

## **Product Spotlight**

# **New Core Patch Bonding is Stronger than Pavement**

wo decades ago vacuum excavation was hailed as a major breakthrough in underground utility construction. Today, a new process of rotary coring and pavement reinstatement developed and field-proven over the past ten years by Enbridge Gas, Distribution, is being touted as the perfect complement to that innovative excavation process which makes it easier and cheaper to access or identify underground facilities buried under pavement.

"Rotary and coring pavement reinstatement is the front-end and back-end of vacuum excavation," says Colin Donoahue, Manager of Field Operations for Utilicor Technologies Inc., the manufacturer and distributor of the process. "The purpose-built rotary cutter quickly and accurately cuts through all kinds of paved surfaces and allows you to vacuum excavate to expose the underground plant," says Donoahue, who spent vears in the vacuum excavation business before joining Utilicor. "Once the repair has been completed and the hole backfilled to the level of the base of the pavement, the core or "coupon" that was originally cut from the pavement, is reinserted back into the road surface and permanently bonded by a special proprietary adhesive (Utilibond<sup>TM</sup>) which creates a waterproof bond stronger than the original pavement."

"It's the most exciting and productive maintenance innovation that I've come across in my more than 18 years with the company," said Keith Griffin, Regional Manager Distribution Metro Region for Nicor Gas, which inaugurated the coring and reinstatement program in April 2003."

"It's amazing," says Bob Jones, Distribution Supervisor and the project manager at Nicor Gas, "once the repair has been completed and the core cemented back into place with Utilibond, we can be open for traffic in 30 minutes!" In addition to utility maintenance, the process also has direct application to other underground and trenchless operations including: test holes, service drops and shallow splice pits for the telecommunications and cable industry, daylighting and test holes and bore-gel blow-out holes for directional drilling and inspection holes for pipeline integrity and SUE. Based on actual experience, rotary coring and reinstatement literally pays for itself within six to eight weeks from paving budgets and cost savings on road cut fees.

"The process also works for the municipality," says Donoahue. "Not only is the precise circular cut 80% smaller than a conventional rectangular road-cut, but it is almost invisible after the repair, which makes it aesthetically pleasing to the municipality that owns the road. Its high-strength, waterproof bond and circular shape also means no more corner stress cracks and no groundwater leaks that penetrate the subsurface and cause pavements to fail prematurely. This can add years to the life of the roadway and can be the source of major tax savings for the municipality." "It's a 'win-win' for everyone," says Donoahue.

#### Utility Cuts and Pavement Performance

Improperly restored utility cuts can affect pavement performance and contribute to deterioration and reduced pavement life.

Keyhole technology procedures and rotary coring and reinstatement processes are designed to minimize the impact of utility cuts on roadways and other paved surfaces by reinstating the paved surface to the operating condition that preceded the repair. Pavements are designed as systems to transfer or share the vertical wheel load laterally across the paved surface, thereby reducing the vertical pressure on the subgrade.

"Effective coupling is achieved where the road will share the effect of traffic loading, as postulated in conventional road design theories," says Sandy Brown, project manager at Golder Associates, the international engineering firm which has monitored the development and implementation of the process over the last 10 years. "Our lab trials and field demonstrations on the rotary cutting method have shown that the reinstated pavement coupon has been bonded into the slab in such a manner that the loads of traffic are effectively transmitted to the remaining intact slab and the road is as good as it was before the excavation." (see figure below)

The illustration on the left shows how the normal uncut road distributes the surface load transversely through the pavement (the red area) in accordance with its design.

The center illustration shows the result of a conventional utility cut repair in which, because the edge of the repair has not properly bonded to the remaining pavement, the road has not been reinstated as a system. In this case the surface load is not transmitted laterally beyond the perimeter of the cut, with the result that the pressure (the red area) is concentrated downward in a vertical plane directly into the



Utility cuts reinstated with Utilibond restore the ability of the road to perform as a system and share the surface load laterally as originally designed, thereby minimizing damage to the sub-grade.

sub-grade where it can contribute to a more rapid deterioration of the roadway. In extreme cases, the pavement cut repaired in the conventional way, may actually "float" free of the rest of the surface resulting in surface cracking and spalling.

