STEP SDK

ODA's STEP SDK provides robust support for EXPRESS-based schemas, enabling powerful data exchange and model access across industries. The SDK is designed to work with any EXPRESS-defined standard through a unified, common API.

It has been tested and verified with major application protocols, including AP203, AP214, AP238, AP242 ed.3, AP242 ed.4, and CIS/2, ensuring compatibility with widely used STEP-based workflows in manufacturing, engineering, and construction.

What is STEP

STEP (STandard for the Exchange of Product data) is defined by a family of **ISO 10303 standards** used for reliable data exchange across CAD, CAM, CAE, and PLM applications.

Key Concepts

EXPRESS

A formal data modeling language used to define data structures in STEP files.

SDAI (Standard Data Access Interface)

A platform-independent interface for accessing and manipulating STEP data objects. Implementations exist for multiple programming languages, including **C**, **C++**, and **Java**.

Application Protocols (APs)

Industry-specific subsets of STEP that standardize the use of EXPRESS data structures for particular domains (e.g., AP242 for PMI and 3D geometry).

Why STEP Matters

Stability

STEP standards evolve slowly, with backward-compatible updates typically released every five years.

Accessibility

Publicly documented standards are available through the ISO official website.

Core ISO 10303 Standards

Modeling and Interfaces

ISO 10303-11	EXPRESS: Data modeling language
ISO 10303-22	SDAI infrastructure model
ISO 10303-23/24/25	SDAI bindings for C++, C, and Java respectively

Object Model & Geometry

ISO 10303-41	Product description fundamentals
ISO 10303-42	Geometry and topology (curves, surfaces, B-Rep, etc.)

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Data Exchange Formats	
ISO 10303-21	STEP physical file (SPF)
ISO 10303-26	HDF5 format
ISO 10303-28	XML format
ZIP packaging	For compressing multi-file STEP archives

STEP SDK Features

Create

Create and edit STEP files using a flexible data model that supports geometry, topology, metadata, and product manufacturing information (PMI). Generate new STEP entities based on EXPRESS schemas using either early- or late-bound access.

Edit

Modify geometry, metadata, and PMI within STEP files using rule-based logic and schema validation. Access and manipulate derived attributes, WHERE clauses, and global rules through the built-in EXPRESS interpreter.

Save

Write STEP data to standard ISO formats including SPF, HDF5, and XML, with optional ZIP compression for compact storage and transport.

Conversion

- **Import:** DWG, DXF
- **Export:** DWG, GLTF, GLB, VsfX, JSON, and raster formats
- Convert B-Rep geometry into ODA Solid Modeler bodies for advanced modeling or visualization.

Visualization

Visualize STEP geometry independently or in combination with other file types. The SDK supports:

- 2D and 3D geometry rendering
- B-Rep visualization compliant with ISO 10303-42
- PMI/Dimensions visualization from AP242
- XML-based assemblies using StepX schema definitions

Data Access

- Access all metadata defined by the EXPRESS schema using ODA's late-bound C++ API or ISO 10303-24 SDAI.
- Generate and use early-bound classes for established schemas.
- CDA integration allows for uniform access to STEP and other supported file formats.

Validation

- SDAI-based and format-dependent validation for STEP models.
- Supports evaluation of derived attributes, WHERE rules, and global constraints.

Schema Support

- Initialize runtime schemas directly from EXPRESS files.
- ISO 10303-42 (geometry and topology) and ISO 10303-242 (PMI) support included.

Wrappers

Access STEP SDK functionality not only through cross-platform C++, but also via intuitive C# wrappers to simplify integration into .NET-based workflows.

Sample applications

Here you can find an overview of the STEP Sample applications available to all ODA Members, including trial users. If you're interested in any of these, links to the documentation will become available immediately after applying for a free trial.

NAME	DESCRIPTION
ExDwg2Step	Sample application that converts .dwg files to STEP or STP files.
ExStepDgn	Sample application module that contains example commands for OdaDgnApp.
ExStep2Dwg	Sample application that converts a STEP or STP file to a .dwg file.
ExStepReadFile	An example of reading STEP file content.
ExStepTutorials	An example application with code samples grouped by functionality.
ExStepVectorize	An example application that illustrates creation of an STL file with STEP file geometry content.

Open Step Viewer

Explore STEP files using Open STEP Viewer — a lightweight, easy-to-use professional-grade viewer powered by the ODA STEP and Visualize SDKs.

- Visualize 2D and 3D geometry
- Inspect PMI data and model structure
- Load files in various STEP formats, including .stp, .step, and .p21
- QIF support starting with version 26.6
- IGES support coming in version 26.7

This viewer showcases the core capabilities of the STEP SDK in a real-world application, demonstrating performance, compatibility, and ease of integration.

openstepviewer.com

Pricing

ODA operates under a membership-based model, where the membership fee is per company, not per developer. You can find all pricing details on our website.

Membership Levels

Commercial

Ideal for desktop/mobile applications with fewer than 100 copies of the end-user product distributed annually. Only the Core Package is available at this level.

Sustaining

Suitable for unlimited distribution of desktop/mobile applications or web/SaaS solutions. This level allows access to various Extensions in addition to the Core Package.

Founding

Offers access to the source code of the SDKs, along with all the benefits of the Sustaining membership.

STEP SDK is a part of the Core Package, making it available to all membership levels.

What is the Core Package

The Core Package includes access to Drawings, Visualize, Architecture, IFC, STEP, and Publish SDKs. Please note that individual products from the Core Package cannot be purchased separately.

More about the Core Package.