

# Longwall Visual Analysis

## Information Sheet



## Load Cycle Histograms

Revision 0, 11 Aug 2021

### Summary

LVA's Load Cycle Maps (LCM's) show average values per shear for each leg or shield across the face. They summarize a large amount of longwall data over a whole panel or section of a panel. Load Cycle Histograms were introduced in LVA version 7.22 to display various statistical data derived from these LCM's including distribution histograms for each shield across the face, a summary histogram for the whole LCM, and trending of the average value per shear. Several data filtering options are available for excluding atypical shields such as those at the gate ends, shields in cavities, or shield values that are outliers due to instrumentation or other issues. Like the LCM's, up to three cases can be displayed together for comparison.

### Load Cycle Maps (LCM's)

LVA's Load Cycle Maps (LCM's) show average values per shear for each leg or shield across the face. Each horizontal line of pixels represents one shear across the face. These summarize a large amount of longwall data over a whole panel or section of a panel.

To access the LCM's, go to the "Load Cycle Maps" tab and click "Load Cycle Maps" under Settings...



Fig. 1. How to display Load Cycle Maps

## Load Cycle Histograms

Load Cycle Histograms display statistical data derived from the LCM's including distribution histograms for each shield across the face, a summary histogram for the whole LCM, and trending of the average value across the face per shear. Several data filtering options are available for excluding atypical shields such as those at the gate ends, shields in cavities, or shield values that may be incorrect due to instrumentation or other issues.

To access the Load Cycle Histograms, go to the "Load Cycle Maps" tab and click "Histograms and Stats" under Settings. If these settings are not visible it may have been hidden by the top menu View item – try hitting the F4 key to toggle this tab's visibility. Select the range of dates to display (As selected in the date box at top of screen, or whole panel, or the past 20 days).

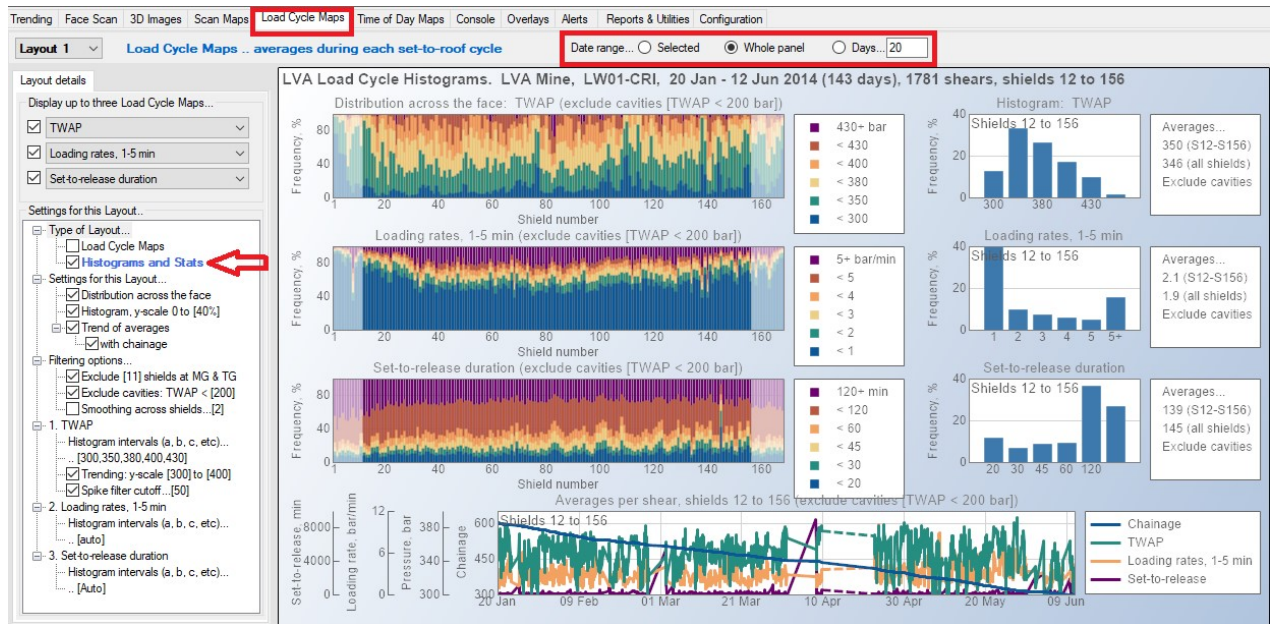


Fig. 2. How to display Load Cycle Histograms. Also showing distribution and overall histograms, and trend of average values for three cases (TWAP, loading rates, and set-to-release duration).

## Selecting what to display

Display up to three cases at a time, including TWAP (time-weighted average pressure), set pressure, yields, loading rates after setting, set-to-release cycle duration, calibration and leaking issues, shield heights and convergence if available, and TCC (top coal caving) items if available.

