HyperX CAD and Composites Digital Thread

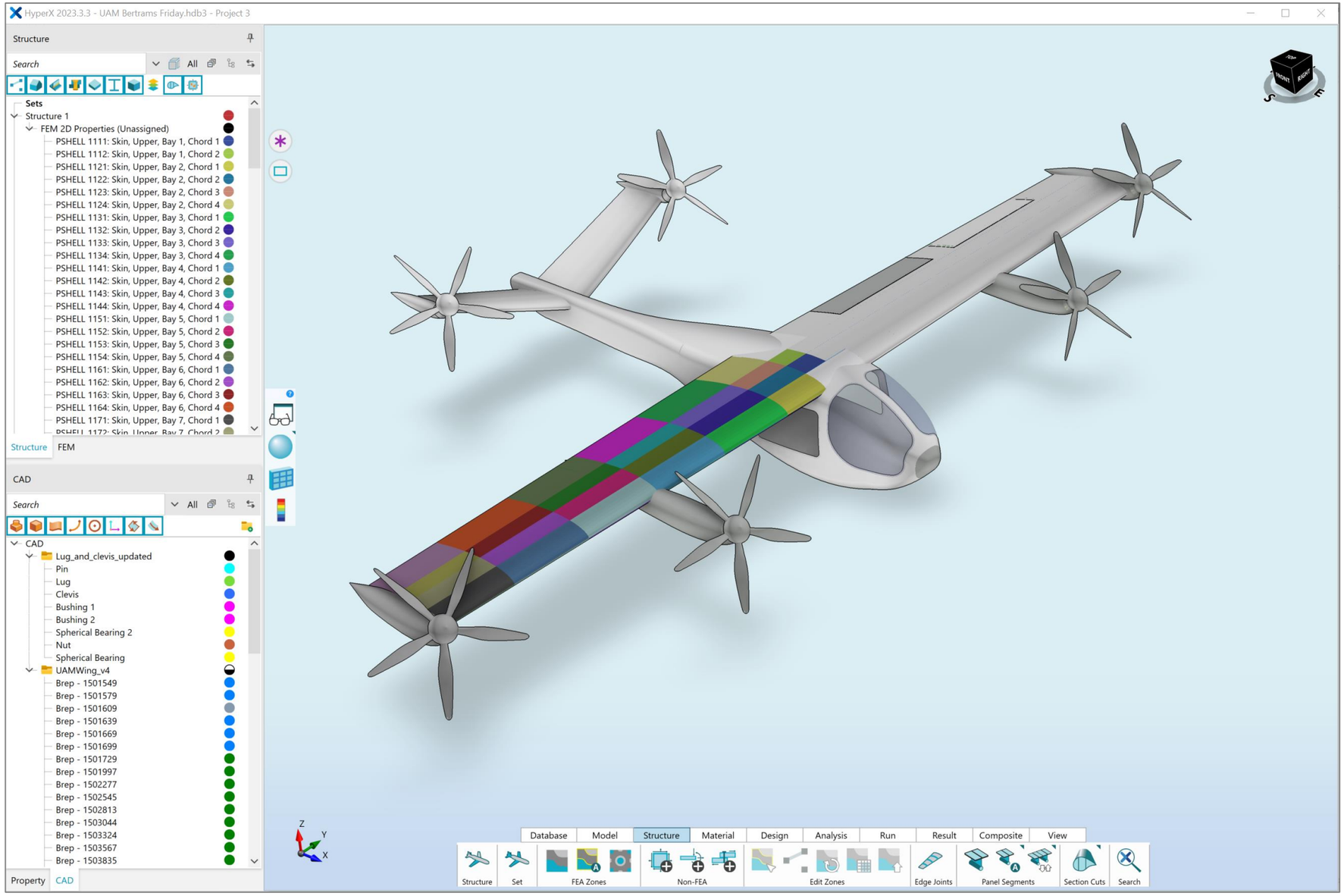
August Noevere

Contact us: www.collieraerospace.com

HyperX and the Digital Thread

Objectives of Presentation

- Describe current HyperX CAD and composites integration
- Highlight recent milestones in upcoming 2025 release



Why is the digital thread important?

