Importing DXF Data

For LUSAS version:	19.0
For software product(s):	All (except LT versions)
With product option(s):	None.
Note: This example exceeds the limits of the LUSAS Teaching and Training Version.	

Description

This example shows the steps involved in importing DXF drawing data for use in LUSAS.

Features imported
from DXF file
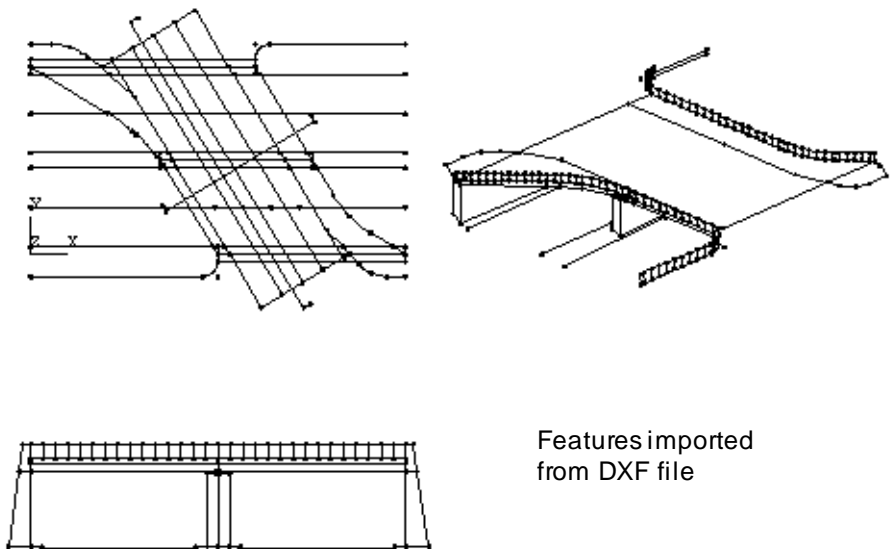
The initial geometry shown is equivalent to that imported from a typical CAD general arrangement drawing.

Modelling Objectives

The operations in the creation of the model are as follows:

❑ Import initial Point and Line feature information from CAD drawing.

❑ Rationalise drawing to delete unwanted information.

❑ Re-scale imported features to establish analysis units of length (m).

Keywords

2D, Inplane, Import, DXF

Associated Files

❑ **slab.dxf** contains the drawing information available in DXF format.

Modelling

Running LUSAS Modeller

For details of how to run LUSAS Modeller see the heading *Running LUSAS Modeller* in the *Introduction to LUSAS Worked Examples* document.

Note. This example is written assuming a new LUSAS Modeller session has been started. If continuing from an existing Modeller session select the menu command **File>New** to start a new model file. Modeller will prompt for any unsaved data and display the New Model dialog.

Creating a new model

- Enter a File name of **dxf_slab**

- Use the default User-defined working folder.

- Ensure an Analysis type of **Structural** is set.

- Select an Analysis Category of **2D Inplane**

- Set Model units of **kN,m,t,s,C**

- Leave the Timescale units as **Seconds**

- Select a Startup template of **None**.

- Ensure the Layout grid is set as **None**

- Enter the title as **Imported DXF file of slab** and click **OK**.

Importing DXF Model Data

With DXF data there may be situations where the DXF drawing units need to be converted from scaled 'paper' dimensions into full size model dimensions as with this example where modelling units of metres are required. This conversion of units can be done in two ways:

1. By setting a pre-translation scale <u>before</u> importing the data

2. By transforming the data using a scale factor <u>after</u> importing the data

In both cases, unless the paper dimensions are already known, some measurement of data will be involved in LUSAS prior to either re-importing or scaling the data. By using the File > Import menu item and pressing the Advanced button entities can be selected for inclusion/exclusion from import and LUSAS modelling-related features can be automatically tidied or merged together. This example covers the use of scaling the data after import. Notes describing the use of a pre-translation scale are at the end of the example.

Importing the DXF Data for Scaling

File
  Import…

• Select the DXF file **slab.dxf** from the **\<Lusas Installation Folder>\Examples\Modeller** directory and click the **Import** button.

Feature Geometry
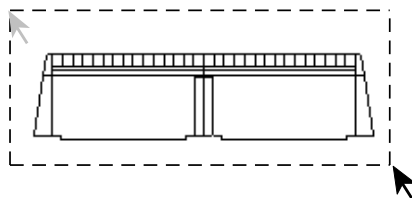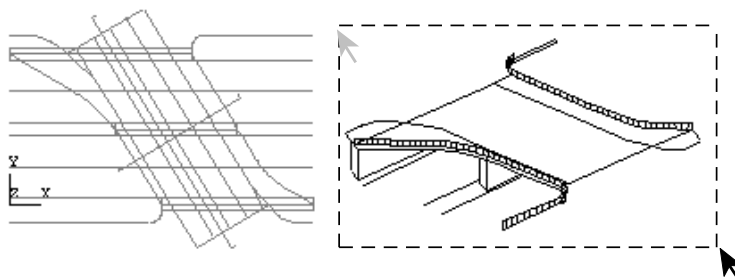
Delete these Features

The DXF features are imported in scaled units defined by the drawing scale. These features will need to be scaled to suit the units of the analysis. Only the features

defining the plan view are to be used in creating the analysis model. All other features can be deleted.

