

AFNeT Standardization Days 2020

datakit

The comprehensive world of CrossCAD



In partnership with



AFNeT Standards Days

Datakit

Christian Caillet

6-7 October 2020

AFNeT Standardization Days

Datakit : standardization of data exchanges and interoperability

Christian Caillet

Datakit

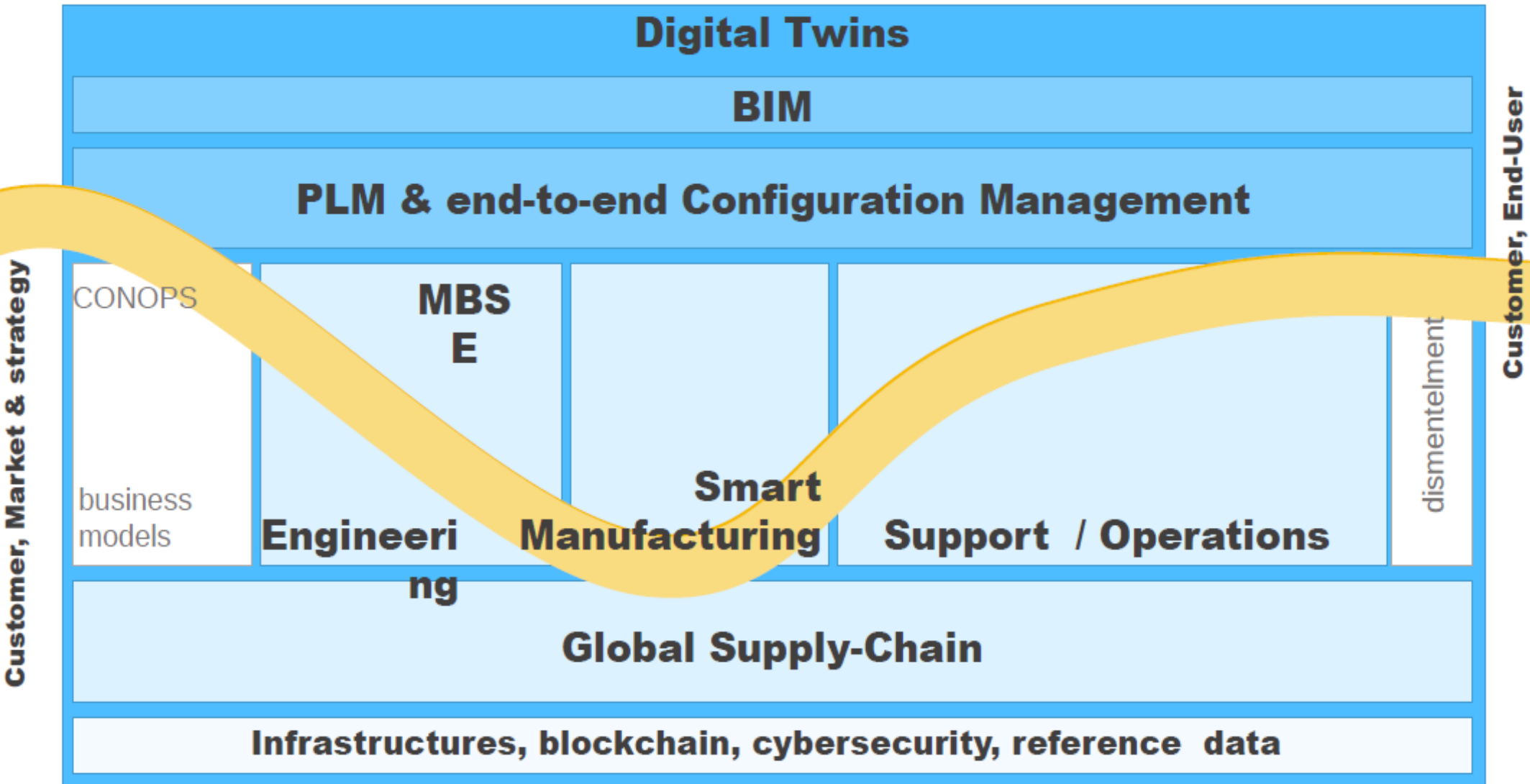
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AFNeT Standardization Days 2020

datakit

The comprehensive world of CrossCAD

Foundations for model-based industry ecosystems



Core Business :

