

DACON INSPECTION SERVICES

# ADVANCED ULTRASONIC INSPECTION TOFD





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Conventional and  
Advanced NDT and  
Inspection Services

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Oil and Gas, Refinery,  
Petrochemical, Heavy  
Industry, Mining

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Over 400 personnel  
including more than  
300 inspectors

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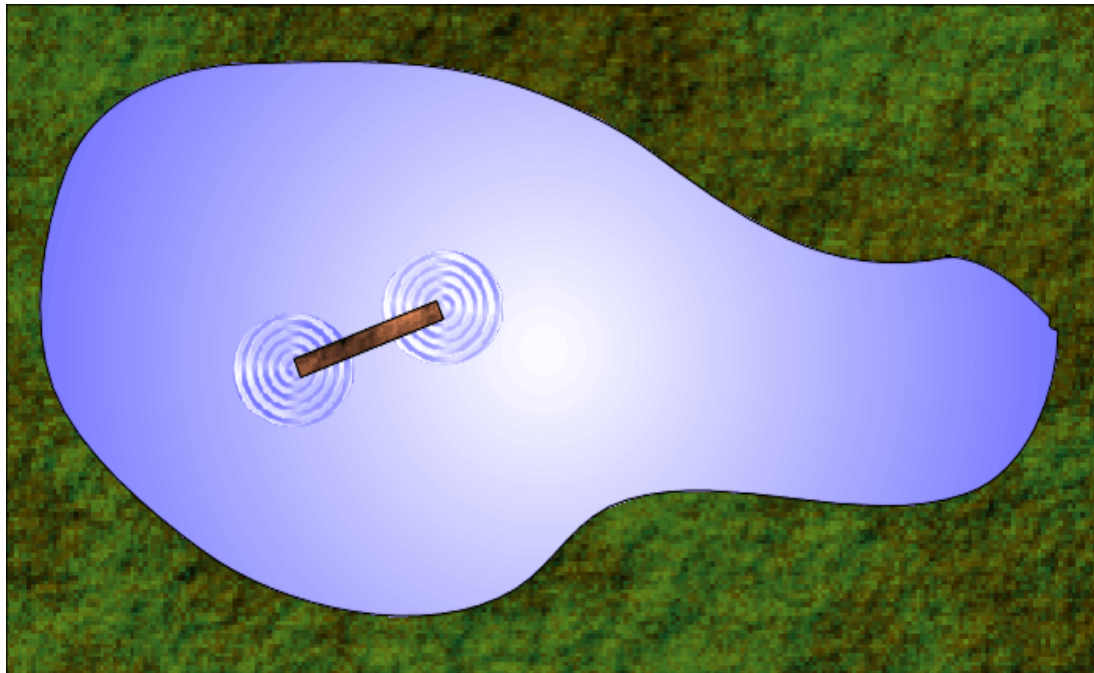
Thailand headquarters  
with International  
expertise since 1979

# Operational Excellence - Our Customers



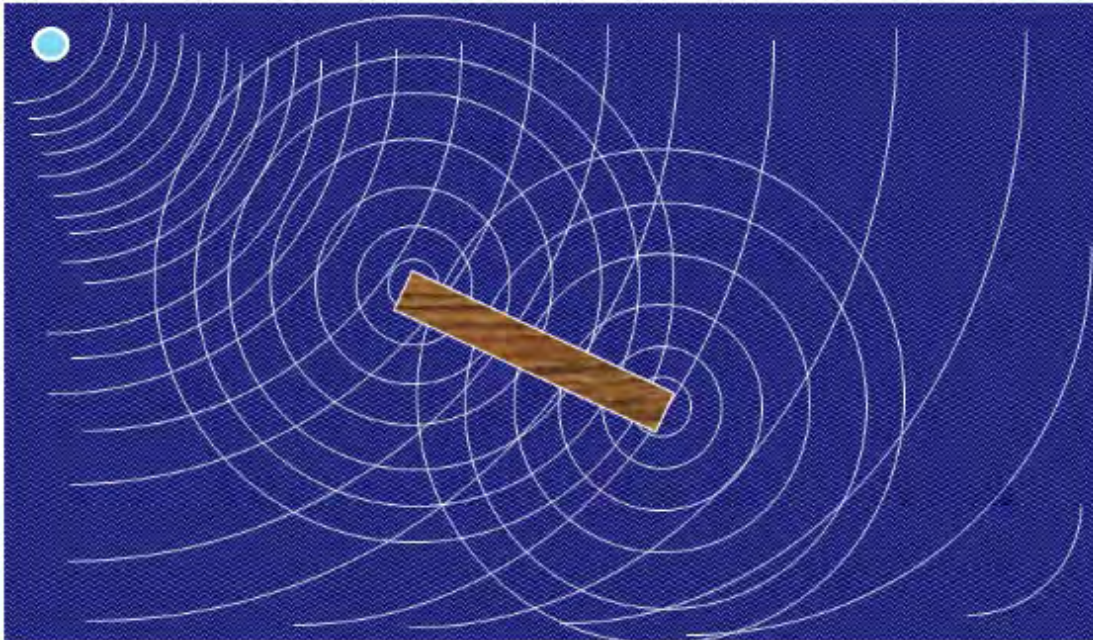
- TOFD = Time of Flight Diffraction
- Was originally designed for accurate sizing of flaws in nuclear industry
- Was found that the technique is also effective for detection of flaws in welds
- Uses the diffracted sound which initiates at flaw tips when a flaw is “hit” by a wide UT beam
- Flaws can be detected regardless of the orientation of the flaw
- Uses longitudinal sound

