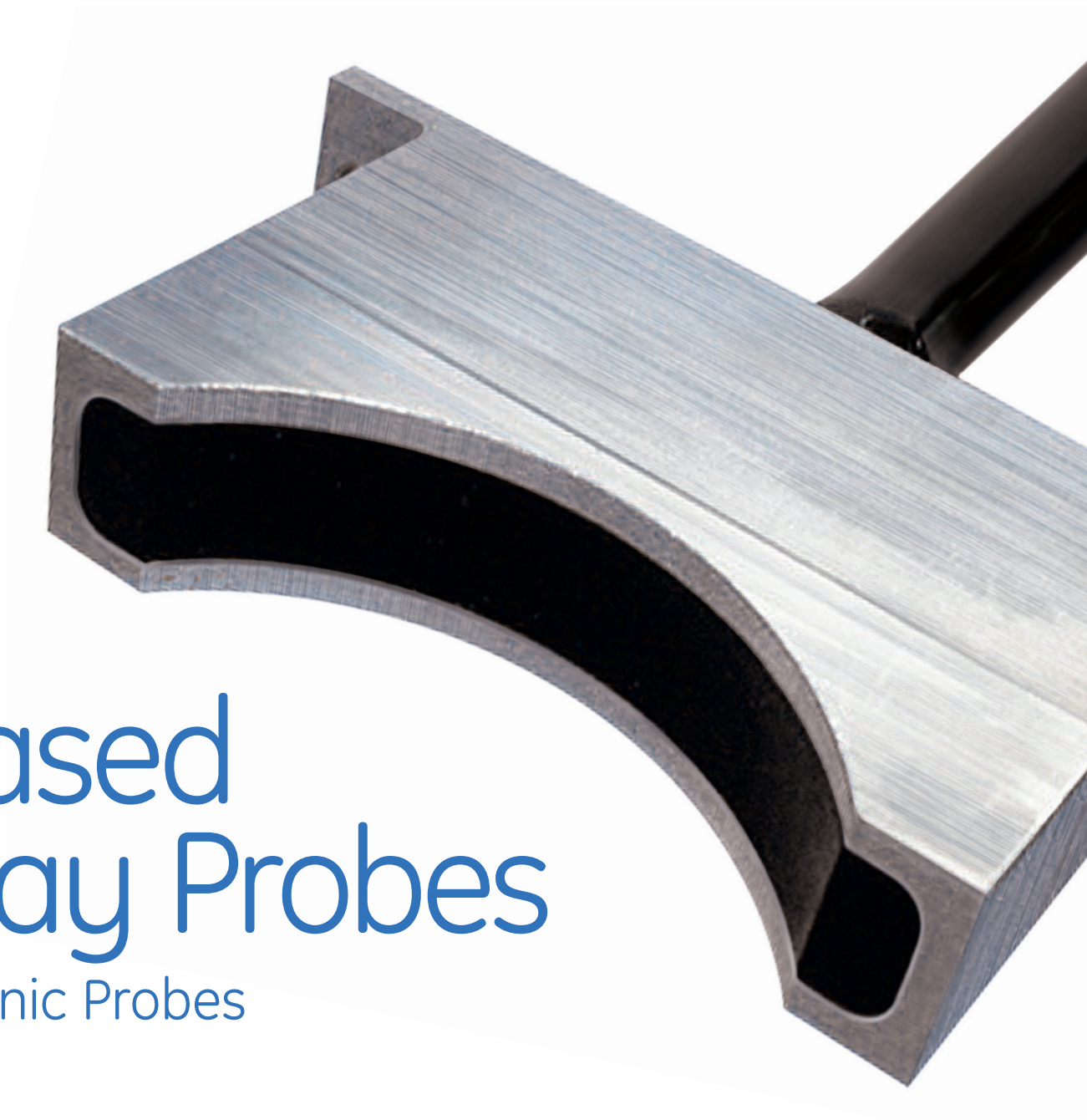
GE
Inspection Technologies



Phased Array Probes

Ultrasonic Probes

imagination at work

Driving Forward Ultrasonic Technology

GE Expertise

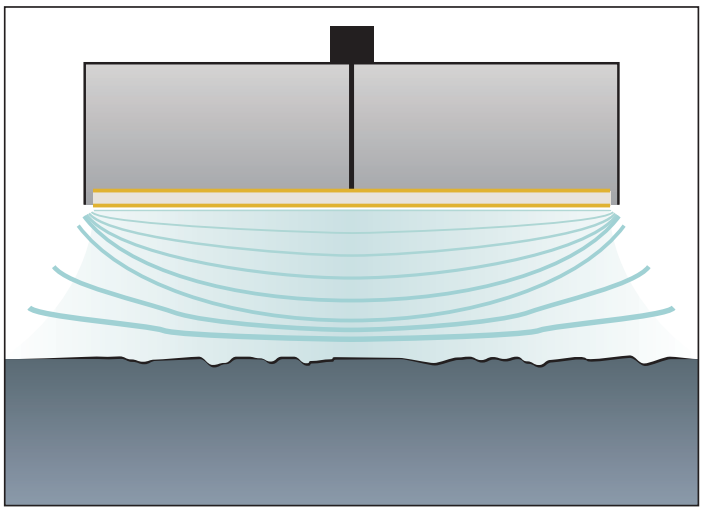
At GE Inspection Technologies, we have made a significant impact in realizing the full potential of ultrasonic testing. The development of phased array probe technology is a prime example. Our current generation of products is an astounding leap forward from conventional, single-element UT probes.

A phased array probe can be compared to a large single element transducer whose active area has been subdivided into small segments or elements. When connected to a phased array instrument, the angle and focus of the sound beam can be changed on each pulse repetition.

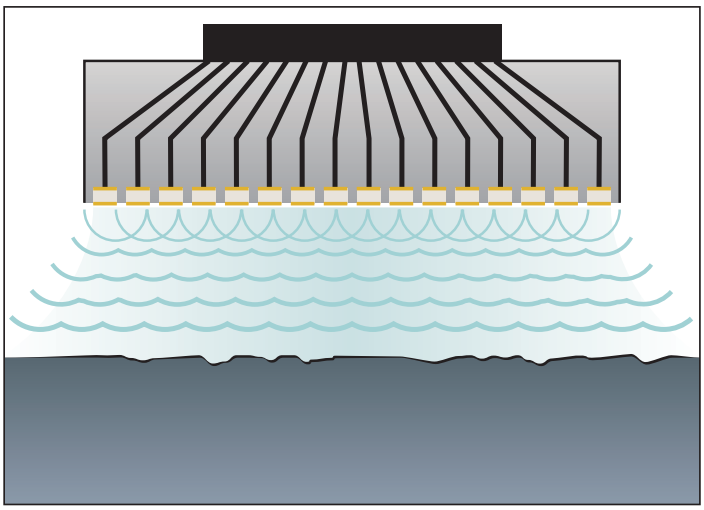
Both the phased array instrument and probes can be customized to application specific needs, regardless of the tested material or asset. GE will develop a tailored phased array solution with precise specifications. Users have the ability to both steer and focus the sound beam through a range of angles and focal depths, resulting in vast improvements in productivity and reliability for inspections.

What it does for you

- **Save Time** - Reduce time required to change test setups and reduce scan time
