Introduction

• Sound, a mechanical disturbance that propagates through a medium

• Ultrasound, sound with a frequency greater than 20 kHz

• Speed of sound depends on the mechanical properties of medium
Ultrasound through transmission measurement

Receiver Pulser

Load cell

T

Tablet

R

Signal Oscilloscope Sync

Frame
Ultrasound TT signal

Reference

Amplitude [V]

Time [μs]

Normalized amplitude

Frequency [MHz]
Implementation of US transducers
Previous studies 1: Defect detection results

$$\alpha_i(f) = \frac{8.686}{x_i} \ln \frac{A_{\text{ref}}(f)}{A_i(f)}$$

$x_i$ = tablet thickness
$A_{\text{ref}}$ = reference spectrum
$A_i$ = measured spectrum
Measurement during tableting

- **Tablets:**
  MCC 69% Paracetamol 30 %, MgSt 1%

- **Ultrasound measurement were made every 8 ms (300…620 ms)**

- **Synchronized with force and displacement measurements**
Implementation of US measurements
Measurements during tableting (cont.)

A. Image showing oscillations over time.

B. Graph showing force [N] over time [ms].

C. Graph showing voltage [V] at 540 ms over time of flight [s].

D. Graph showing intensity [A.U.] over frequency [Hz].
Measurement during tableting (cont.)