## Principle of Diffraction

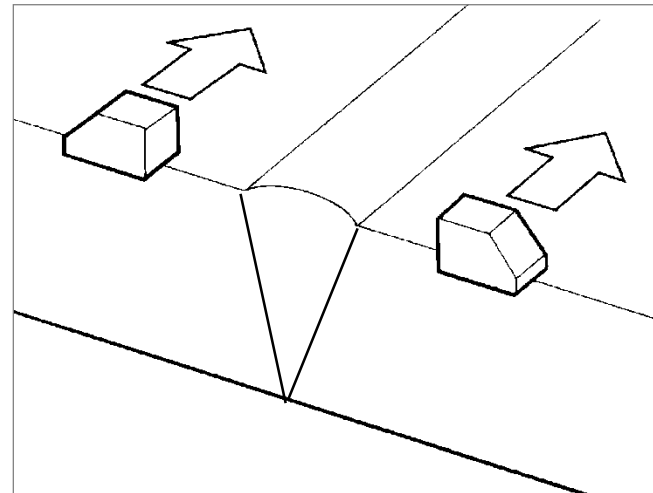


Diffracted UT signals can be compared to the waves that will occur around the ends of a piece of wood floating in water when it is hit by incoming waves

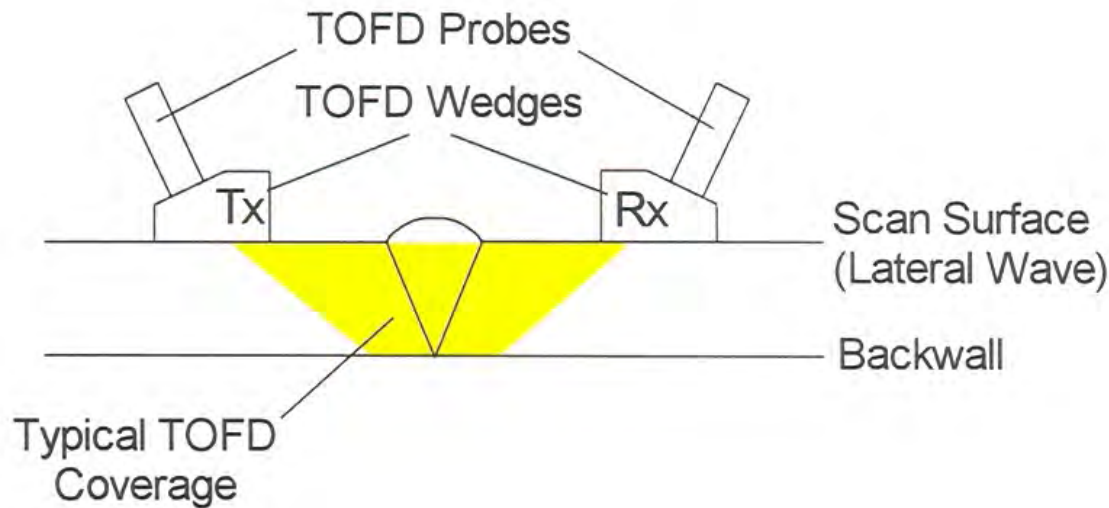
## Principle of Diffraction



- 2 Probes opposite each other.
- 1 transmitting and 1 receiving the signals



