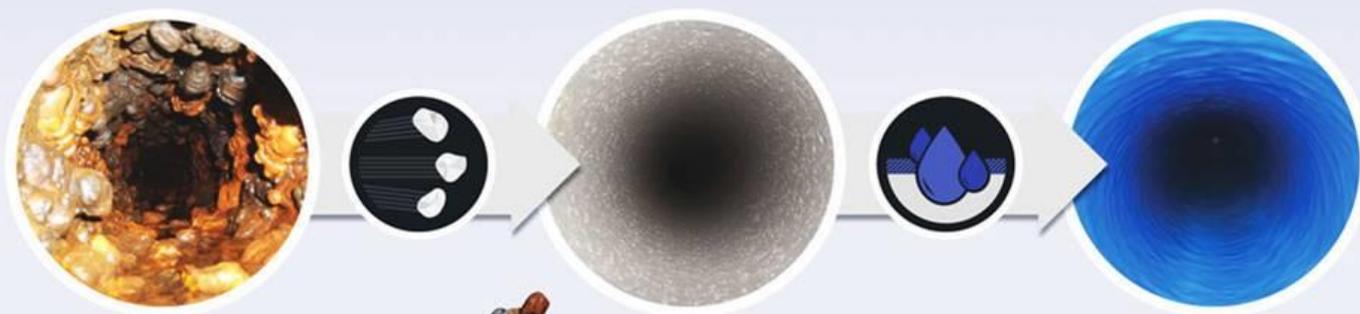
Conduites en
fonte grise et
ductile, acier,
ciment amiante,



APRÈS



RÉHABILITATION DE CONDUITES D'EAU POTABLE

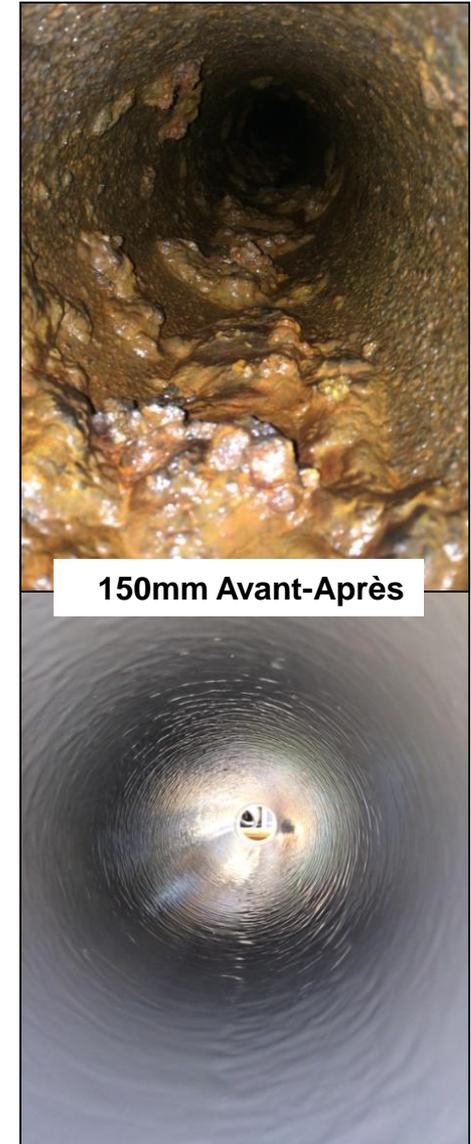


Vidéo: Injection de la résine



Réhabilitation

- AWWA M28, Class I – “ Prévient la corrosion, l’accumulation de dépôts et la coloration de l’eau”
- Freine les piqures de corrosion
- “ Un grand pourcentage des conduites en fonte ne nécessite qu’une protection contre la corrosion ”



Vidéo



Waterloo - Rue Albert

Entrée de service



Vue des deux directions

Same service connection viewed from both directions



Waterloo - Rue Albert



Recouvrement de l'entrée de service sans blocage

Pictures show pipe section with service connection that was removed from ground. Some liner coverage can be seen around interior with no resulting blockage.



Waterloo - Rue Albert

Joint



Vue des deux directions

Same pipe joint viewed from both directions



**Le revêtement freine les
piques de corrosion de
façon permanente**



Trenchless Technology Magazine – Canada January 2016

EXPANDING



THE CAPABILITIES

AIRBORNE BARRIER COATING CAN
ADD YEARS OF LIFE TO PIPES

BY MIKE

AFTER FINDING SUCCESS CLEANING WATER PIPES USING ABRASIVE STONES AND LOW-PRESSURE AIR.

Envirologics Engineering Inc. is in the process of expanding the capability of its Tomahawk system.

The Tomahawk System — commercially available since 2012 — removes tuberculation, corrosion, biofilms and old tar-based liners in potable water pipes. The system can clean pipes from 4- to 12-in. diameter and up to 500 ft in length. When the cleaning is

complete, the utility owner is left with a clean, dried and inspected pipe suitable for rehabilitation with sprayed-in-place pipe (SIPP) or cured-in-place pipe (CIPP) lining.

