



Business Collaboration through STEP AP242

Florian PORCHER
Dassault Systèmes
R&D Interoperability Manager

19 October 2021

Agenda

R&D Involvement in STEP groups

STEP support within **3DEXPERIENCE** and CATIA V5

Conclusion

R&D Involvement in STEP groups

- ▶ Member of ISO/TC184 (AFNOR/IDMI) and AFNeT (FR), PDES Inc (US) and prostep ivip (DE)
 - ▷ Strong collaboration with STEP experts to enhance Business Collaboration and Long Term Archiving
 - ▷ Contribution to and validation of STEP Recommended Practices
 - ▷ Participation to ISO/SC4 Plenary, Standardization Days, STEP AP242 Day
- ▶ Cooperation on archiving with Aerospace joint group LOTAR
 - ▷ Data model definition (tessellation, PMI, ...)
 - ▷ Participation to LOTAR pilots to validate data models
- ▶ Key actor through AFNeT in Implementor Fora
 - ▷ Participation to all CAX-IF Test rounds since TR2J (1999)
 - ▷ Participation to PDM-IF
 - ▷ Participation to EWIS-IF
- ▶ Participation to CAD and PDM Benchmarks (AFNeT and prostep ivip)
 - ▷ <http://benchmark.ap242.org/>

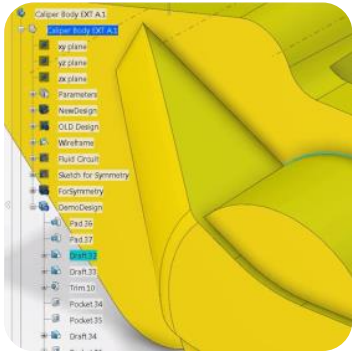
Agenda

R&D Involvement in STEP groups

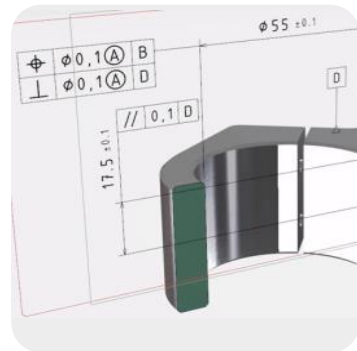
STEP support within 3DEXPERIENCE and CATIA V5