- Drag a box around the Point and Line features on the other views of the bridge. Use the **Shift** key to add additional features to the initial selection.

 Delete the selected features, confirming that the Lines and Points are to be deleted.

The remaining features will form the basis of the slab definition, but some further manipulation is required before a finite element model can be created.

Converting Units

The imported DXF drawing units are millimetres plotted at 1:100 scale, so these will need to be scaled by 100 to get the actual full-size dimensions of the slab in millimetres. These dimensions in millimetres will then need to be scaled by 0.001 to convert them into metres. To save scaling the data twice, one scale factor of (100x0.001)=0.1 can be used to convert the feature data into metres. Before scaling the model data it is worth checking the dimensions of the slab.

To check the existing model dimensions, 2 sample Points on the centre line of the mid-span support can be selected in turn and their coordinates obtained. If necessary zoom in on the model to make Point selection easier.
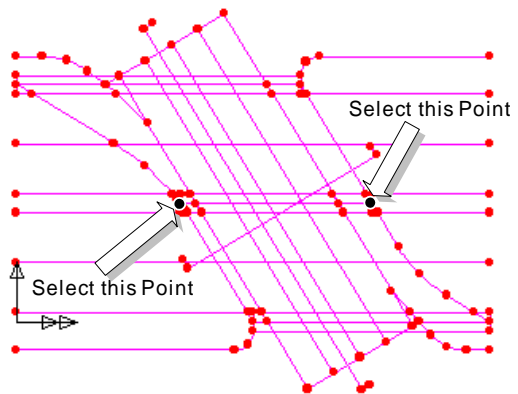
 Use the Zoom in button to enlarge the view to include both ends of the centreline.

Select this Point

Select this Point

 Return to normal cursor selection mode.

- Select the Point on the left-hand edge of the slab deck as shown in the diagram

- With the **Shift** key held down, select the Point shown on the right-hand edge of the deck.

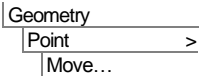A value between the Points selected of 202.075 will be displayed in the message window.

 Resize the model to fit the graphics window.

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Scaling the model units

- Drag a box around the slab to select all the features. (Or press the **Ctrl** and **A** keys together).

Geometry	
Point	>
Move…	

⊢ Select the **Scale** option and enter a **Scale** factor of **0.1** in the **X**, **Y** and **Z** fields. Leave the origin set as 0,0,0 and click **OK**
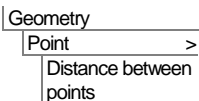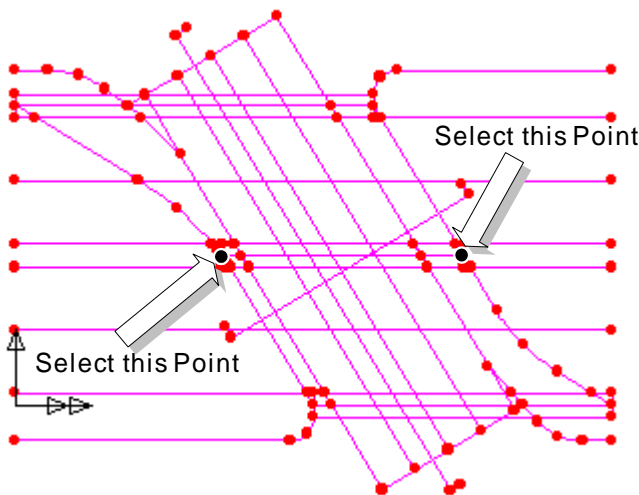
The slab dimensions will be scaled accordingly.

To check the new model dimensions, The same sample Points on the centre line of the mid-span support are to be selected and their new coordinates obtained.

Use the Zoom in button to enlarge the view to include both ends of the centreline as before.

Return to normal cursor selection mode.

- Select the Point on the left-hand edge of the slab deck as shown in the diagram

Select this Point

Select this Point

- With the **Shift** key held down, select the Point shown on the right-hand edge of the deck.

Geometry	
Point	>
Distance between points	

A value between the Points selected of 20.2075 will be displayed in the message window.

Resize the model to fit the graphics window.

Save the model

File	
Save	

Save the model.

This completes the conversion and preparation of the DXF data model for use in LUSAS. From the imported data, Surfaces would be defined, a mesh assigned to the model, and geometric properties, supports and loading added.

This completes the example.

Notes on importing the DXF data using a pre-translation scale

As an alternative to scaling data a pre-translation scale could be used. After importing the DXF data and checking the model dimensions in LUSAS as previously described (if required) the DXF file can be re-imported using a pre-translation scale to convert it into the correct dimensions for use.

File
Import…

On the Import dialog select the DXF file **slab.dxf** from the **<Lusas Installation Folder>\Examples\Modeller** directory.

- Click the **Advanced** button

- On the Import Parameters dialog enter a pre-translation scale of **0.1**

- Click the **OK** button

- Press the **Import** button.

This completes the example.