Finally, the illustration on the right, shows the results of a utility cut reinstated with Utilibond<sup>TM</sup>. In this case the core and the balance of the pavement have been reintegrated into a load-bearing system, capable of laterally transmitting the surface load across the original cut lines to the remainder of the roadway. The reinstated roadway is again capable of performing in accordance with the original pavement design specifications.

The circular shape or geometry of the cut is also important. Square or rectangular utility cuts after repair tend to concentrate stress in the corners causing corner cracking which can allow surface water to infiltrate the paved surface and undermine the road. There are no corners in a circular hole. No corners - no cracks.

The hole is also smaller and more precise, with no trauma from pounding jackhammers and backhoes. The neat, almost invisible circular keyhole excavation is also more aesthetically pleasing and is less than a quarter of the area of a conventional 2ft. x 4ft. rectangular road cut. From both a performance and aesthetic point of view, the smaller footprint the better.

#### It's All in the Bond

While there are a variety of coring tools available, the key element in the pavement reinstatement process, is the bonding compound used to restore the repaired roadway. To be effective it must be able to bond the core to the remaining intact slab of pavement in a manner that allows the road to again perform as a system and to share the effect of traffic loading. It must also generate sufficient bond strength to quickly meet relevant AASHTO standards and allow the road to be opened to traffic as soon as possible.

In July 2003, the performance of Utilibond<sup>™</sup> was tested by Professor David A. Lange, Ph.D., P.E., FACI of the Department of Civil Engineering at the University of Illinois at Urbana-Champaign and compared with two other bonding compounds currently being experimented with in California and Pennsylvania.

Because the objective of the bonding compound is to cost-effectively and permanently restore a pavement to its pre-excavated condition and allow it to accept normal traffic loads as soon as possible after the repair, the tests focused both on absolute bonding strength as well as on the time taken for the various



The Utilicor coring unit operates through a complete 270° arc, allowing the truck to be positioned on the shoulder or off the traveled surface to minimize traffic disruption.

bonding compounds to achieve sufficient strength to meet or exceed AASHTO standards.

The University of Illinois tests showed that the Utilibond<sup>™</sup> material achieved an average punch out safety factor of 4 to 5 times the AASHTO standard at the 30 minute test, i.e. a comparative load bearing factor equivalent to more that 50,000 lbs. The other two products did not achieve measurable or sufficient strength gain until at least one hour in one case and two hours in the other.

According to Dr. Lange "the Utilibond<sup>™</sup> material excelled consistently as a rapid set material, achieved the highest punch out loads at all test times and was the only product to set up and gain strength within 30 minutes." Given the proposed application, it was Dr. Lange's opinion that this substantial time differential in set up and strength gain represented "a significant difference in performance that effectively differentiate the performance of bonding materials for reinstatement of cores."

#### A Win-Win Process

The rotary coring and reinstatement process dramatically reduces paving budgets and saves up to \$1,000 per hole over traditional pavement cut and repair methods. Because it is a faster, less intrusive process, it results in fewer complaints from municipalities about unsightly road cuts, sunken patches or weakened or failed roads and can be a source of positive community relations. It is a reliable, fieldproven process with ZERO reported failures in more than 10 years and over 5,000 successful coring and reinstatements in tough urban climates. One-stop, same-day coring and pavement reinstatement means improved logistics for both the utility and its contractors with simplified crew scheduling, no temporary patching or repaving and no repeat site visits. With a ten year, proven track record, supported by independent engineering reports and test data, quick approval for the process is gained from municipalities and other highway authorities or DOTs.

In addition to Enbridge Gas Distribution, which has used the process for ten years in Canada, Rotary Coring and Reinstatement is currently being used in Michigan by MichCon Gas, in Maryland by Baltimore Gas and Electric, in Illinois by Nicor Gas, in Oregon by NW Natural, in California by Southern California Gas and in the District of Columbia, Virginia and Maryland by Washington Gas. **UF** 

### **Contact Information**

Utilicor Technologies Inc.

- 1090 Don Mills Road, Suite 600 Toronto ON, Canada M3C 3R6
- 411 S. Wells Street, Suite 400, Chicago IL, USA 60607 Toll Free 1-888-572-666 Email: info@Utilicor.ca Website: www.utilicor.ca

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