- *Legacy approach*: design data exchanged between disciplines via “disposable/untracked” files – Excel, PPT, email, etc

- *Digital thread approach*: design data exchanged via CAD models

Outline – HyperX and the Digital Thread

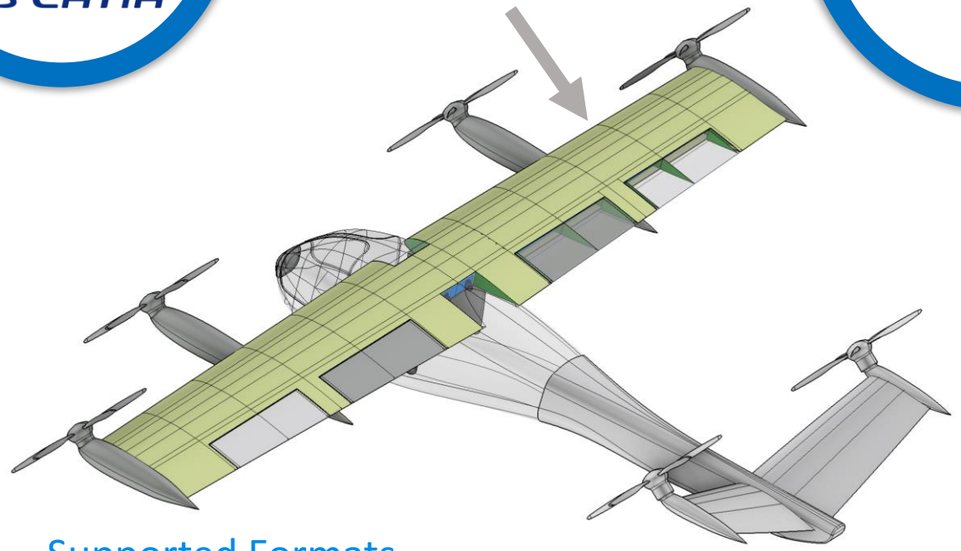
- CAD Topics
  - Introduction (**PPT**) – 5min
  - CAD import/export/CAD generation (**demo**) – 10min

- Composites Topics
  - Introduction (**PPT**) – 3min
  - Fibersim and other composites exchange topics (**demo**) – 7min

HyperX and the Digital Thread

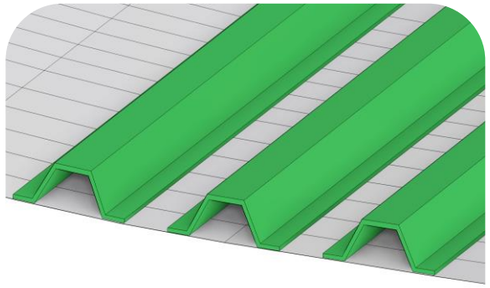
CAD → **CAD Import** → HYPERX → **CAD Export** → CAD