"Tomahawk was initially developed to be an airborne abrasive cleaning system. It provides a high-quality abrasive blast finish and dries the pipe in preparation for a CIPP or SIPP product lining," says Brian Thorogood, P.Eng, general manager.

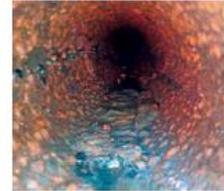
As is often the case through a product's development cycle, things change. In Envirologics' case, about two years into the development of the Tomahawk System, engineers noted that, in many instances, the cleaned pipe was structurally sound and could be rehabilitated using a thin,

well-bonded barrier coat as opposed to a semi-structural SIPP liner or a fully structural CIPP liner.

This prompted Envirologics engineers to develop an application system for this thin barrier coat that used the airborne application methodology and much of the same equipment already onsite during the Tomahawk system cleaning.

A BARRIER IS BORN

By adding a pre-calculated amount of polymeric coating to the airstream followed by the deployment of a proprietary distributive body to pull through the pipe, engineers found they could create controlled turbulence, which evenly



THE PHOTOS ABOVE, FROM LEFT, SHOW THE SAME WATER PIPE BEFORE CLEANING, AFTER A TOMAHAWK CLEANING AND AFTER THE TOMAHAWK BARRIER COATING. THE IMAGES ARE FROM THE JULY 2015 WATERLOO DEMO. CREWS WERE ABLE TO LINE 50 M OF PIPE IN 10 MINUTES.

tion is receptive to seeing new technologies in action.

"Ersman Construction sees the potential in this and likes being part of

ects. Similarly, the barrier coating system offers a lower cost alternative to those experiencing what Pearce referred to as aesthetic issues of water — discoloration,

barrier coating — and sent it to the University of Waterloo, CATT's base of operation, for analysis.

"We [Waterloo] have tried to maintain a perspective of doing what we can to help advance the trenchless industry and innovative solutions. I think that the Tomahawk cleaning and lining systems is innovative," Pearce says. "I look at it as a learning opportunity for everyone here at the City, and I think the learning opportunity should not be passed up. Every new technology or idea has to have an opportunity to be tried in the field so that the weaknesses or the errors can be addressed so that the industry can move forward, and that technology can move forward."

system will be available for pipes from 4- to 12-in. like the cleaning system. Kramer adds that they are also looking at using the cleaning and coating system to provide life extensions and encasement for asbestos cement pipes.

MARKET AVAILABILITY

In terms of market availability, Kramer and Thorogood say the Tomahawk System barrier coating method is targeted to be commercially available in 2016, and throughout the year will continue product demonstrations and small projects. The next demo is set for the spring in Kingston, Ontario.

At this time, the bulk of the research on the barrier coating system is focused on 6-in. pipe, which is the predominate water distribution system pipe size in North America. "Our entire complete, the system will be available for pipes from 4- to 12-in. like the cleaning system. Kramer adds that they are also looking at using the cleaning and coating system to provide life extensions and encasement for asbestos cement pipes.

Mike Kezdi is associate editor of *Trenchless Technology Canada*.



AFTER THE WATER LINE WAS CLEANED, CREWS BEGIN TO ADD THE TOMAHAWK BARRIER COATING.





Vidéo: R & D





106 mètres (350 pieds)



Rapport

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A banner image for CATT. On the left, a close-up profile of a person's head and shoulder, looking towards the right. In the background, a blurred scene of a meeting or conference with people seated at tables. On the right side of the banner, there is a presentation screen displaying a diagram or chart. The banner has a dark background with white and red text and logos.

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Conduite en fonte



Figure 4: Adhesion testing of lining



Résultats fonte

Figure 3: Specimen description/labeling

Table 2 shows the adhesion test results. The pull-off strength values varied from a minimum of 14.5 MPa (2095.8 psi) to a maximum of 18.3 MPa (2655.6 psi). Figure 4 shows the observed glue and cohesive failures.

Table 2: Adhesion test results (Sample 515 Bottom)

Dolly No.	Pull-off Strength		Cohesive Failure %	Adhesive Failure %		Remarks	
	MPa	psi					
1	14.5	2095.8	Glue (<i>Y</i>)	0%	<i>Y/Z</i>	0%	Glue failure
			Lining (<i>B</i>)	0%	<i>B/Y</i>	100%	
			Substrate (<i>A</i>)	0%	<i>A/B</i>	0%	
2	11.3	1631.7	Glue (<i>Y</i>)	90%	<i>Y/Z</i>	0%	Glue and lining failure
			Lining (<i>B</i>)	10%	<i>B/Y</i>	0%	
			Substrate (<i>A</i>)	0%	<i>A/B</i>	0%	
3	18.3	2655.6	Glue (<i>Y</i>)	0%	<i>Y/Z</i>	0%	Inter-lining failure
			Lining (<i>B</i>)	100%	<i>B/Y</i>	0%	
			Substrate (<i>A</i>)	0%	<i>A/B</i>	0%	



Résultats

1 épaisseur

2 épaisseurs...





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