Conclusion

STEP | Major Supported functionalities



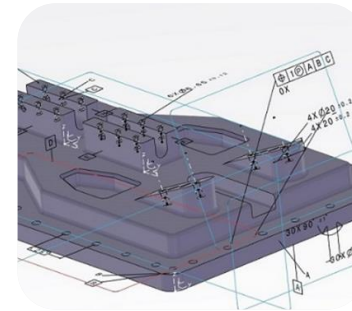
Exact Geometry,
Product Structure



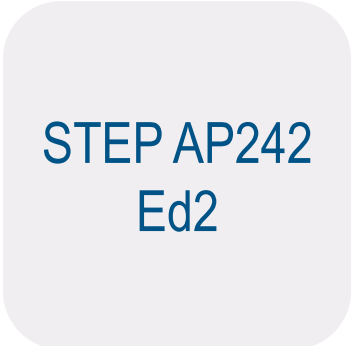
Graphic PMI,
Validation Properties



Composite,
Tessellated Geometry



Semantic PMI,
PDM



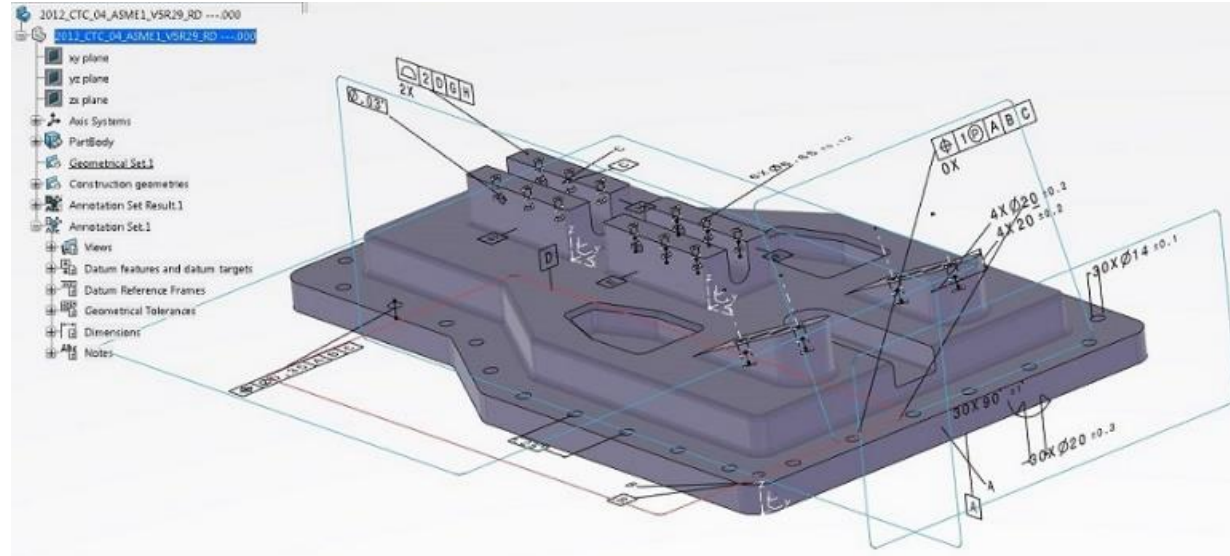
Composite*,
Semantic PMI*



5 * Enhanced with STEP AP242 Ed2

STEP AP242 CAD | Product & Manufacturing Information

- ▶ Facilitate design review with support of saved views with hide/show of geometry on Graphic PMI.

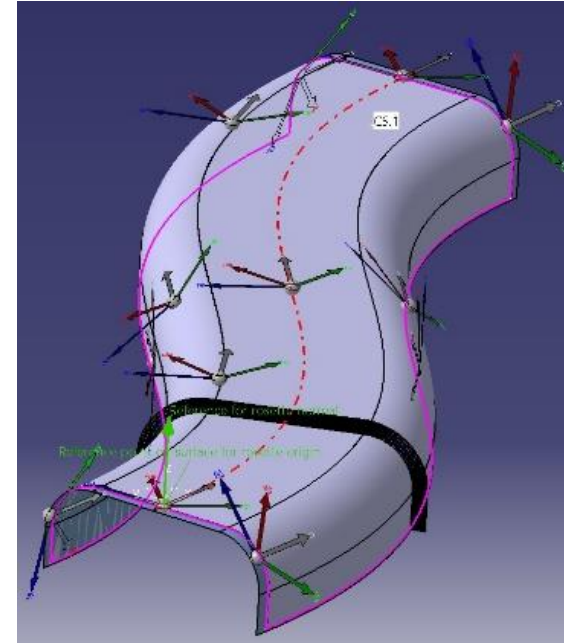


- ▶ Improve display of Semantic PMI using “Presentation Placeholder” thanks to STEP AP242 Ed2
- ▶ Collaboration with STEP community on Semantic PMI
 - ▷ Continuous feedback from DS expert about lack in STEP to support ASME-ANSI and ISO standard

STEP AP242 CAD | Applicative Data

► Enhanced composite design support

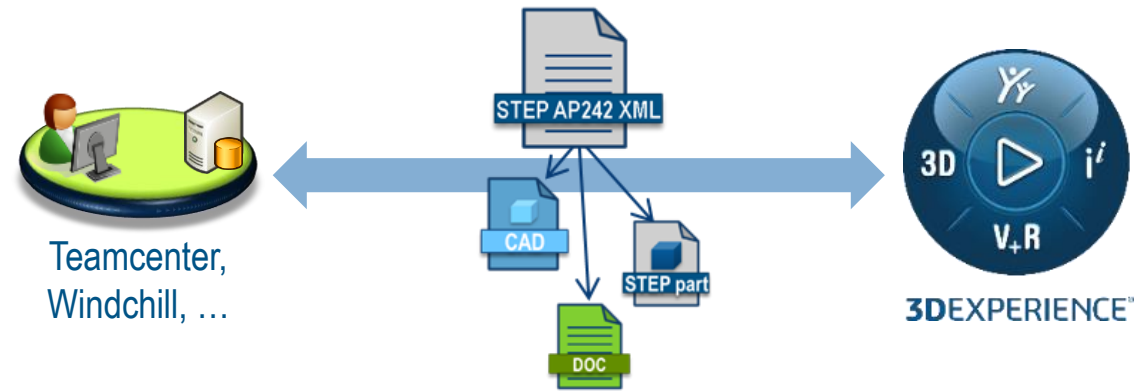
- ▷ Rosette guided by curve
- ▷ Multiple rosettes
- ▷ Work in progress
 - ▶ Edge Of Part
 - ▶ Flattened representation of plies
 - ▶ Validation properties



► Improved completeness of applicative data interoperability

- ▷ Export-Import of the User Attributes defined thru a Parameter set at Part/Product level
- ▷ Export-Import of the Geometric Sets with their associated Attributes.