Current CAD Design

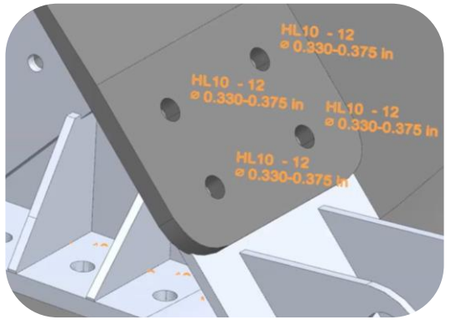


Optimized Design Data

Stiffener Geometry



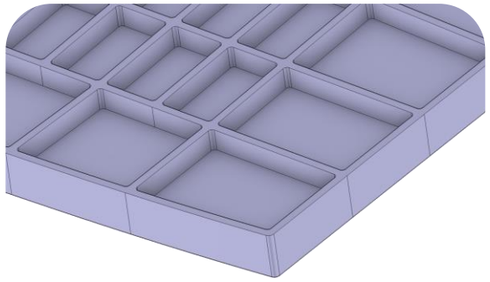
Metadata Annotations



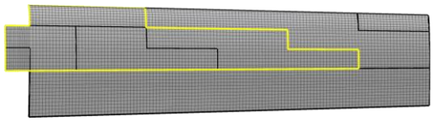
Supported Formats

File Type	Software	Import	Export
.stp, .igs	All	✓	✓
.JT	Siemens NX	✓	✓
.prt	Siemens NX	✓	
.x_t, .x_b	Siemens NX	✓	✓
.CATpart	Dassault CATIA/3DX	✓	

Optimum Dimensions

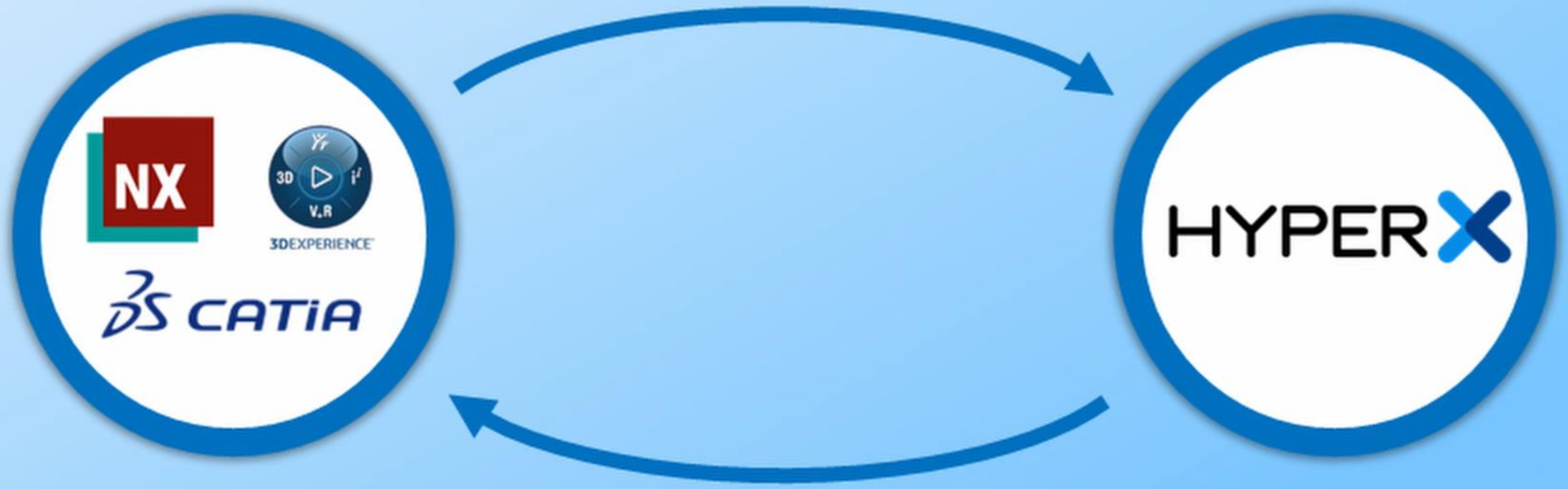


Composite Ply Data



CAD Exchange Demo

CAD Exchange



HyperX CAD Exchange – Key Takeaways

- CAD data imported into HyperX
  - Import CAD models to overlay on FEM – locate cutouts, fillets, etc that are not modeled on FEM
  - Dissect geometry and extract dimensions to be used in analysis

Stress analysts can collect geometry data without relying on CAD designers or software

