

NX and the LS-Dyna environment

fact sheet

Siemens PLM Software

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► Summary

The LS-Dyna environment provides the tools needed to build models and define LS-Dyna parameters. The environment speaks the LS-Dyna language in terms of element definitions. It allows the user to fully leverage the NX™ Advanced FEM software's finite element pre-processing capabilities to prepare for LS-Dyna analysis. The LS-Dyna environment enables NX export capabilities to LS-Dyna input file data.

Benefits

Leverage the NX pre/post simulation toolset with the CAD-associativity and NX collaboration features to generate LS-Dyna models

Use the NX geometry-based and/or FE-based modeling tools to simplify the modeling process

The LS-Dyna environment speaks the LS-Dyna terminology and supports a wide variety of elements and other LS-Dyna-specific entities

Features

A broad range of LS-Dyna entities and solutions are supported

Creating complete finite element models for LS-Dyna input files

Exporting LS-Dyna models for structural analyses

LS-DYNA elements

[Overview](#) [How To](#) [Options](#) [Related Topics](#)

Physical properties and element attributes

The following table lists the LS-DYNA elements that are supported in Advanced Simulation. It also lists the Keyword and physical property tables that can be defined for each element type. For more information about defining physical and material properties, see [Physical properties and element attributes overview](#).

In the LS-DYNA FEM, you describe the model's physical and material properties using the physical property named **PART** and the modeling objects named **SECTION** and **HOURGLASS**.

For example, in a physical property dialog box such as **PART**, you can specify an NX material or type the ID of an external LS-DYNA material.

You can define the material orientation for 2D and 3D elements in the physical properties, **Mesh Associated Data** dialog box, or the **Element Associated Data** dialog box.

The following table lists the LS-DYNA elements supported in Advanced Simulation. It also lists the keyword and physical property tables that can be defined for each element type. The **SECTION** modeling object contains additional physical properties such as shell thickness, spring constant, and so on.

For descriptions of an element type, see the LS-DYNA documentation.

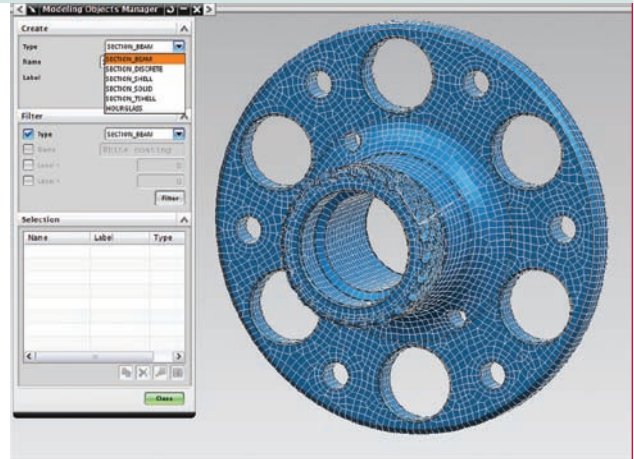
Element/LS-DYNA Keyword	Description	Mesh collector/Physical property name	Modeling object name
0D elements			
ELEMENT_MASS	0D structural mass element.	n/a	n/a
ELEMENT_INERTIA	Lumped inertia element assigned to a node.	n/a	n/a
1D elements			
ELEMENT_BEAM	Two-node 1D linear beam element (beam, truss).	PART (beam)	SECTION_BEAM HOURGLASS
ELEMENT_BEAM_OFFSET	Section properties (created automatically when you define offset and use default orientation).	PART (beam)	SECTION_BEAM HOURGLASS
ELEMENT_BEAM_ORIENTATION	Section properties (created automatically when you define orientation but not offset).	PART (beam)	SECTION_BEAM HOURGLASS
ELEMENT_BEAM_OFFSET_ORIENTATION	Section properties (created automatically when you define both orientation and offset).	PART (beam)	SECTION_BEAM HOURGLASS

Environment capabilities

- A broad range of LS-Dyna entities are supported
- Exporting LS-Dyna models for structural analyses

Using NX to create LS-Dyna models

The power of NX Advanced FEM pre- and post-processing is an ideal partner for the use of the LS-Dyna solver capabilities. NX Advanced FEM geometry-based finite element modeling tools simplify the modeling process. The LS-Dyna environment builds an LS-Dyna input file, so little intermediate processing is needed. The LS-Dyna translator is continuously enhanced.



Elements and other entities

A wide variety of elements and other model entities are supported.