STEP AP242 PDM | Collaboration in 3DEXPERIENCE

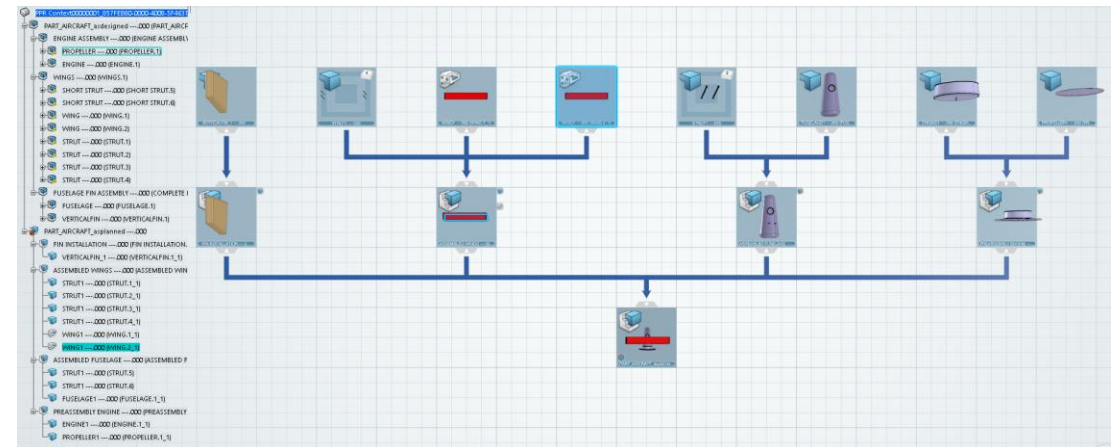
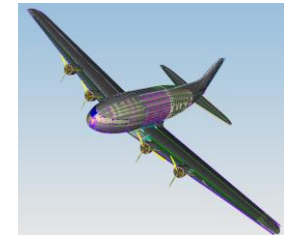
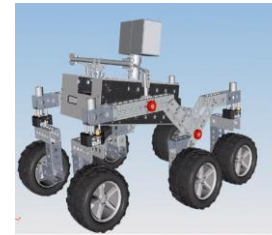


► Scenarios supported with STEP AP242 XML.

- ▷ Exchange of assemblies referencing CAD files (STEP or native) and non-CAD documents (PDF, Office,...)
- ▷ STEP PDM Collaboration with **lifecycle** management (Update and Versioning)
- ▷ STEP PDM Collaboration with **configuration** management (Effectivities)
- ▷ Exchange between **customized PDM system**

STEP AP242 PDM | Work in progress with PDM-IF

- ▶ Configuration
- ▶ Improve completeness of exchanged semantic
- ▶ Incremental Exchange
- ▶ Alternate / Substitute
- ▶ AsDesigned / AsPlanned
- ▶ Change management



