Figure 1: Demonstrator position in the UAV

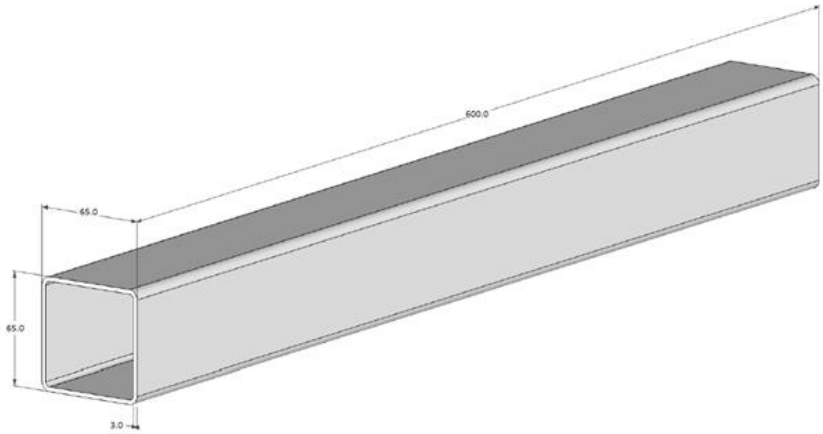

Figure 2: Small scale composite part

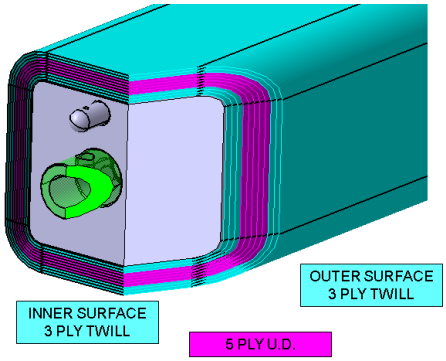

Figure 3: Small scale composite part layup

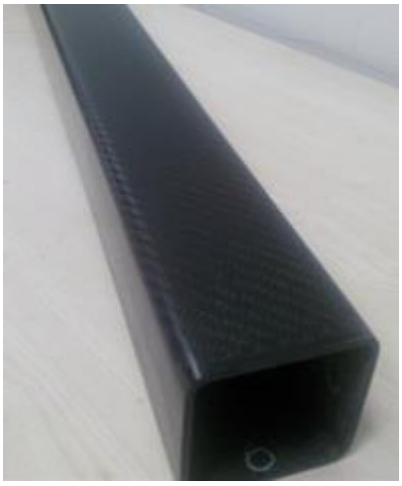

Figure 4: Small scale composite part manufactured

Table 1: Experiments at ambient temperature

Condition of the part	Experiments per part	Number of parts	Damage location	Damage magnitude	Number of experiments
Healthy	5	Up to 45	No damage	No damage	Up to 225
Damaged	5	Up to 45	Up to 15 locations linearly spaced throughout the part length	Low damage Medium damage High damage	Up to 225

Table 2: Experiments at low temperature

Condition of the part	Experiments per part	Number of parts	Temperature range	Damage location	Damage magnitude	Number of experiments
Healthy	3	Up to 45	From -20°C to 20°C at 10°C intervals	No damage	No damage	Up to 675
Damaged	3	Up to 45	From -20°C to 20°C at 10°C intervals	Up to 15 locations linearly spaced throughout the part length	Low damage Medium damage High damage	Up to 675

