

ECA Gear Probes

Single-Pass Crack Detection in Gears



Gears are critical components in a variety of mining equipment, such as girth gears, pinions, bull gears, and sugar mill drive trains. For safety and life-cycle considerations each gear must be closely monitored for surface-breaking cracks caused by stress during operation.

Techniques such as dye-penetrant testing (PT) and magnetic particle testing (MT) are the conventional inspection methods on gears, but they require extensive pre-inspection (surfaces must be free of lubricant) and post-inspection (lubricant must be applied at the end of the inspection) processing, making them expensive and time consuming.

Faster and Better Sensitivity

Eddy current array (ECA), by design, is more sensitive to small surface defects than MT, PT, and ultrasonic testing (UT) because of the way eddy currents propagate inside conductive materials.

Multiplexing an array of eddy current testing (ECT) coils allows scanning wider surfaces faster than other techniques or pencil ECT probes could, enabling scanning gear tooth flanks in a single pass.

Benefits and Features

- Single-pass detection of cracking in gear tooth flanks
- Optimized tip design to cover a wide range of gear sizes
- High tolerance to liftoff and shape irregularities
- Fast — 250 mm/s (10 in/s) or faster
- Robust — Probe body reinforced with silicon-nitride ceramic balls for wear resistance
- Solution included in ASTM standard E2905
- Avoid removing grease and performing extensive pre-inspection cleaning

Computerized Records

ECA gives the acquisition and analysis software the ability to display inspection data in the form of 2D and 3D C-scans. C-scans obtained with ECA technology are much simpler to analyze and much more accurate than other display methods. These scans can easily be recorded and reported on, which are also great advantages over other inspection technologies.

Standard-Quality Inspection

ECA is included in the ASTM E2905 *Standard Practice for Examination of Mill and Kiln Girth Gear Teeth—Electromagnetic Methods* for inspecting gear teeth, ensuring quality results.



High Liftoff Tolerance

Gear tooth profile shapes and sizes vary greatly and require profiled probes that can minimize liftoff, which increases probe sensitivity.

Rugged and Easy to Handle

Gear probes are ingeniously equipped with silicon-nitride ceramic balls to minimize wear. The probe's shape also makes handling easier, even with gloves.

Specifications

	GEAR-M13_20-050-N03T	GEAR-M20_30-076-N03T	GEAR-M30_42-112-N03T
Casing	Small	Medium	Large
Gear module	13–20	20–30	30–42
Topology	Long, single driver	Long, single driver	Long, single driver
Cable	3 m (9.8 ft)	3 m (9.8 ft)	3 m (9.8 ft)
Coverage	50 mm (2.0 in)	76 mm (3.0 in)	112 mm (4.4 in)
Central frequency	500 kHz	500 kHz	500 kHz
Frequency range	250 kHz–1 MHz	250 kHz–1 MHz	250 kHz–1 MHz
Coils (diameter × number)	4.5 mm × 22	4.5 mm × 33	4.5 mm × 48
Minimum channel requirement	32, 64	64	96



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