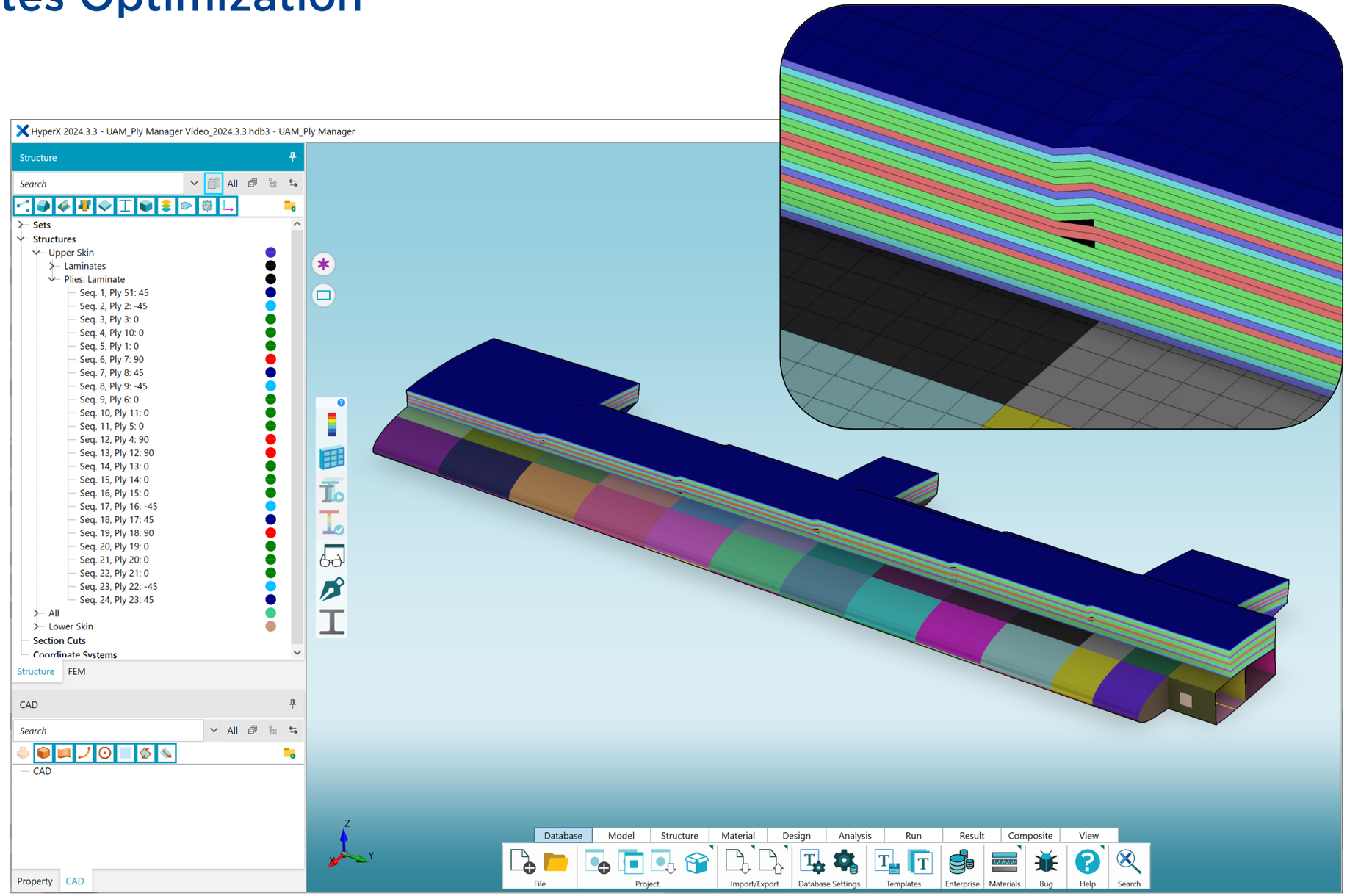
- CAD data exported from HyperX
  - Generate CAD for optimized stiffener geometry (uniaxial or grid stiffened)
  - Export CAD designs in standard CAD formats (.igs, .stp, .JT, .x_t, .x_b)
  - Export metadata in CAD formats (.JT, .stp)

Hand off optimized geometry and metadata to CAD designers in CAD-friendly formats