- 2D & 3D CAD readers/writers using reverse engineering approach
- Independent from third party components.
- Independent from limitation due to API use.
- Homogeneous access data from various CAD formats
- To be flexible concerning business models and licensing issues towards OEM customers
- Neutral file format expertise. Strong involvement in STEP & LOTAR activities

Facts & Figures

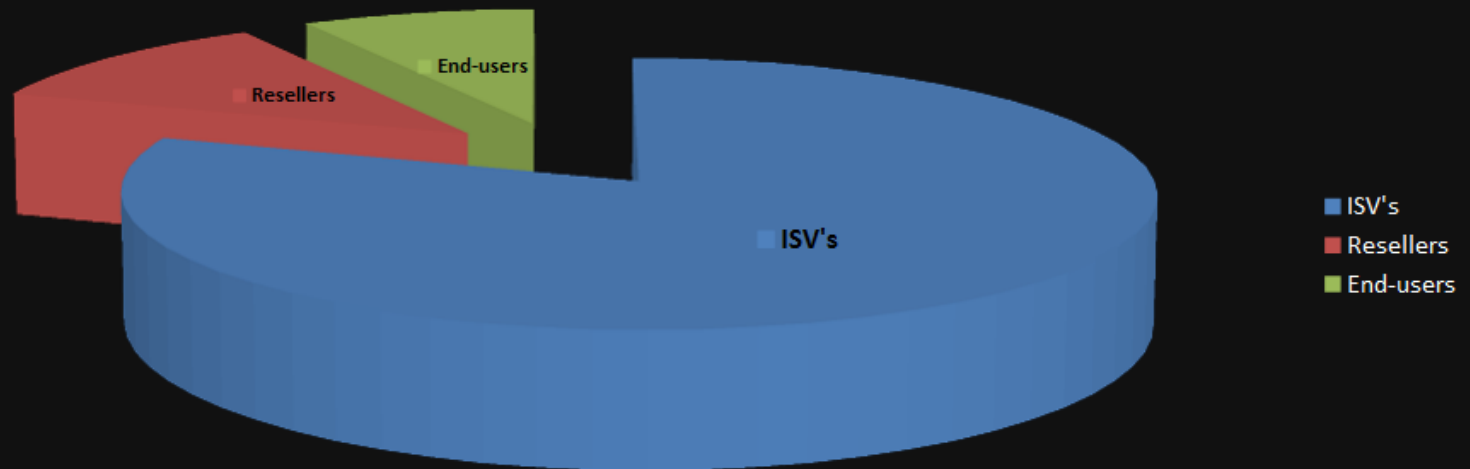
- since 1992
- International business 80% outside of France
- Staff of 25 people
- Turnover 2019 : 4,1 M €
- 100+ Independent Software Vendors (ISV) using Datakit components. 10 new ones / year.
- 2000+ End-users direct sales or through 100+ resellers worldwide, from small businesses to very large accounts in automotive/aeronautic/aerospace