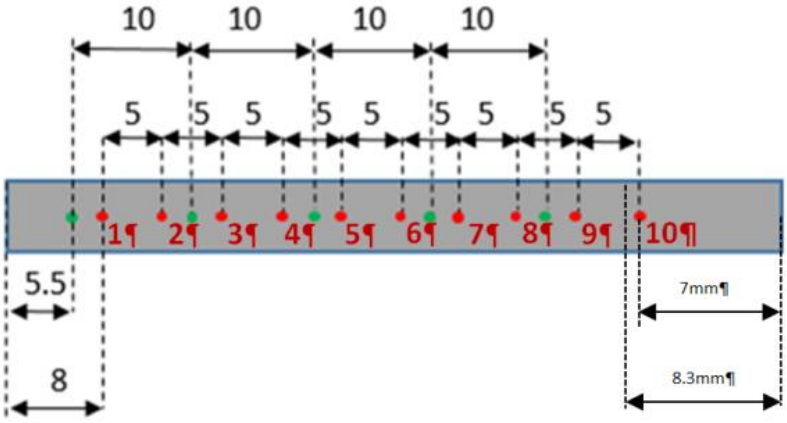

Figure 5: Impact location

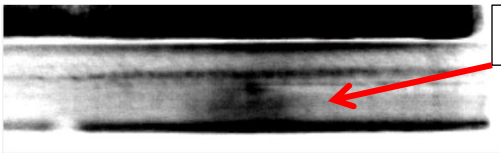

Figure 6: IRT of beam No. 4

Figure 6: US inspection of beam No. 4

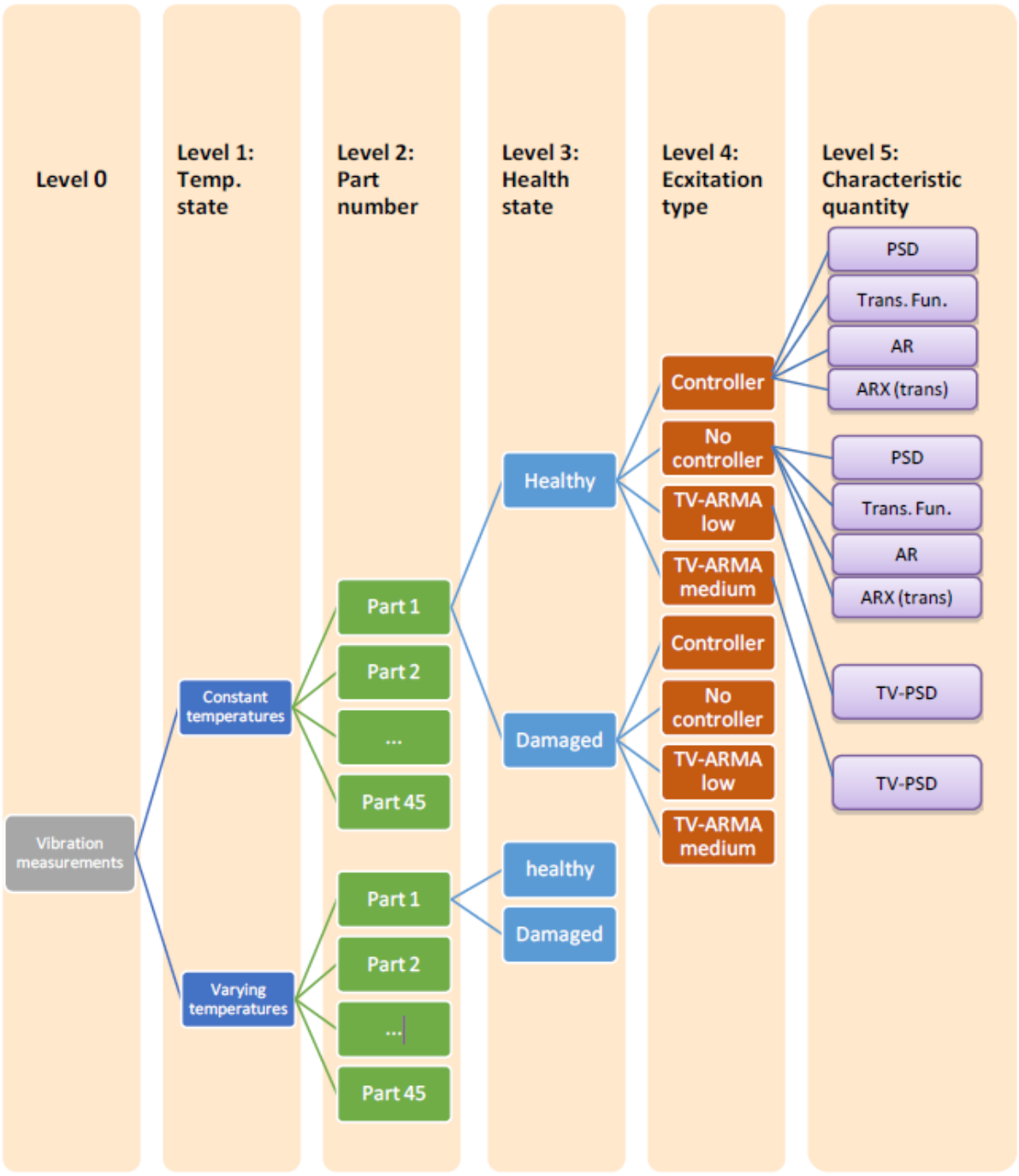

Figure 7: Structure of the data base that contains the extracted characteristic quantities