HyperX and the Digital Thread: Composites Topics

HyperX Composites Optimization

- HyperX optimizes:
  - Laminate stack
  - Ply shapes
- HyperX can map these results back and forth with external CAD/CAM software



Composite Data Exchange

CAM

Composite Import

Current Composite Design and Manufacturing Data

HYPERX

Composite Export

Optimized Layup

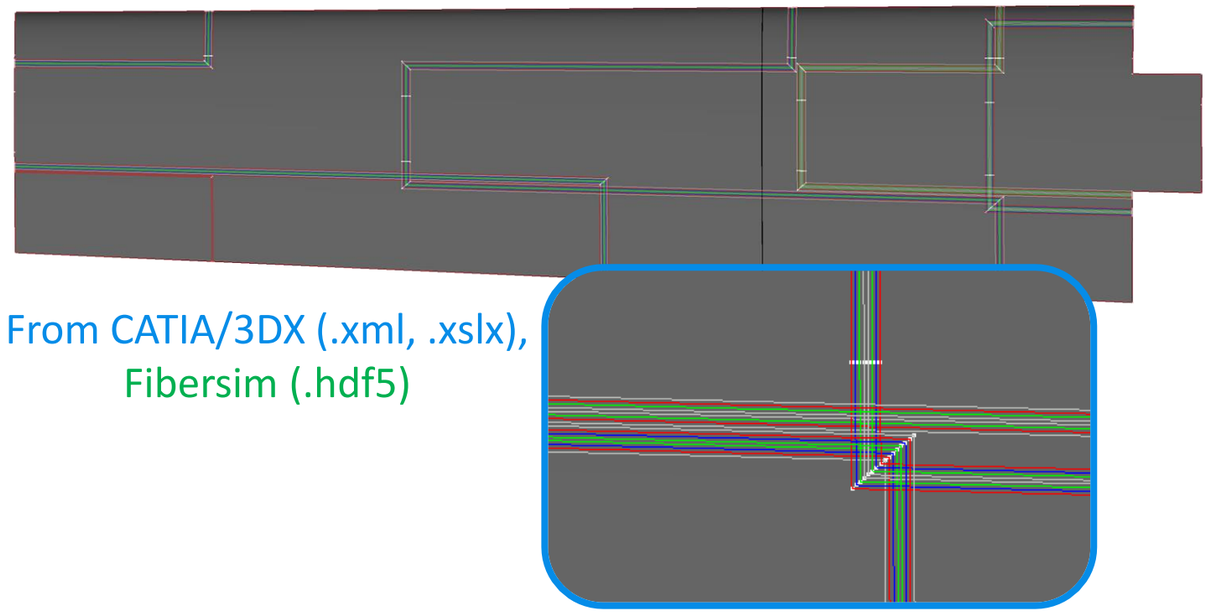
CAM

Generic CAD Ply Boundaries

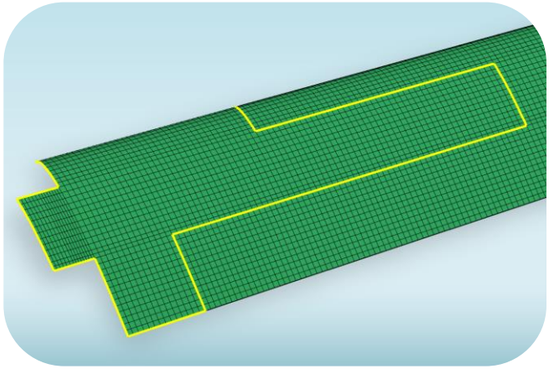
Software-Specific Formats

Fibersim .hdf5

CATIA/3DX .xlsx