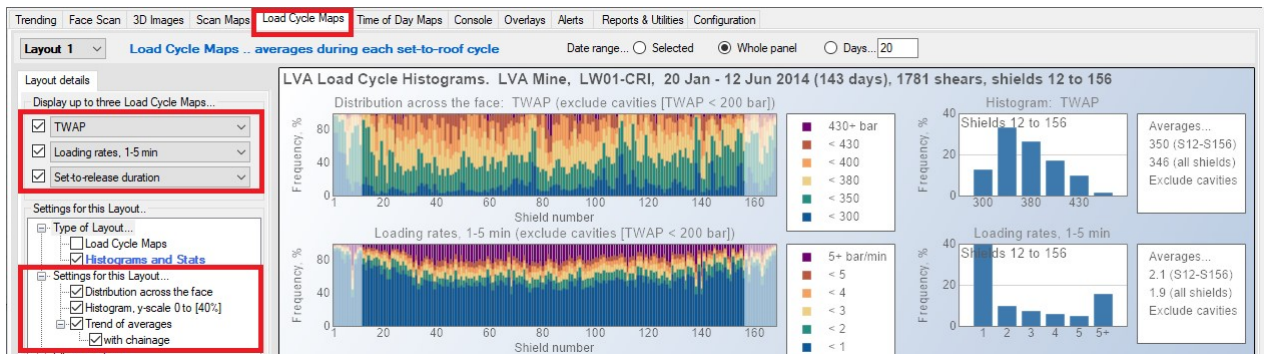


Fig. 3. Showing where to select which cases to display (TWAP etc), and which histogram options to display, including the Distribution across the face, Histogram (summary of all shields and shears), and the Averages per shear.

## Distribution across the face

The “Distribution across the face” is a stacked cumulative histogram showing the frequency distribution for all shears, for each shield separately, across the face.

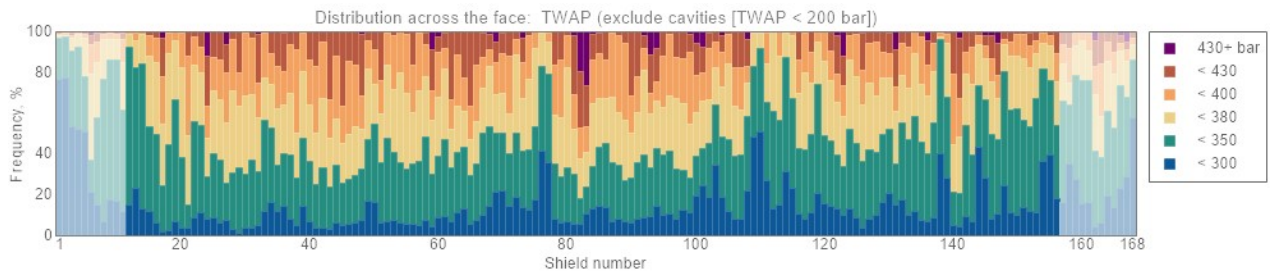


Fig. 4. Distribution across the face

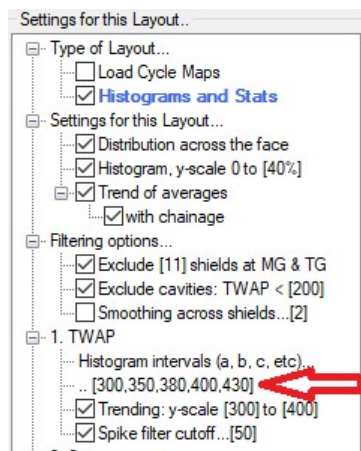


Fig. 5. Histogram intervals

To specify histogram intervals, right-click or double click where it's shown at the red arrow in Figure 5. This brings up an edit box, and either type “Auto” or a list of interval values separated by commas (e.g. five values like “300, 350, 380, 400, 430” gives six intervals <300, <350, <380, <400, <430 and 430+) as shown here. When you specify “Auto” you'll get six evenly spaced intervals between suitable limits.

You can also set various filtering options to exclude certain shields or apply smoothing across the face. These are described later on.

## Histograms

The histograms show the overall frequency distribution for all shields and all shears in the time frame specified, using the same intervals specified above. The box to the right of the graph shows the average for all shields. If shields at the gate end are excluded then the average for all shields excluding the gate ends is also shown.

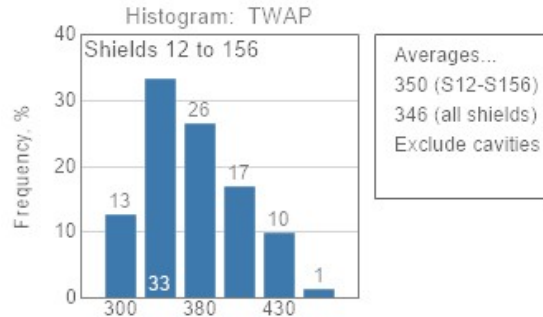


Fig. 6. Histogram – frequency distribution for all shields and all shears.