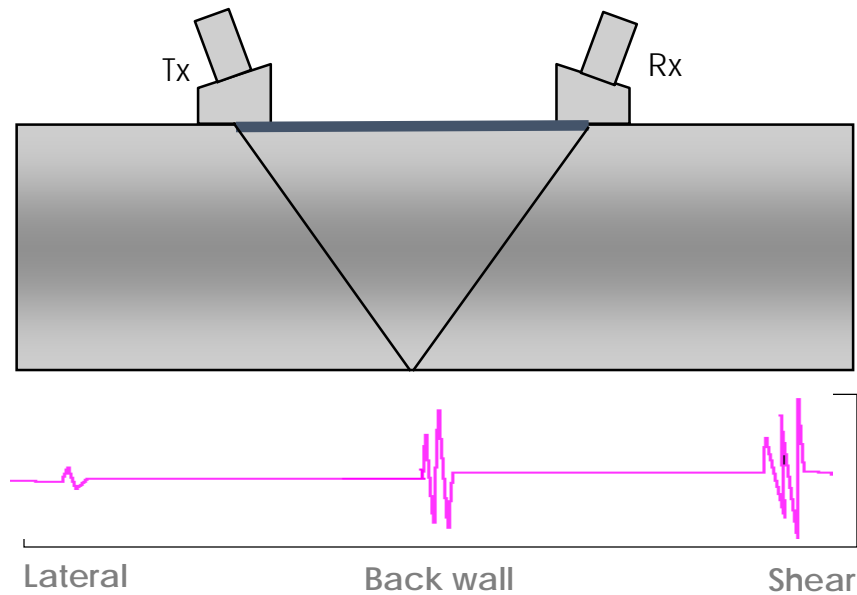
- Use longitudinal sound
- Transducers with a high band width are used to flood as much of the material thickness, resulting in good coverage





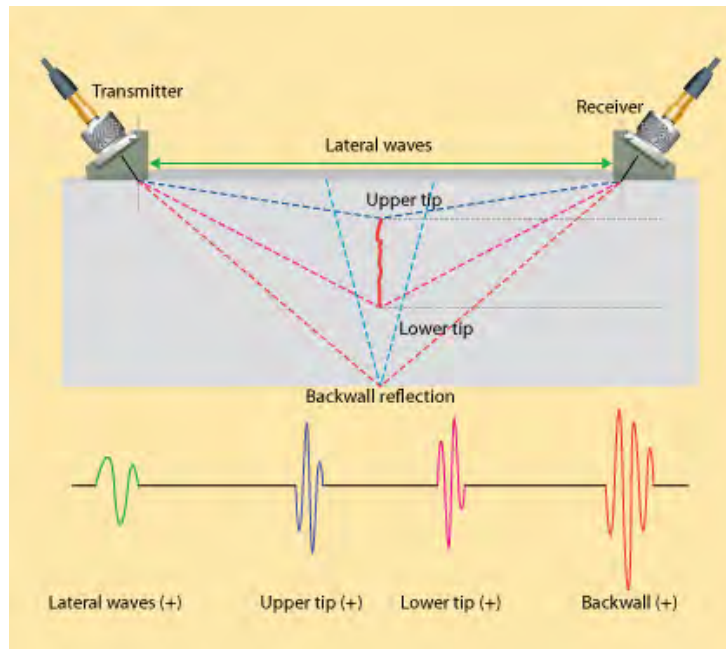
## A-scan presentation of the TOFD signal

- Lateral wave
- Back wall echo
- Mode converted (shear waves)



