

Safer Access, Smarter Inspection: Reach Master Deployment at UPL

How a breakthrough decision at UPL in scaffold-free technology transformed high-access industrial inspections across our plant infrastructure.

Competitiveness in globalized sectors like the chemical and petrochemical industries is predicated on two fundamentals: safety and operability. A plant must operate reliably, inspect critical assets on time, and protect its people from avoidable risk. Timely detection of material loss and structural defects does not just mitigate operating risk; it directly reduces energy wastage and material loss. At UPL, these core priorities guide the way we evaluate and adopt new technologies.

As part of this commitment to operational excellence, UPL recently deployed **Reach Master**, an advanced telescopic pole-based robotic inspection system developed by deep-technology startup Octobotics. The objective was clear: to completely eliminate dependency on conventional scaffolding and work-at-height methods, improve access to highly restricted locations, and enable rapid asset integrity checks with robust, defensible data.



Figure 1: Ground-based UTM inspection of a tank shell using Reach Master, without scaffolding.



Figure 2: Remote inspection of a chemical tank roof, eliminating the risk of roof-collapse incidents.

The Inspection Access Challenge

Chemical manufacturing facilities house a wide, dense array of high-value assets requiring periodic structural inspection, including storage tanks, elevated process lines, civil structures and overhead pipe racks. While these assets are critical to total plant reliability, accessing them via conventional methods introduces substantial logistical bottlenecks.

Traditionally, extensive scaffolding networks must be engineered, erected, and safety-certified before any actual non-destructive testing (NDT) can begin. This setup process consumes several days, heavy manpower, and intense permit coordination for an execution window that may only take a few minutes. This structural mismatch creates an operational challenge where deferred inspections sometimes directly affect predictive maintenance modeling, while excessive preparation costs disrupt routine plant activities.

What Reach Master Enabled at UPL

The deployment of the Reach Master system allowed our asset integrity team to execute close visual inspections and highly accurate ultrasonic thickness Measurement (UTM) at height while the operator remained safely positioned at ground. The lightweight telescopic system carries specialized inspection tool directly to the asset surface, eliminating the need for personnel to climb or deploy rope access teams.

During the campaign at UPL, the system was seamlessly deployed across several critical scenarios:

- **High-Vertical Tank Shells:** Conducting precise ultrasonic thickness gauging on tank shell up to 20 meters high directly from ground level.
- **Obstructed Wind Girder Zones:** Accessing the notoriously difficult-to-reach areas above tank wind girders and structural stiffeners, zones where conventional magnetic crawlers get blocked and cannot cross.
- **Overhead Pipe Racks & Lines:** Delivering full 360-degree thickness and visual coverage on elevated process lines up to 10 meters from ground.
- **Live Pipeline Condition Monitoring:** Using specialized curvature adapters to conform perfectly to pipelines from 2 inches upwards, mapping localized corrosion pockets across 0°, 90°, 180°, and 270° orientations.
- **Through-Coat Measurement:** Utilizing advanced through-coat UTM probes to read remaining wall thickness directly through existing paint and coatings, completely removing the need for time-consuming surface stripping and chemical preparation.



Figure 3: Team inspecting a high-altitude pipe rack using Reach Master



Figure 4: Curvature adapter enhancing probe stability and measurement accuracy on curved pipe surfaces

The Dual-Variant Deployment Strategy

To align with the varied hazard zones across our plant, the campaign successfully utilized the two specialized Variants of the Reach Master. This dual-variant approach ensured that mechanical and structural inspection parameters were perfectly matched to local safety requirements:

Reach Master - C	Reach Master – Ex
Non-Intrinsically safe • Through-Coat UTM Gauging (no coating stripping required) • Surface preparation capability via integrated rotary wire brush / grinder module • 4K wireless visual inspection camera with high-power light feed • 180° adjustable carbon fiber arm to reach under flanges and over wind girder obstacles • Paint spray setup mounted on telescopic pole for immediate spot touch-ups	Intrinsically Safe Identical in functional performance, but engineered specifically for explosive plant zones. • Zone 0 and Zone 1 Certified for intrinsic safety across all electrical and structural components • Deploys on a live, fully operating tank with absolutely zero ignition or sparking risk • Eliminates the requirement for unit shutdowns, gas-freeing, or hot-work control permits • Allows continuous asset integrity tracking within active chemical vapor atmospheres

Quantifiable Safety & Operational Impact

By shifting from risk mitigation to risk elimination at the source, Reach Master removes the need for personnel to work at height, erect scaffolding, or access hazardous areas for routine inspections. Tasks that once required elevated access can now be safely performed from ground level, effectively eliminating worker exposure to many common inspection-related hazards.

20 m MAX TANK SHELL REACH	10 m PIPELINE VERTICAL REACH	99% MEASUREMENT ACCURACY	0 WORKERS IN HAZARD ZONE
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Reach Master vs. What Came Before

To appreciate how significant this shift is, it helps to understand the limitations of what the Reach Master replaces. Magnetic crawlers, the previous standard for automated tank inspection, operate on a restrictive line-scan principle that only covers roughly half the available surface, cannot go beyond wind girders, require the tank to be empty, and require complete unit shutdowns for Ex-rated zones.

Capability / Feature	Reach Master / Reach Master-Ex	Magnetic Crawler (Line Scan)
Hazardous Zone (Zone 0/1)	✓ Intrinsically safe , Ex-rated; no shutdown needed	✗ Not Ex-rated ; unit shutdown required
Live Tank Operation	✓ Full tank , roof & wind girder accessible	✗ Tank must be emptied first
Surface Preparation	✓ Through-coat probe ; no paint stripping required	✗ False readings if rust or heavy coating present
Pipeline 360° Coverage	✓ 0°/90°/180°/270° from 2" pipes upwards	✗ Top-of-pipe unreachable effectively
Plate Coverage Quality	✓ Multi-point - detects localized corrosion pockets	✗ Single line scan , misses 50% of area localized defects
Human Risk Exposure	✓ Zero - operator stays firmly at ground	✗ Operator near vessel - high-altitude risk remains
Scaffolding & Downtime	✓ None - immediate setup; live deployment	✗ Days of preparation and structural downtime required

Conclusion: A Shared Vision for Smarter Operations

The successful integration of Reach Master at UPL reflects a highly practical approach to industrial innovation. The true value of robotics lies not in its complexity, but in its ability to solve real plant problems: protecting our people, protecting our assets, and lowering operational costs. By moving early and adopting scaffold-free, intrinsically safe robotic systems, UPL has raised the standard for what is possible in chemical plant operations, ensuring our facilities remain among the safest, most reliable, and most competitive in the world.