## Averages per shear (trending)

This graph shows the average value across the face for each shear, trended against time. Optionally include the chainage data if available in LVA.

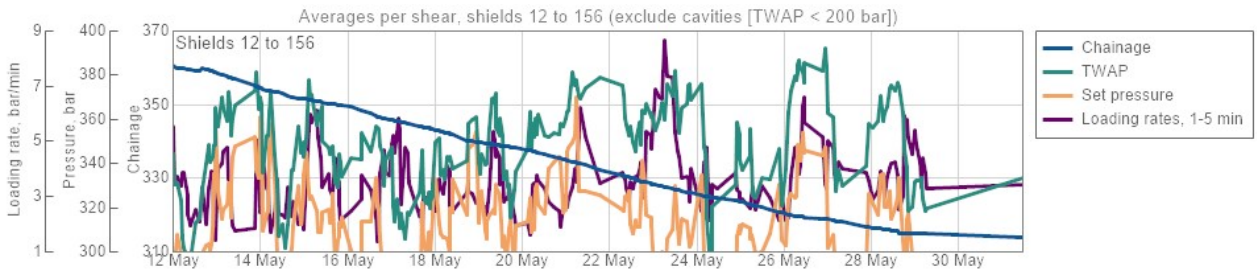


Fig. 7. Trending of averages across the face, with optional chainage trend added.

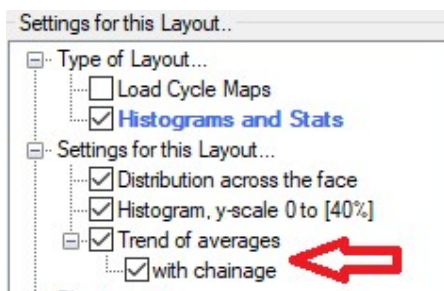


Fig. 8. Selection of Trend of averages, including chainage trend.

## Filtering options

Several data filtering options are available for excluding atypical shields from the histograms and averages. These include shields at the gate ends, shields in cavities, or shield values that are outliers due to instrumentation or other issues (spikes that differ significantly from neighbours).

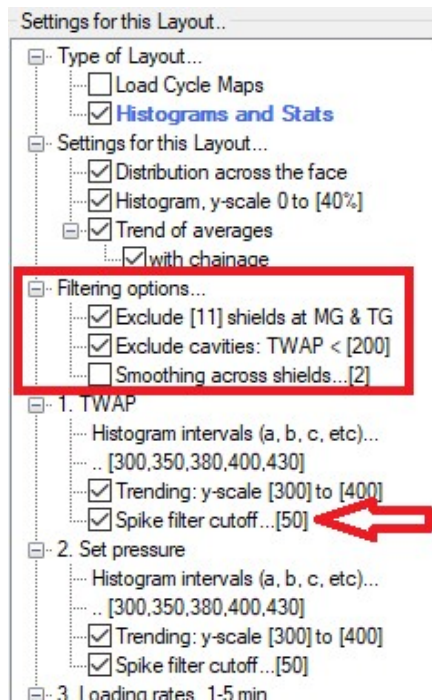


Fig. 9. Filtering options

- Select “Exclude [n] shields at MG & TG”, and all histogram calculations and averages will be done on the internal shields only. The excluded shields will be displayed in fainter colours.
- Select “Exclude cavities” and specify a TWAP value: for each shear all shields with a low TWAP will be assumed to be in a cavity at that time, and those points will be excluded from the calculations for histograms and averages.
- Select “Spike filter cut-off” and a cut-off value to modify shields that differ from both their neighbours by at least the cut-off value. The shield’s value is changed to the average of its two neighbours. This option is available for TWAP, set pressure, and shield heights and convergence where these data are available.
- Select “Smoothing across shields” and the degree of smoothing (2 to 5) to apply a smoothing algorithm across all shields in every shear before calculating histograms and averages. The smoothing is applied after the cavity and spike filters.

## Exporting data from graphs

You can export the data used to generate the graphs. Right-click any graph to bring up a menu, and select “Copy Data as table” and then paste into Excel. Note that this will also work on all the other 2D trending and bar graphs in LVA. (btw You can also export data from any 3D graphs or heat maps using the “Graph|Copy graph data as table” menu item in the LVA main menu area.)

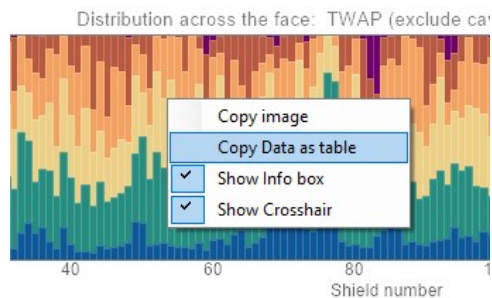


Fig. 10. Right-click to copy data from any of LVA’s bar charts and trending graphs, then paste into Excel.