CAD functional capabilities supported by the STEP AP242 interface

- Dassault Systèmes 3DEXPERIENCE R2021x

CAD information		Implementation format				Level of implementation		
		AP242 Ed1		AP242 Ed2		Pilot	IF test	COTS
		P21- AIM	XML-BOM	P21- AIM	XML-DM			
3D geometry	3D exact BREP representation	YES	n/a	YES	n/a			YES
	3D tessellated BREP representation	YES	n/a	YES	n/a			YES
	presentation (color, layers, transparency, invisibility, etc.)	YES	n/a	YES	n/a			YES
3D Product & Manufacturing Information (PMI)	graphic presentation	YES	n/a	YES	n/a			YES
	semantic representation	YES	n/a	YES	n/a			YES
	minimal presentation information for semantic PMI (placeholder, etc.)	YES	n/a	YES	n/a		YES	
	saved view in a part	YES	n/a	YES	n/a			YES
	saved view at assembly	NO	n/a	NO	n/a	NO	not covered yet	
	presentation at assembly level	PARTIAL	n/a	PARTIAL	n/a	NO	not covered yet	
Assembly structure	1 STEP file with assembly structure and 3D geometry	YES	n/a	YES	n/a			YES
	1 assembly with references to CAD 3D files	YES	YES	YES	YES			YES
	nested assemblies with references to CAD 3D files	YES	YES	YES	YES			YES
Composite design	Ply shape definition based on contour, exact surface	YES	n/a	YES	n/a			YES
	Ply shape definition based on 3D tessellated geometry	YES	n/a	YES	n/a			YES
	Cartesian Rosette	YES	n/a	YES	n/a			YES
	Rosette guide by a curve	n/a	n/a	YES	n/a			YES
	MEOP	n/a	n/a	PLANNED	n/a	NO		
	Ply shape flatten	PLANNED	n/a	PLANNED	n/a	NO		
Assembly and installation with fasteners	Hole and fasteners definition based on UDA, UDF and geometric set	YES	n/a	YES	n/a		not covered yet	YES
	Mating requirement	NO	NO	NO	NO	NO	not covered yet	
	Fasteners installation	NO	NO	NO	NO	NO	not covered yet	
	Hole definition	NO	n/a	NO	n/a	NO	not covered yet	
Kinematics	Motion	N.R.	YES	N.R.	YES	YES	not covered yet	
	Mechanism	N.R.	YES	N.R.	YES		YES	
Electrical Wiring Harness	wiring harness assembly structure	n/a	n/a	NO	PLANNED	YES		
	wiring harness topology	n/a	n/a	NO	PLANNED	NO		
	wiring harness connectivity	n/a	n/a	NO	PLANNED	NO		
	harness segments and cables content description	n/a	n/a	NO	PLANNED	NO		
STEP compressed file		YES	YES	YES	YES			YES
Validation property	3D geometry	YES	YES	YES	YES			YES
	PMI	YES	n/a	YES	n/a			YES
	kinematics	n/a	n/a	N.R.	NO	NO		
	assembly structure	YES	YES	YES	YES			YES
	composite	PARTIAL	n/a	PARTIAL	n/a			YES
Properties	user defined attribute (UDA)	YES	n/a	YES	n/a			YES
	user defined attribute (UDA) on geometry level	YES	n/a	YES	n/a			YES
	user defined attribute (UDA) on part level	YES	YES	YES	YES			YES
	customized PDM property	YES	YES	YES	YES			YES

DM = Domain Model
n/a = not applicable because not supported by the standard
N.R. = not recommended (based on IFs) to be supported by this format, but by the other one (P21 vs XML)
level of implementation = Pilot, IF test and COTS are three levels of maturity
Pilot = initial implementation started
IF test = interoperability testing started
COTS = mature and commercially available ("Commercial Off The Shell")

PDM functional capabilities supported by the STEP AP242 interface



- Dassault Systèmes 3DEXPERIENCE R2021x

PDM information	Implementation format				Level of implementation		
	AP242 Ed1		AP242 Ed2		Pilot	IF test	COTS
	P21- AIM	XML-BOM	P21- AIM	XML-DM			
"As Designed" PDM product structure	YES	YES	YES	PLANNED			YES
"As Planned" PDM product structure	N.R.	YES	N.R.	PLANNED		YES	
Nested PDM product structure	YES	YES	YES	PLANNED			YES
Assembly validation properties	YES	YES	YES	PLANNED			YES
Lifecycle management (LifeCycle, ApplicationDomain, Approvals)	N.R.	YES	N.R.	PLANNED			YES
Document management	N.R.	YES	N.R.	PLANNED			YES
Person and organization	N.R.	YES	N.R.	PLANNED			YES
Date and Time	N.R.	YES	N.R.	PLANNED			YES
Classification	N.R.	YES	N.R.	PLANNED			YES
Material property	N.R.	NO	N.R.	NO	NO	not covered yet	
Customized PDM property	YES	YES	YES	PLANNED			YES
User defined attribute	YES	NO	YES	NO			YES
Multi-identification	N.R.	YES	N.R.	PLANNED			YES
Change management (WorkRequest, WorkOrder, Activity)	N.R.	YES	N.R.	PLANNED		YES	
Configuration management	based on effectivities	N.R.	YES	PLANNED		YES	
	based on specifications	N.R.	YES	PLANNED		YES	
	filtering information	N.R.	PLANNED	N.R.	PLANNED	YES	not covered yet

DM = Domain Model

n/a = not applicable because not supported by the standard

N.R.= not recommended (based on IFs) to be supported by this format, but by the other one (P21 vs XML)

level of implementation = Pilot, IF test and COTS are three levels of maturity

Pilot = initial implementation started

IF test = interoperability testing started

COTS = mature and commercially available ("Commercial Off The Shell")

