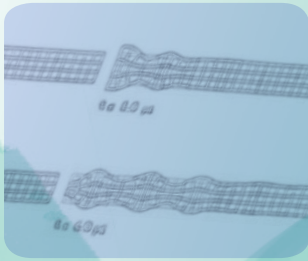


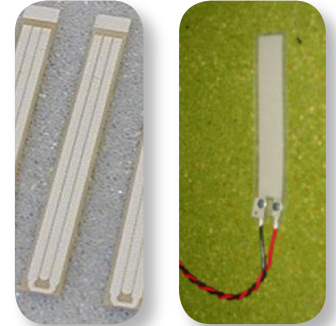
# NDT based on ultrasonic guided waves



Non Destructive Testing activities are crucial in some high reliability applications. Among the different techniques, the ultrasonic technology is widely used. Detecting defects through ultrasonic guided waves offers the possibility to obtain compact Structural Health Monitoring (SHM) systems.

## Objective

- Detecting structural defects through ultrasonic guided waves,
- Modeling and understanding the ultrasonic waves propagation,
- Perform the excitation and signal conditioning of the ultrasounds,
- Perform the signal processing to obtain a Structural Health Monitoring.



Piezoelectric patches: PZT and PVDF technologies.  
Courtesy FP6 AISHA.

## Piezo patches to generate and detect ultrasonic waves

Piezo patches are the core part of the Structural Health Monitoring system using ultrasonic guided waves. Several technologies of active materials can be used and are being modeled by the FEA ATILA<sup>®</sup> software. The importance of the electrode pattern has been shown.

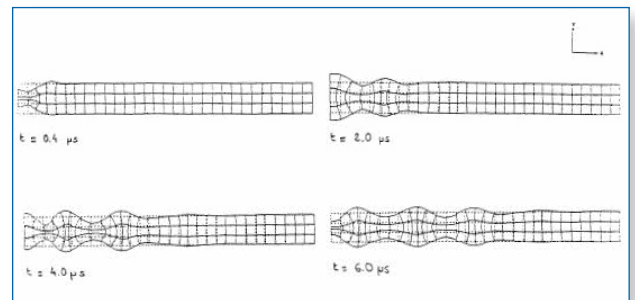
The interaction of the ultrasonic waves can be studied by several modeling techniques:

- analytical approach (CIVA<sup>nde</sup><sup>®</sup> software),
- finite element approach (ATILA<sup>®</sup> software).

Typical performances are given in the following table. This table is not exhaustive as many other actuators can be designed by CEDRAT TECHNOLOGIES using its design tools, lab facilities and technological know-how.

## Drive and sensing of ultrasonic Lamb waves

A pulse-echo or a transmission technique is used to detect structural defects. To generate the tone burst excitation and realize a low noise – broadband amplification, the Lamb Wave drive and sensing electronic has been designed and developed. It includes a USB link with the monitoring PC. Several channels can be used in parallel. The technology is available for new SHM configurations.



FEA ATILA transient analysis.



Lamb wave drive and sensing electronic LWDS45. Courtesy FP6 AISHA project.

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