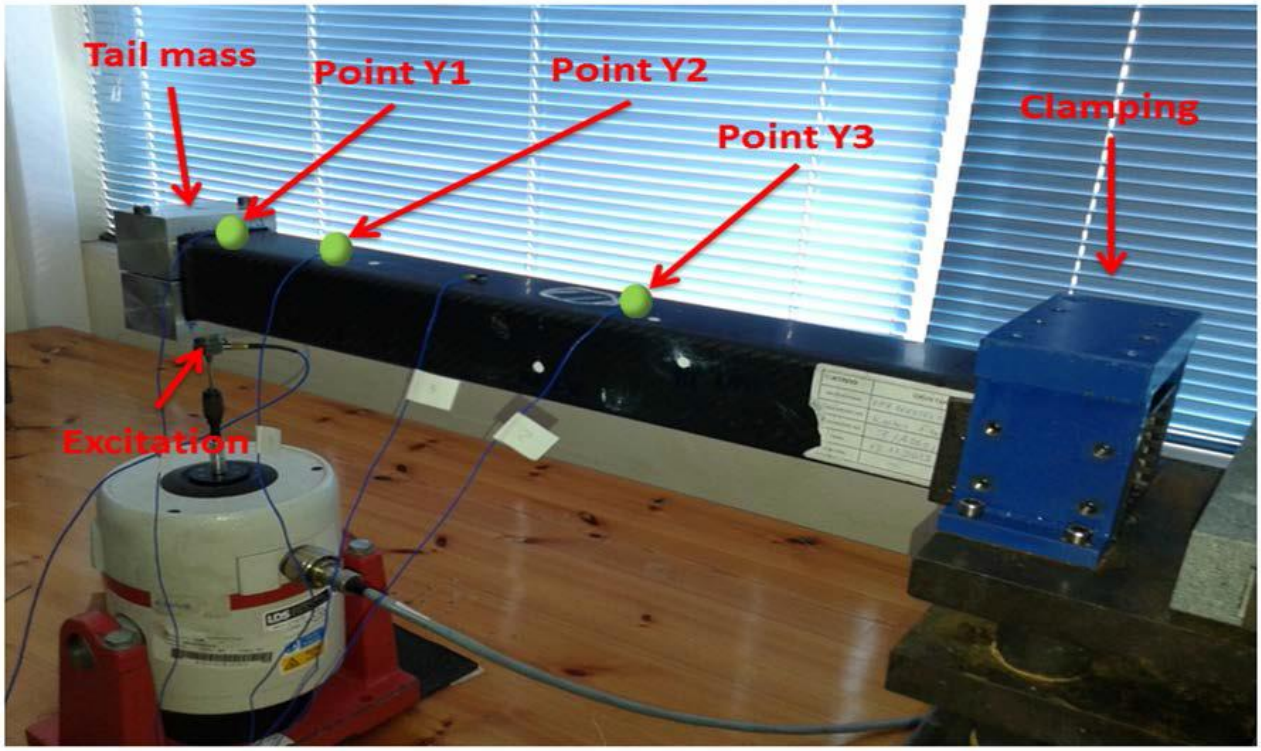

Figure 8: Testing device and specimen set up

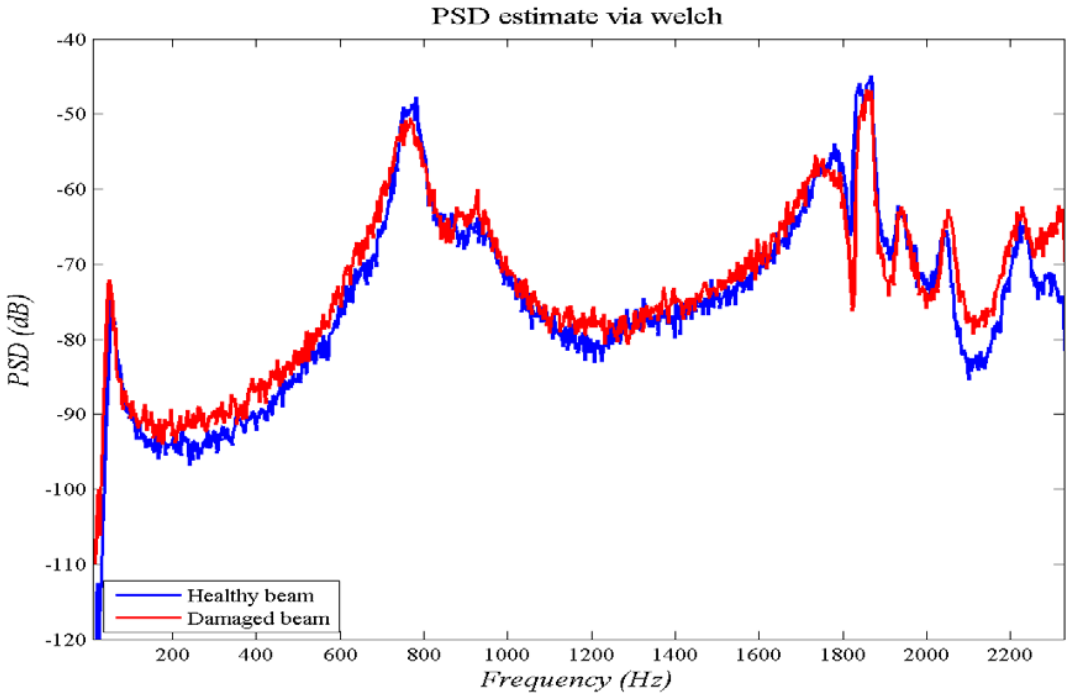

Figure 9: PSD estimates for one healthy beam and its damaged counterpart

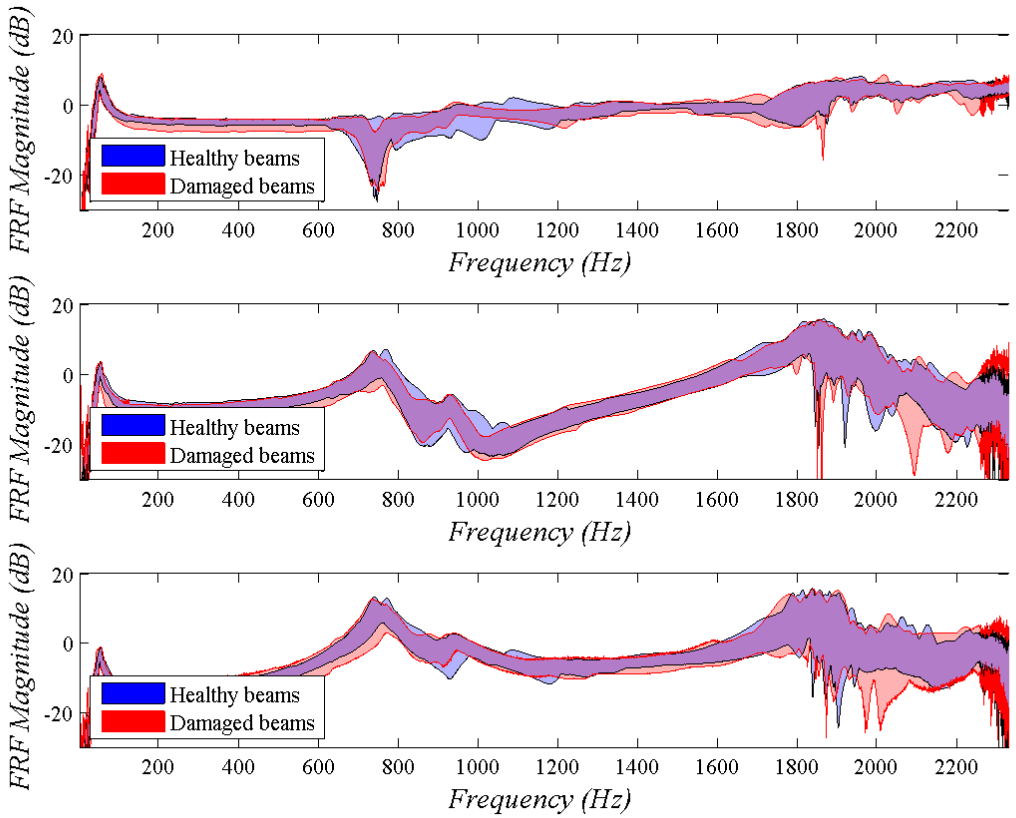

Figure 10: FRF magnitude estimates for all healthy beams are contained in the blue zone while the red zone contains the FRF magnitude estimates of the damaged parts (44 healthy beams; 33 damaged beams; response Points Y1-Y3;

