

# FlexoFORM Pipe Elbow Inspection Solution Phased Array Corrosion Mapping



The innovative FlexoFORM™ scanner makes challenging pipe elbow corrosion inspection easier. With flexible phased array technology, one probe is all you need to cover the full range of elbow diameters.

### Key Features

- Quickly measure wall thickness of elbows
- 100% elbow coverage for high probability of detection
- High-resolution data (1 mm × 1 mm)
- Intuitive 2D C-scan imaging

# The Power of Flexibility



The FlexoFORM scanner inspecting the intrados of a 4.5 in. OD pipe elbow.

Pipe elbows are susceptible to damage, such as from flow-accelerated corrosion (FAC). However, inspecting them poses unique challenges. Because their surface shape changes from convex on the extrados (outside curve) to concave on the intrados (inside curve), and because many diameter standards exist, ultrasonic testing to evaluate damage in the elbow was limited to doing spot check thickness measurements using probes with small footprints.

The FlexoFORM™ solution solves the challenges of pipe elbow inspection and enables 100% coverage with intuitive C-scan imaging. The solution integrates flexible ultrasonic phased array probe technology and a water column in a scanner that is easy to use and offers high productivity.

## A Convenient Elbow Inspection Solution

The scanner's strong magnetic wheels minimize the operator's physical input while following the scan lines. The wheels keep the scanner attached to the pipe, and a foam gasket is permanently in contact with the surface to keep the water column filled. The wedge minimizes water consumption and provides easy air bubble management. The water column enables the scanner to conform to extrados and intrados shapes, couple to surfaces with moderate roughness, and synchronize data to the front wall.

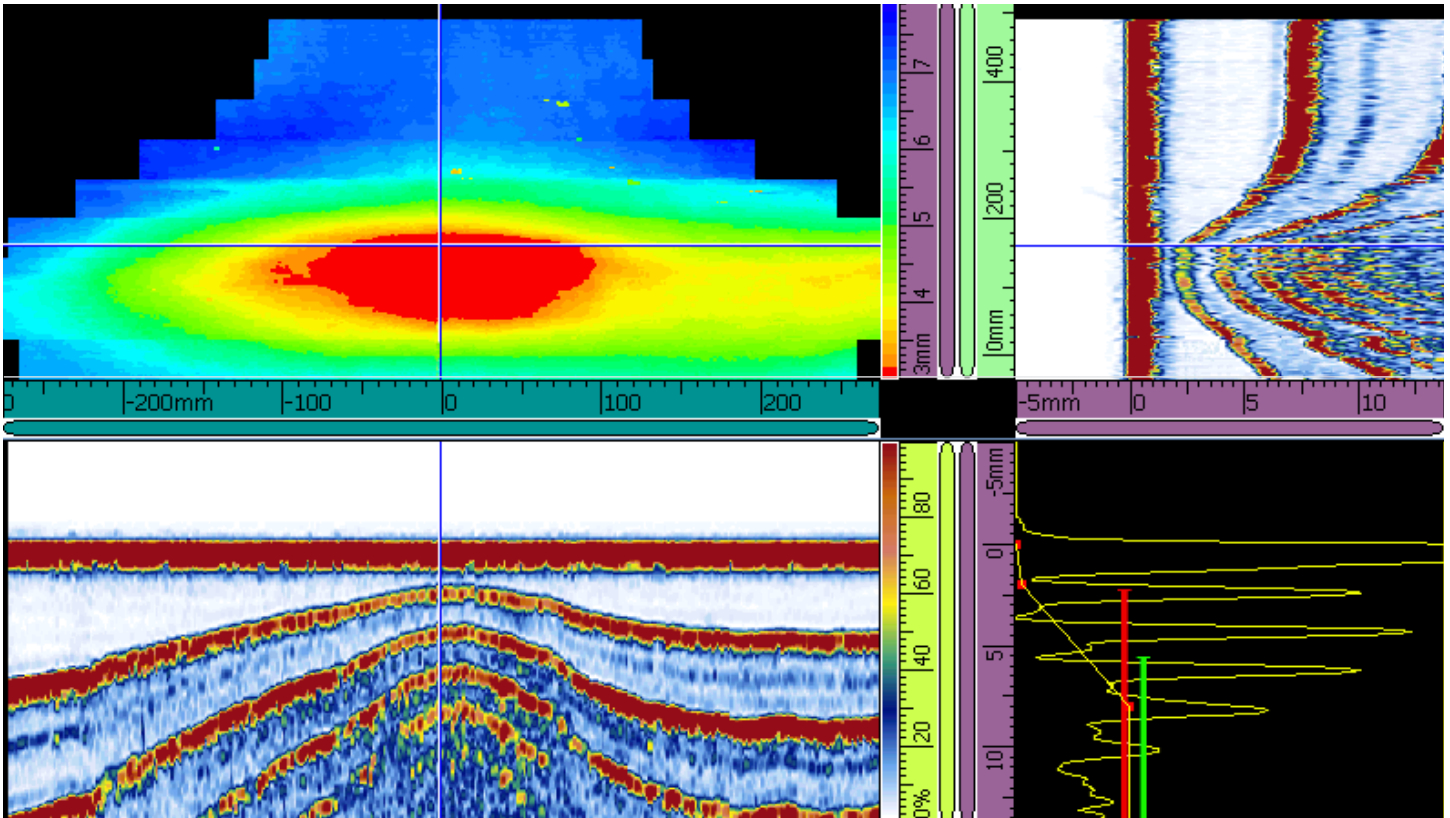
The only part that needs to be changed is the wedge, which is contoured to fit a specific diameter. The flexible array is shaped by the wedge to sit concentric to the elbow's surface, enabling the use of simple 0-degree focal laws, similar to inspecting a flat surface.