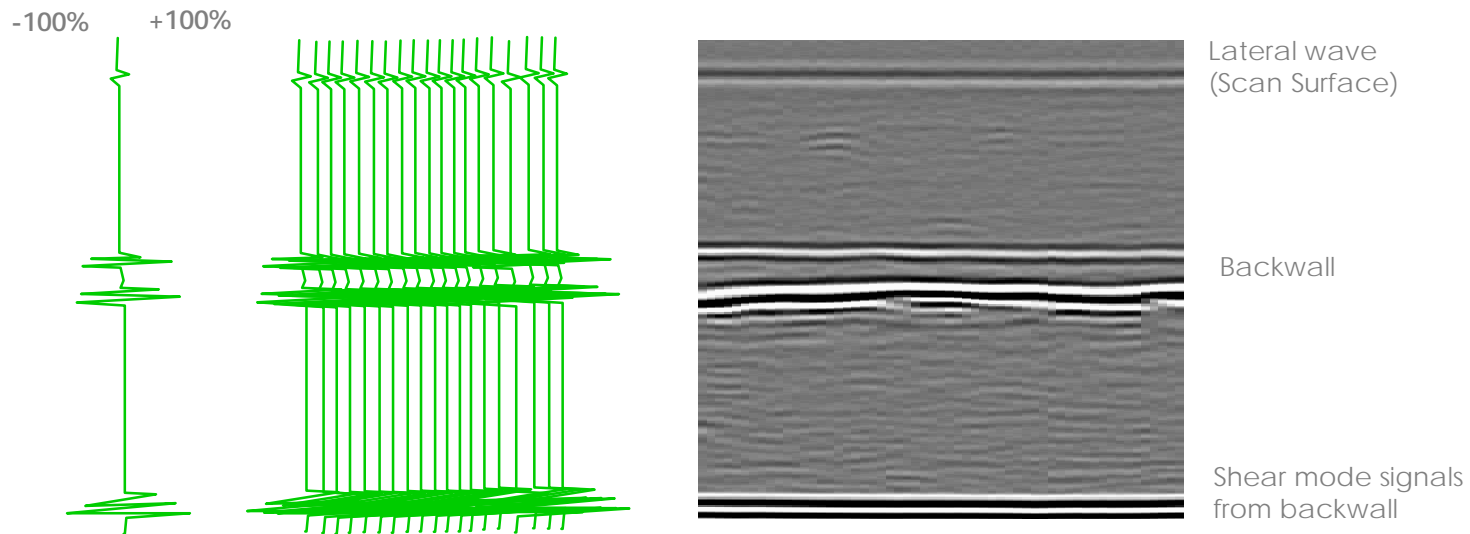
A-scan presentation of the TOFD signal, when defect is present

- Lateral wave
- Back wall echo
- Defect upper tip signal
- Defect lower tip signal

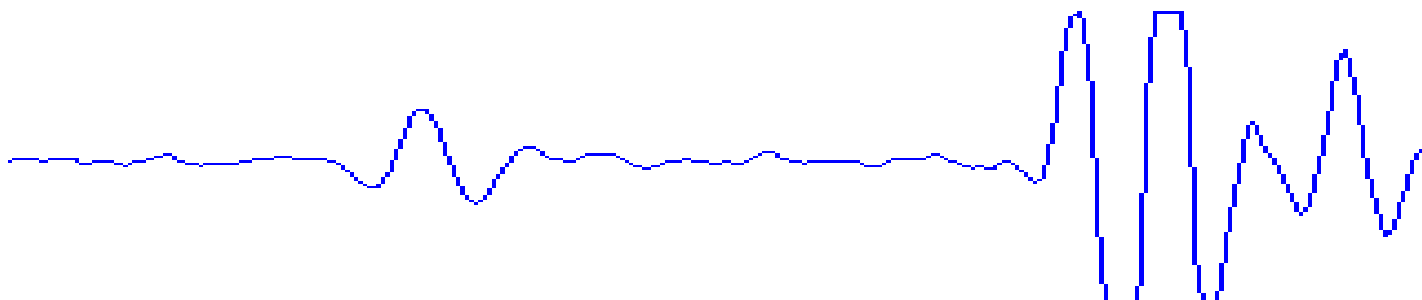
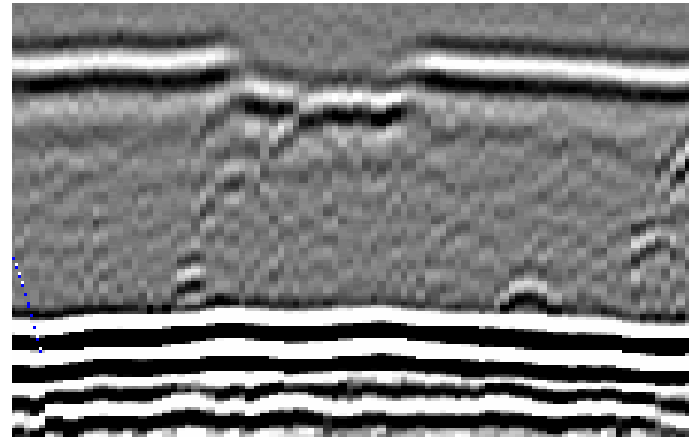
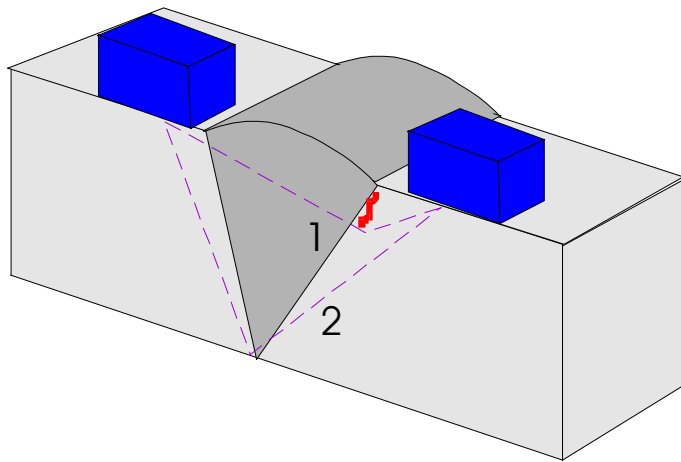


