عنوان دوره:

Phased Array (PA) Evaluation Course

هدف دوره:

این دوره مطابق با سر فصلهای التراسونیک (PA) Phased Array مندرج در CP-105-2011 بوده و برای کارشناسان، بازرسان، پرسنل QC، دستگاه نظارت و تمامی افراد علاقمند و مرتبط با آزمایشهای غیرمخرب مناسب است.

محتوای دوره:

- مقدمه و آشنایی
- مفاهیم پایه Phased Array
- تجهیزات
- کالیبراسیون
- آشنایی بادستورالعملها و استانداردهای مربوطه

پیش نیاز: گواهینامه سطح ۲ آلتراسونیک یا گذراندن دوره آلتراسونیک پیش نیاز PA/TOFD به مدت ۸ روز	**کارگاه آموزشی:** دارد	**قیمت :** ۲۵۰۰۰۰،۰۰۰ ریال
نوع گواهینامه: **According to SNT-TC-1A of ASNT requirements (TUBI TAK certificates)**		

Phased Array Level II Topical Outline

Note: It is recommended that this course have as a minimum prerequisite of an Ultrasonic Level II unrestricted certification.
The intent of this document is to provide "Basic" knowledge on phased array ultrasonic testing consistent with other methods and to acknowledge phased array as unique enough to warrant an additional body of knowledge and qualification requirements.

Phased Array Evaluation Course

1.0 Introduction
1.1 Terminology of PA
1.2 History of PA – medical ultrasound, etc.
1.3 Responsibilities of levels of certification
2.0 Basic Principles of PA
2.1 Review of ultrasonic wave theory: longitudinal and shear wave
2.2 Introduction to PA concepts and theory
3.0 Equipment
3.1 Computer-based systems
3.1.1 Processors
3.1.2 Control panel including input and output sockets
3.1.3 Block diagram showing basic internal circuit modules
3.1.4 Multi-element/multi-channel configurations
3.1.5 Portable battery operated versus full computer-based systems
3.2 Focal law generation
3.2.1 Onboard focal law generator
3.2.2 External focal law generator
3.3 Probes
3.3.1 Composite materials
3.3.2 Pitch, gap and size
3.3.3 Passive planes
3.3.4 Active planes
3.3.5 Arrays: 1D, 2D, polar, annular, special shape, etc.
3.3.6 Beam and wave forming
3.3.7 Grating lobes
3.4 Wedges
3.4.1 Types of wedge designs
3.5 Scanners
3.5.1 Mechanized
3.5.2 Manual
4.0 Testing Techniques
4.1 Linear scans
4.2 Sectorial scans
4.3 Electronic scans

5.0 Calibration
5.1 Active element and probe checks
5.2 Wedge delay
5.3 Velocity
5.4 Exit point verifications
5.5 Refraction angle verifications
5.6 Sensitivity
5.7 DAC, TCG, TVG and ACG variables and parameters
5.8 Effects of curvature
5.9 Focusing effects
5.10 Beam steering
5.11 Acquisition gates
6.0 Data Collection
6.1 Single probes
6.2 Multiple probes
6.3 Multiple groups or multiplexing single/multiple probes
6.4 Non-encoded scans
6.4.1 Time-based data storage
6.5 Encoded scans
6.5.1 Line scans
6.5.2 Raster scans
6.6 Zone discrimination
6.7 Scan plans and exam coverages
6.7.1 Sectorial
6.7.2 Linear
6.7.3 Electronic raster scans
6.8 Probe offsets and indexing
7.0 Procedures
7.1 Specific applications
7.1.1 Material evaluations
7.1.1.1 Composites
7.1.1.2 Non-metallic materials
7.1.1.3 Metallic materials
7.1.1.4 Base material scan
7.1.1.5 Bar, rod and rail
7.1.1.6 Forgings
7.1.1.7 Castings
7.1.2 Component evaluations
7.1.2.1 Ease with complex geometries
7.1.2.1.1 Turbines (blades, dovetails, rotors)
7.1.2.1.2 Shafts, keyways, etc.
7.1.2.1.3 Nozzles
7.1.2.1.4 Flanges
7.1.2.2 Geometric limitations
7.1.3 Weld inspections
7.1.3.1 Fabrication/inservice

7.1.3.2 Differences in material: carbon steel, stainless steel, high-temperature nickel-chromium alloy etc.
7.1.3.3 Review of welding discontinuities
7.1.3.4 Responses from various discontinuities
7.2 Data presentations
7.2.1 Standard (A-scan, B-scan and C-scan)
7.2.2 Other (D-scan, S-scan, etc.)
7.3 Data evaluation
7.3.1 Codes/standards/specifications
7.3.2 Flaw characterization
7.3.3 Flaw dimensioning
7.3.4 Geometry
7.3.5 Software tools
7.3.6 Evaluation gates
7.4 Reporting
7.4.1 Imaging outputs
7.4.2 Onboard reporting tools
7.4.3 Plotting, ACAD, etc.