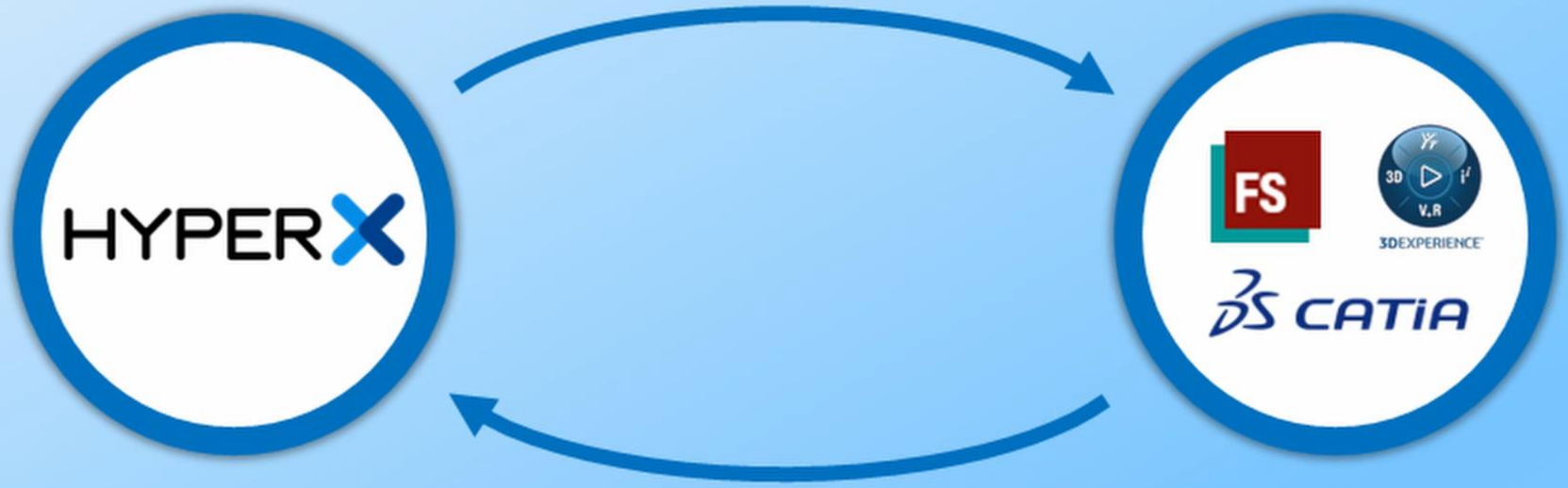


From CATIA/3DX (.xml, .xslx), Fibersim (.hdf5)



Fibersim Exchange Demo

Composites Exchange



HyperX Composites Exchange – Key Takeaways

- Composites data exported from HyperX
  - Optimized ply shapes
  - Ply metadata (orientation, sequence, material)

Automates tedious documentation of ply shapes

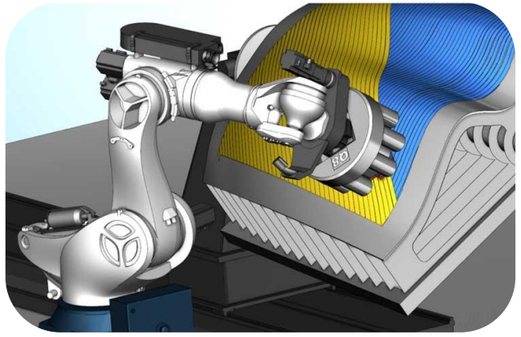
- Composites data imported to HyperX
  - Optimized ply shapes
  - Ply metadata (orientation, sequence, material)
  - As-manufactured fiber orientations, thickness