Structural element types:
Element/LS-Dyna keyword

0D elements

- *Element mass*: Structural mass element
- *Element inertia*: Lumped inertia element assigned to a node

1D elements

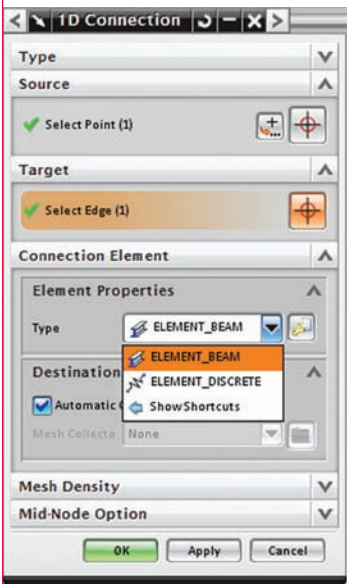
- *Element beam*: Two-node 1D linear beam element (beam, truss)
- *Element beam offset*: Section properties (created automatically when you define offset and use default orientation).
- *Element beam orientation*: Section properties (created automatically when you define orientation but not offset).
- *Element beam offset orientation*: Section properties (created automatically when you define both orientation and offset).
- *Element discrete*: Two-node 1D element (spring, damper).

2D elements

- *Element shell (3), (4), (6), (8)*: Three, four, six, and eight node 2D thin-shell elements.
- *Element shell thickness*: Thickness extracted from midsurface (created automatically).
- *Element shell offset*: Thickness offset (created automatically when you define offset).
- *Element shell beta*: Material orientation (created automatically when you define the angle in element associated data).
- *Element shell MCID*: Material orientation (created automatically when you define material coordinate system in element associated data).
- Part composite keyword is supported in NX Laminate Composites

3D elements

- *Element tshell (6), (8)*: Six-node and eight-node 3D solid Hex6 and Hex8 elements.
- *Element solid (4), (6), (8), (10)*: Four, six, eight, and ten node 3D solid elements for isotropic materials.
- *Element solid ortho*: Material orientation for orthotropic/anisotropic materials (created automatically when you define material orientation). Material orientation is defined by two vectors.



Note:

A complete list of LS-Dyna export entity support is provided in the NX online help documentation under the following header: Advanced Simulation / Solving the Model / Importing and Exporting Model Data /

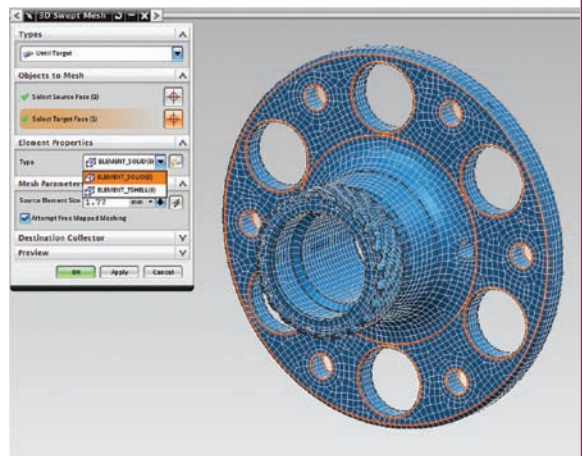
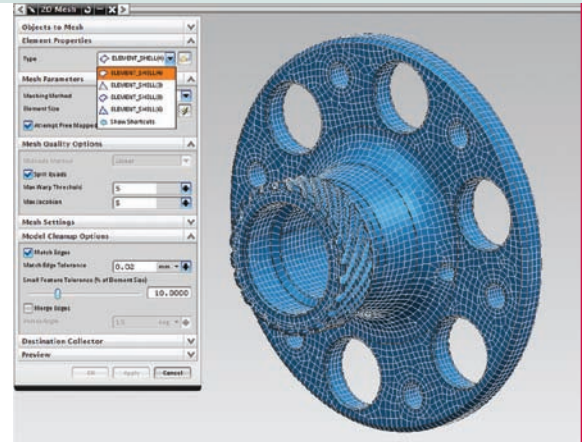
Compatibility

The LS-Dyna environment is compatible with the following LS-Dyna releases:

- LS-Dyna v971 or earlier

Supported hardware/OS

The LS-Dyna environment is an add-on module within the NX Advanced Simulation suite. It requires a license of NX Advanced FEM as a pre-requisite. It is available on all NX supported hardware/OS platforms (Windows, Linux and Unix) including selected 64-bit platforms.



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