

Online Resource 3

README for Supplementary Data

Item	Information
Article	Longitudinal Segmentation and Terminal Classification of WAAM Single Beads from 3D Point Clouds
Journal	Welding in the World
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This document defines the content, variables, units, and organization of the two supplementary data workbooks accompanying the article.

Online Resource 1

File: ESM_1_Supplementary_Data_S1.xlsx

Online Resource 1 contains one row for each of the 50 deposited beads. The workbook contains two worksheets.

Bead_metadata_and_ROIs

This worksheet provides the bead identifier, design-of-experiments run, deposition current, travel speed, point-cloud scan group, physical substrate plate, and manually selected spatial regions of interest (ROIs). The ROI bounds are reported in millimetres in the scanner-coordinate system.

The ROI column names follow the pattern [ROI]_[axis]_[min/max]_mm:

- Analysis_ROI_* defines the complete analysis area.
- Substrate_plane_ROI_* defines the region used for local substrate-plane estimation.
- Bead_vicinity_ROI_* defines the region used for initial bead-point selection.
- X, Y, and Z identify the scanner-coordinate axis.
- min and max identify the lower and upper coordinate bounds.

Scan_group identifies one of the six point-cloud acquisitions. Physical_plate identifies the corresponding physical substrate plate; each of the three plates was measured in two scan groups.

Variable_description

This worksheet defines the variables and units used in Bead_metadata_and_ROIs. The ROI columns are documented by naming pattern because each pattern applies to all three coordinate axes and both bounds.

Online Resource 2

File: ESM_2_Supplementary_Data_S2.xlsx

Online Resource 2 contains the longitudinal slice-level geometric profiles used in the Q-L-Q segmentation and regional analyses. The workbook contains two worksheets.

Longitudinal_profiles

Each row represents one valid longitudinal slice of one bead. The worksheet includes:

- bead, process, scan-group, and physical-plate identifiers;
- slice start, end, and centre coordinates along the local longitudinal coordinate u ;
- unsmoothed bead width, height, and cross-sectional area;
- the number of point-cloud points contributing to each slice;
- the corresponding three-slice moving-median profiles used for transition-coordinate estimation; and
- the automatic Q-L-Q assignment (START, MID, or END).

Bead_width_mm, Bead_height_mm, and Cross_sectional_area_mm2 contain the original unsmoothed slice-level values from which the reported regional characteristics were calculated. Width_smoothed_mm, Height_smoothed_mm, and Area_smoothed_mm2 contain the moving-median values used for automatic transition-coordinate estimation.

Variable_description

This worksheet defines every variable and unit included in Longitudinal_profiles.

Relationship to the analysis files

The supplementary workbooks are publication-oriented data tables. Their descriptive column names differ from some shorter names used in the MATLAB working files. For example, ScanOrder, Current_A, and TravelSpeed_cm_min correspond to Bead_ID, Deposition_current_A, and Travel_speed_cm_min, respectively. The numerical data are unchanged by this naming harmonization.

Online Resource 2 was assembled from the 50 bead-level files named scan_XX_pieewise_V2_slice_values.csv. The source files were checked for the expected variables before their profiles and bead-level metadata were combined.

Missing values

Blank or NaN entries represent unavailable values and must not be interpreted as zero. Online Resource 2 includes the valid longitudinal slices retained for analysis.

Citation

When reusing these data, cite the associated article. The final bibliographic reference and DOI should be used after publication.