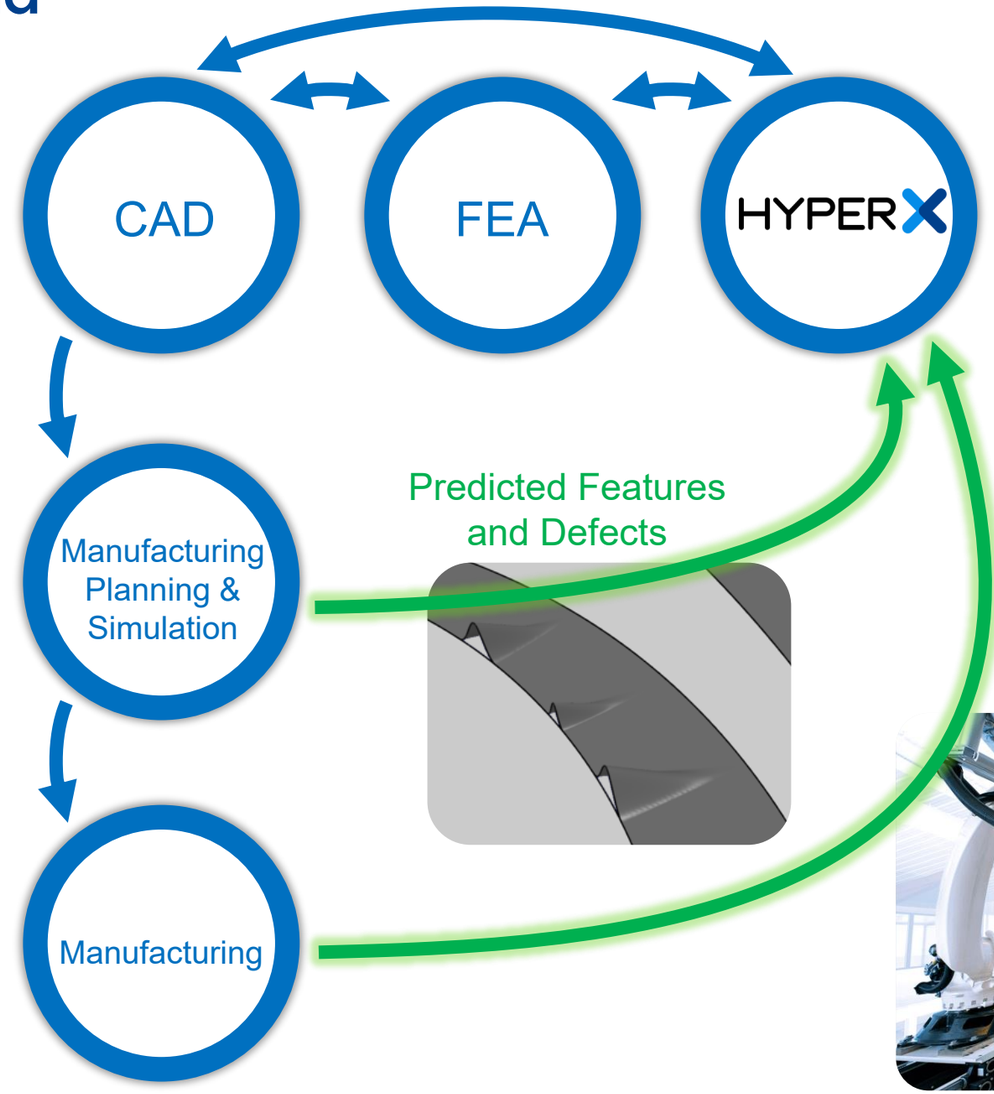
Quickly assess strength and buckling with “as manufactured” laminate

Design for Manufacturing: Effects of Defects

HyperX and the Digital Thread

Integration with manufacturing: receive manufacturing data for analysis





- Assess impact of discrepancies between manufacturing and stress
- Quickly determine when rework is needed for manufacturing issues