Figure 11: Prototype system in VIBRATION

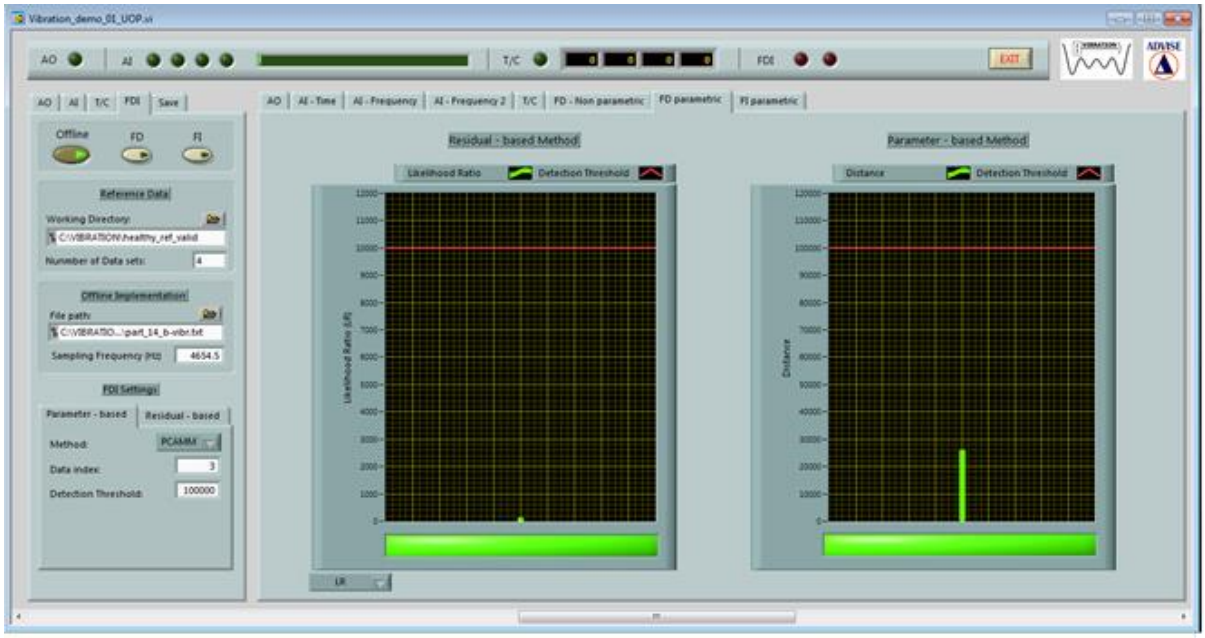

Figure 12:Screenshot of the VIBRATION SHM GUI: The damage detection operation using the Residual-based MM-ARX-DR (on the left) and parameter- based MM-AR-PCA (on the right) methods. The values below the detection threshold (red line) indicate undamaged part (The figure depicts the case of an undamaged part).

