CLAIMS:

1. A control system (10) for estimating nominal stresses in a welded structural component (12), the control system comprising a non-transitory computer readable medium (14) comprising computer readable instructions for estimating nominal stresses and a processor (16) configured to execute the computer readable instructions stored on the non-transitory computer readable medium (14), wherein the instructions are configured to:

use (76) finite element (FE) analysis algorithms (22) based on one or more models (24) of the welded structural component (12) to calculate stresses at a plurality of points from a base point (40) along a base line (38) of the welded structural component (12), wherein the base point (40) is a weld (32) of the welded structural component (12);

identify (78) two or more points (44) of the plurality of points by evaluating second derivatives of calculated stress for adjacent points of the plurality of points, wherein the instructions are configured to identify each point (62) of the two or more points (44) of the plurality of points by identifying a subset of points adjacent the respective point (62), wherein a second derivative of each of the subset of points is within a threshold percentage of each other, and wherein the threshold percentage is less than or equal to 10%;

estimate (80) a nominal stress at the base point (40) by extrapolating calculated stresses of the two or more points (44) of the plurality of points to the base point (40); and

output a control signal (20) in dependence on the estimated nominal stress, wherein the output signal (20) is used for the control of the manufacture of one or more subsequent welded structural components (12) by adjusting a dimension of the one or more subsequent welded structural components (12) or by adjusting a welding process variable.

2. The control system (10) of claim 1, wherein the subset of points comprises five points.

3. The control system (10) of claim 1, wherein the threshold percentage is 5%.

4. The control system (10) of claim 1, wherein the welded structural component (12) comprises a welded component comprising a weld joint root at the base point (40).