CLAIMS

1. A computer-implemented method for determining depth and location of localised thinning in a plate structure, comprising executing on one or more processors the steps of:

selecting a high-order symmetric Lamb wave mode, wherein the step of selecting the high-order symmetric Lamb wave mode comprises:

obtaining group velocity dispersion curves of Lamb wave modes based on plate material and plate thickness;

determining fastest group velocities from the group velocity dispersion curves of the plate structure; and

selecting a frequency for the high-order symmetric Lamb wave mode based on the fastest group velocities from the group velocity dispersion curves of the plate structure;

generating the selected high-order symmetric Lamb wave mode in the plate structure using one or more first ultrasonic transducers attached to the plate structure;

detecting the generated high-order symmetric Lamb wave mode using the one or more first ultrasonic transducers or one or more second ultrasonic transducers attached to the plate structure;

comparing arrival times of the detected high-order symmetric Lamb wave mode with a set of baseline signals to determine the depth of the localised thinning in the plate structure; and

analysing arrival times of the detected high-order symmetric Lamb wave mode reflected from an edge of the localised thinning to determine the location of the localised thinning in the plate structure.

2. The computer-implemented method for determining depth and location of localised thinning in the plate structure according to claim 1, wherein a wavelength of the selected high-order symmetric Lamb wave mode corresponds to a periodicity of a comb-shaped electrode of at least one of the one or more first ultrasonic transducers and the one or more second ultrasonic transducers.

3. The computer-implemented method for determining depth and location of localised thinning in the plate structure according to claim 1 or claim 2, wherein the step of

comparing the arrival times of the detected high-order symmetric Lamb wave mode with the set of baseline signals comprises:

generating the set of baseline signals representing an initial state of the plate structure.

4. The computer-implemented method for determining depth and location of localised thinning in the plate structure according to claim 3, wherein the step of generating the baseline signal comprises:

applying electrical driving signals at a selected frequency to the one or more first ultrasonic transducers attached to the plate structure to generate a plurality of high-order symmetric Lamb waves in the selected high-order symmetric Lamb wave mode.

5. The computer-implemented method for determining depth and location of localised thinning in the plate structure according to claim 4, wherein the step of generating the baseline signal further comprises:

detecting the high-order symmetric Lamb waves at the one or more first ultrasonic transducers via a pulse-echo working mode.

6. The computer-implemented method for determining depth and location of localised thinning in the plate structure according to claim 4 or 5, wherein the step of generating the baseline signal further comprises:

detecting the high-order symmetric Lamb waves at the one or more second ultrasonic transducers via a pitch-catch working mode.

7. The computer-implemented method for determining depth and location of localised thinning in the plate structure according to any one of the preceding claims, wherein the first ultrasonic transducers and the second ultrasonic transducers are arranged to form one or more linear arrays on the plate structure.

8. The computer-implemented method for determining depth and location of localised thinning in the plate structure according to any one of claims 1 to 6, wherein the second ultrasonic transducers are arranged to form a concentric array on the plate structure.