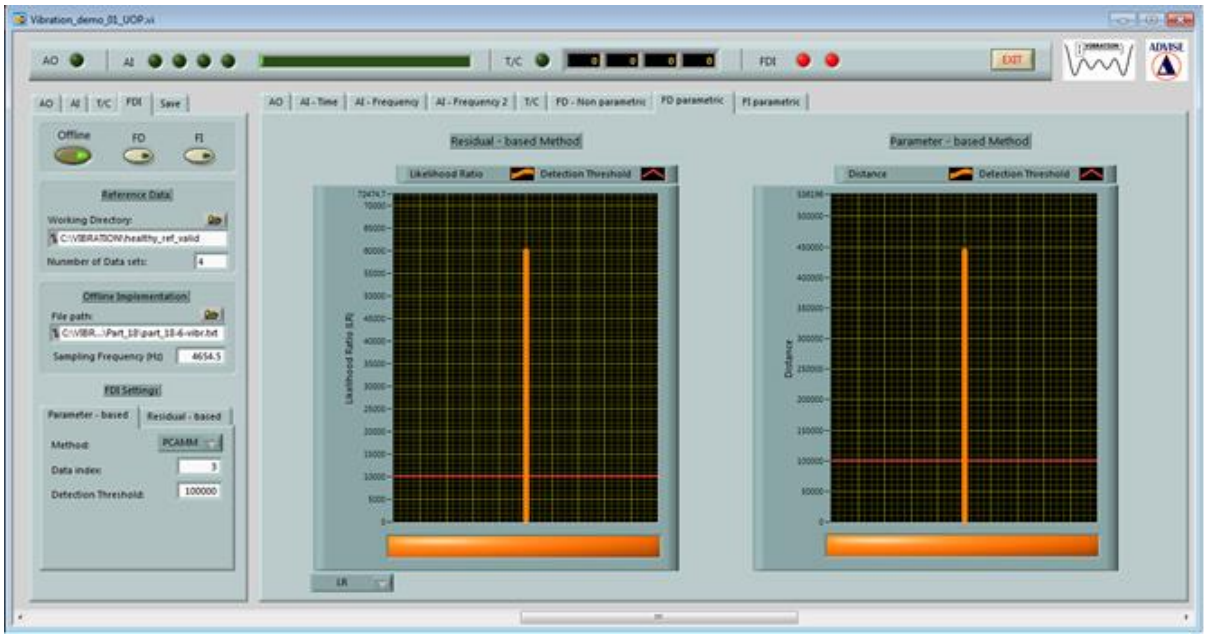

Figure 13: Screenshot of the VIBRATION SHM GUI: The damage detection operation using the Residual-based MM-ARX-DR (on the left) and parameter- based MM-AR-PCA (on the right) methods. The values above the detection threshold (red line) indicate damaged part (The figure depicts the case of a damaged part).