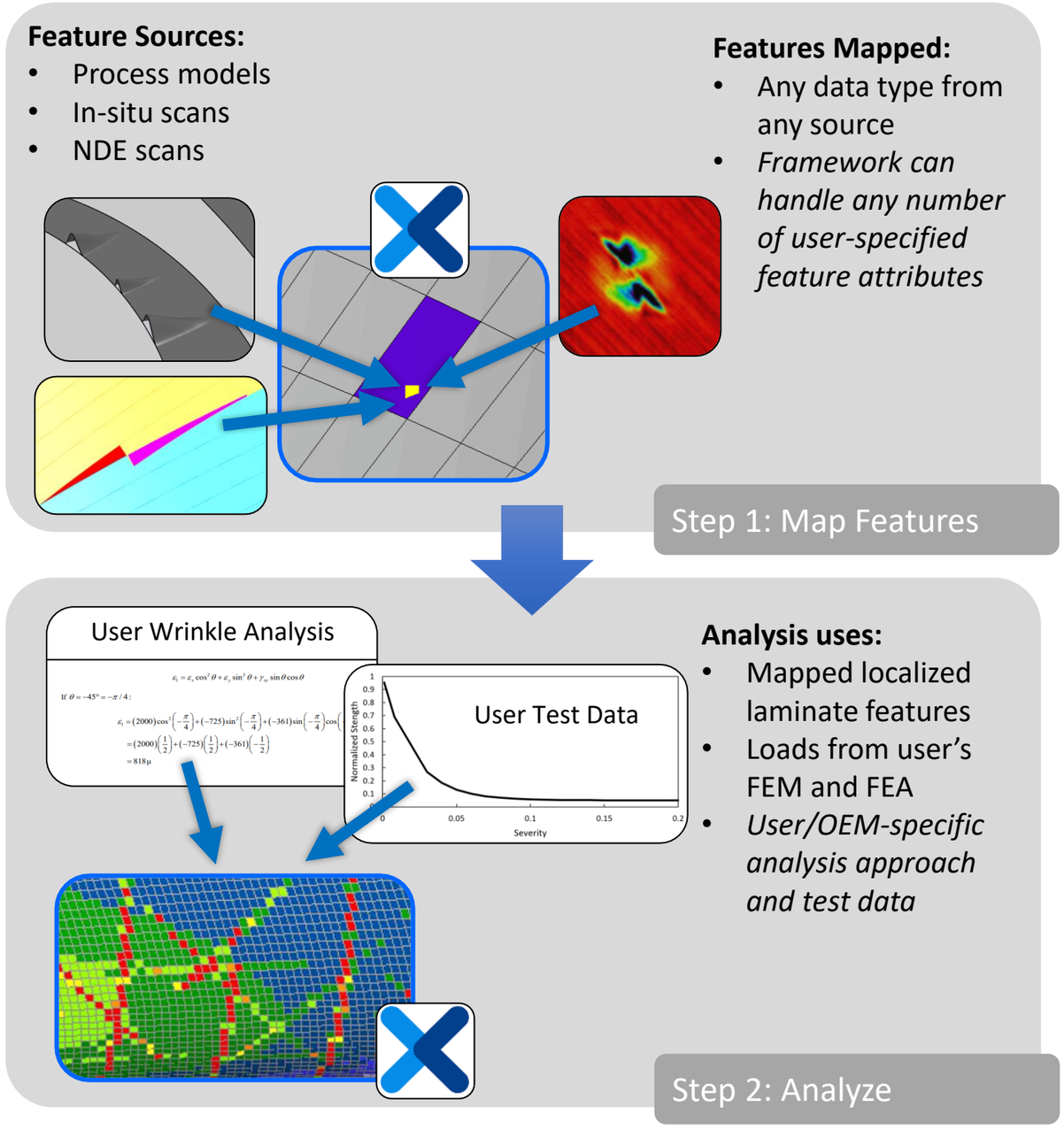
In-Situ or NDE Data

Direct data exchange with manufacturing

Effects of Defects Framework

- **Objective:** create framework for analysis of defects and features of any type, using user-input knockdown test data/simulation

- Implemented with new capability in HyperX Solver to handle custom data



Wrap-Up

CAD and Composites Wrap-Up

- Substantial progress has been made in data exchange and integration of HyperX with:
  - CAD tools
  - Composites Computer Aided Manufacturing (CAM) tools

- HyperX can now:
  - Import and export virtually any CAD and composites data to and from all major CAD and CAM tools used by Aerospace customers
  - Empower stress analysts to be more savvy with consuming and querying CAD models
  - Generate CAD geometry from optimization results
  - Generate and consume detailed composites design data

End of Presentation

Contact us: www.collieraerospace.com