- **Reduce Complexity** - Eliminate multiple inspections with fixed angle and fixed focus probes
- **Greater Detectability** - Increase sensitivity and signal to noise ratio with electronic focusing
- **Increase Flexibility** - Inspect hard to access areas from a single contact point
- **Simplicity of Use** - Reduce or eliminate mechanical and manual manipulation



Single Element Transducer



Phased Array Transducer

What it all means

When looking at Phased Array as a technology, it's important to understand the terminology that goes along with it.

- **Pitch** - center to center distance between adjacent elements
- **Elevation** - width of array active area
- **Virtual Probe** - the number of single elements pulsed as a group to create the desired sound beam characteristics
- **Aperture** - dimensions of the virtual probe, i.e. [Pitch x Number of Elements] x Elevation

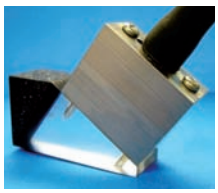
Types of Phased Array Probes

- **Linear** - Single row of elements, usually created by dicing a larger rectangular piezoceramic. Beam steering in a single plane.

- **Linear Curved** - Single row of elements that have been curved to produce a desired beam shape or conform to the geometry of the part under test. Beam steering in a single plane.

- **2D Matrix** - Elements arranged in a grid pattern. Can also be curved. Beam steering in three dimensions.