## High-Resolution Data

The FlexoFORM scanner is used with an OmniScan® MX2 or SX flaw detector to acquire and save data with a resolution as high as 1 mm × 1 mm to detect and measure different types of damages or anomalies such as remaining wall thickness, corrosion pitting, and mid-wall lamination or inclusions. The high-density data combined with the multiple views available directly in the flaw detector or through OmniPC™ software provide clear images of the pipe material's condition and make data interpretation faster and easier. Because the entire surface of the elbow is covered, the FlexoFORM solution is less dependent on the operator and provides an improved probability of detection as compared to simple spot checking.



The scan direction is encoded, and an indexing button is positioned directly on the scanner to perform the index increment in the second axis to create 2D surface maps within the same file.

## Longitudinal Inspection with the FlexoFORM™ Scanner



The FlexoFORM scanner can also inspect pipes in the longitudinal direction. This configuration is especially useful for smaller pipes or when the region of interest is concentrated within a specific sector around the pipe. In these situations, inspection in the longitudinal axis can be more appropriate than scanning in the circumferential direction with a flat phased array probe. The FlexoFORM scanner can also be a powerful tool for the inspection of water walls in power generation boilers.

## Wedges

Along with the scanner's wedges, a wedge series for small-diameter pipes and a series for automated rastering two-axis scanners are also available. All wedge series use the same flexible array probe.



### Small-diameter wedge series

Used to inspect pipes with diameters smaller than 4.5 in. Users can manually scan the extrados of elbows or pipes from 1.3 in. OD up to 4 in. OD. The wedge can be fitted with a Mini-Wheel™ encoder to create an encoded one line scan.

### Automated 2D rastering wedge series

For 100% inspection of corrosion in pipes, the HydroFORM® scanner, combined with the MapROVER™ or SteerROVER scanners, represents a field-proven, reliable option. In some applications, scanning in the longitudinal direction may be preferred over scanning circumferentially. The SFA1-AUTO wedge series works on pipes with diameters from 8.6 in. OD and up, including flat surfaces.

## Ordering information

Item Number	Part number	Description
Q7500062	FlexoFORM	FlexoFORM package with probe and one (1) SFA1 water wedge for 8.625 in. outside diameter. 5 m long cables compatible with current generation of OmniScan and Focus instruments.
Q7500063	FlexoFORM-Kit	FlexoFORM package with probe and six (6) SFA1 water wedges (for 4.5 in., 6.625 in., 8.625 in., 10.75 in., 12.75 in., and 16 in. outside diameters). 5 m long cables compatible with current generation of OmniScan and Focus instruments.
Q3301202	7.5L64-64X7-FA1-P-5-OM	Flexible phased array probe, 7.5 MHz, 64 elements, 1 mm pitch, 7 mm elevation, FA1 case type for the FlexoFORM scanner (SFA1-FLEXO), SFA1-SMALL and SFA1-AUTO wedge series, 5 m cable length, and OmniScan connector.

Probe Type	Wedge Series	Pipe Diameter
<b>SFA1</b>	<b>FLEXO</b>	<b>OD8.625</b>
	<p><b>FLEXO</b> Compatible with FlexoFORM. Diameter range: 4.5in OD up to flat.</p> <p><b>AUTO</b> Compatible with MapROVER and SteerROVER. Diameter range from 8.625in OD up to Flat.</p> <p><b>SMALL</b> Manual inspection with Mini-Wheel encoder. Diameter range from 1.3in up to 4in OD.</p>	Measured external pipe diameter (inches)

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