## TOFD scan image presentation

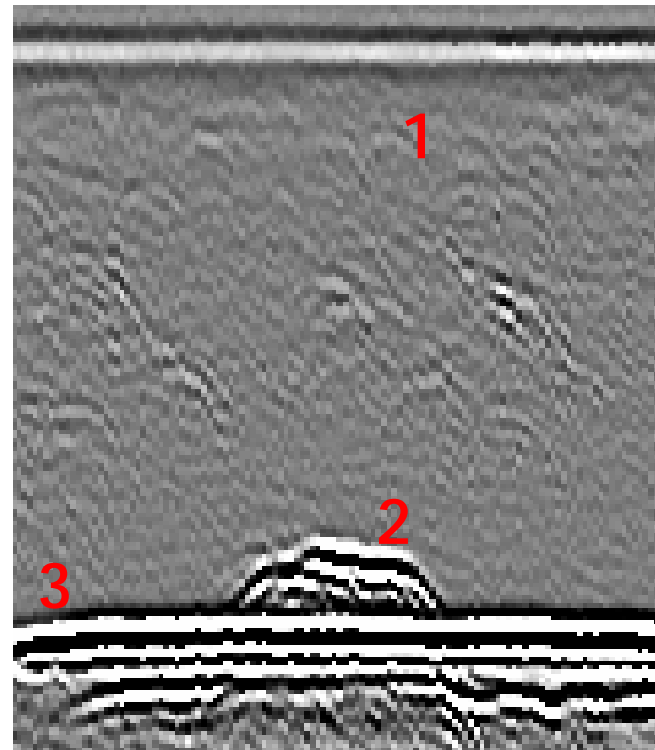
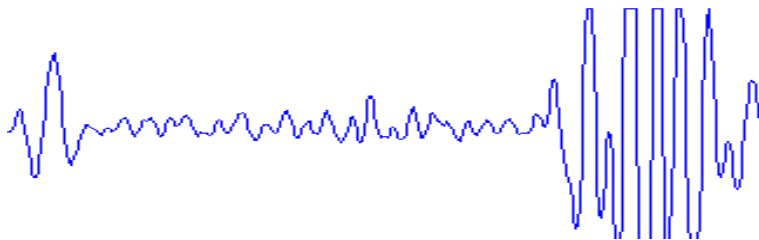
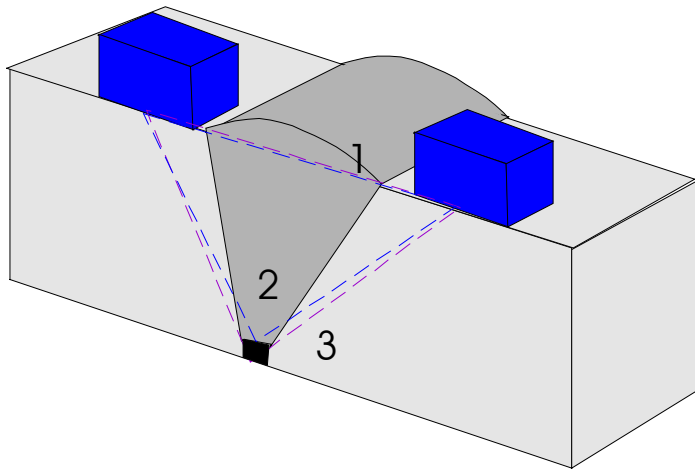
- A-scans are stacked together to form a grey scale image
- The image gives a presentation similar to a radiograph  
(difference is that the weld will be “looked through” from the side instead of the top)



## Near Surface Crack



## Incomplete Root Penetration



# Advanced Ultrasonic Inspection

## TOFD Advantages & Disadvantages



### Advantages

- Accurate Sizing
- Not dependent on flaw orientation
- Gives a permanent record
- Repeatability, good for monitoring
- Fast scanning and easy set up
- No radiation involved

### Disadvantages

- Has a dead zone at the inspection surface, less applicable on thin wall
- No lateral position of defect (transverse position in the weld)
- Requires experienced technician for interpretation
- Existing codes can not always be applied (solved by ASME cc 2235 and 181)

# How Can We Help?



Contact

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