Angle Beam Phased Array Probes



Typical Applications

- **Power** - General weld inspection, austenitic welds, pressure vessels and piping, nozzles, turbine blades, rotors
- **Oil & Gas** - Pipeline girth welds, tanks, general weld inspection
- **Aerospace** - Weld inspection, landing gear
- **Automotive** - Axles, shafts, spindles, brake discs, wheels
- **General** - Welds, forgings, castings, tubular goods, bridges and structures

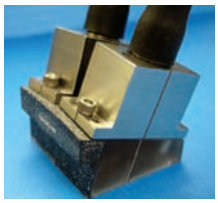
Typical Specifications (others available upon request)

Frequency (MHz)	Element Count	Pitch (mm)	Elevation (mm)
1.0	16, 32, 64, 128	1.0 to 3.0	10 to 25
1.5	16, 32, 64, 128	0.8 to 3.0	10 to 25
2.25	16, 32, 64, 128	0.5 to 2.0	6 to 20
3.5	16, 32, 64, 128	0.5 to 2.0	6 to 20
5.0	16, 32, 64, 128	0.3 to 1.5	6 to 20
7.5	16, 32, 64, 128	0.3 to 1.0	6 to 16

Options - Angle Beam Phased Array Probes

- Replaceable shear wave wedges, 30° to 70° sweep, flat or curved
- Replaceable L-wave wedges, 30° to 70° sweep, flat or curved
- 0° delay lines for straight beam inspection
- Probes with internal wedges and delay lines are also available

Dual (TR) Angle Beam Phased Array Probes - 2D Matrix



Typical Applications

- **Power** - Austenitic welds, dissimilar metal welds, pressure vessels and piping, nozzles, turbine blades, rotors, coarse grain materials
- **Oil & Gas** - Piping, tanks, coarse grain materials
- **Aerospace** - Aluminum welds, coarse grain materials, thin section materials
- **General** - Tubular goods, thin section weld inspection

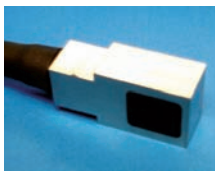
Typical Specifications (others available upon request)

Frequency (MHz)	Element Count	Pitch (mm)	Elevation (mm)
1.5	16, 32, 64	0.8 to 3.0	8 to 13
2.25	16, 32, 64	0.5 to 2.0	6 to 13
3.5	16, 32, 64	0.5 to 2.0	6 to 13
5.0	16, 32, 64	0.3 to 1.5	6 to 13

Options - Dual (TR) Angle Beam Phased Array Probes

- Replaceable dual shear wave wedges, 30° to 70° sweep, flat or curved
- Replaceable dual L-wave wedges, 30° to 70° sweep, flat or curved
- 0° delay lines for straight beam inspection
- Probes with internal wedges and delay lines are also available

Immersion Phased Array Probes - Flat



Typical Applications

- **Power** - Pressure vessels, piping, tubing, automated weld inspection and scanning
- **Oil & Gas** - Piping, tanks, tubing
- **Aerospace** - Plates, billet, disks, composites
- **Automotive** - Axles, shafts, spindles, brake discs, wheels
- **General** - Large area scanning, plate, billet, bar, tubular goods

Typical Specifications (others available upon request)

Frequency (MHz)	Element Count	Pitch (mm)	Elevation (mm)
1.0	32, 64, 128	1.0 to 3.0	10 to 25
2.25	32, 64, 128	0.5 to 2.0	6 to 20
3.5	32, 64, 128	0.5 to 2.0	6 to 20
5.0	32, 64, 128	0.3 to 1.5	6 to 20
7.5	32, 64, 128	0.3 to 1.0	6 to 16
10.0	32, 64, 128	0.3 to 1.0	6 to 13

Immersion Phased Array Probes - Curved

Typical Applications

- **Power** - Pressure vessels, piping, tubing, automated weld inspection and scanning
- **Oil & Gas** - Piping, tubing
- **Aerospace** - Plates, billet, disks, composites
- **Automotive** - Axles, shafts, spindles, wheels
- **General** - Billet, bar, tubular goods

Typical Specifications (others available upon request)

Frequency (MHz)	Element Count	Pitch (mm)	Elevation (mm)
1.0	32, 64, 128	1.0 to 3.0	10 to 25
2.25	32, 64, 128	0.5 to 2.0	6 to 20
3.5	32, 64, 128	0.5 to 2.0	6 to 20
5.0	32, 64, 128	0.3 to 1.5	6 to 20
7.5	32, 64, 128	0.3 to 1.0	6 to 16
10.0	32, 64, 128	0.3 to 1.0	6 to 13

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