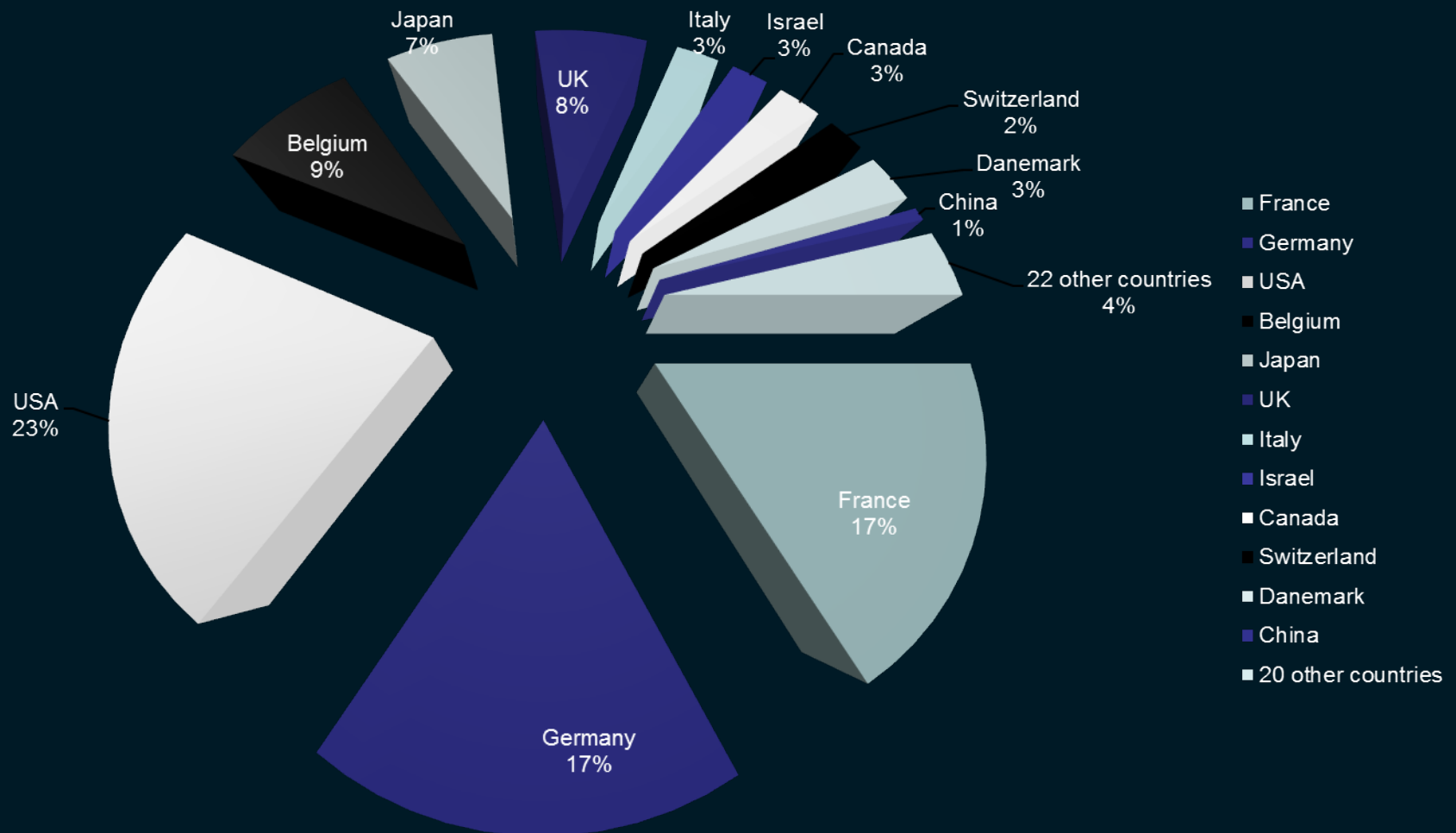
WORLDWIDE REVENUE

- ❑ Outside of France : accounted for around **80%** of the turnover
- ❑ ISVs accounted for **80%** of the turnover

SALES BY ACTIVITY



SALES BY ZONES



More than 100 companies rely on Datakit's technology

- CAD
- CAM / 3D Printing
- Metrology / Control / Inspection
- Visualisation, Animation, Documentation
- CAE / Simulation
- BIM

CrossCADWare Products

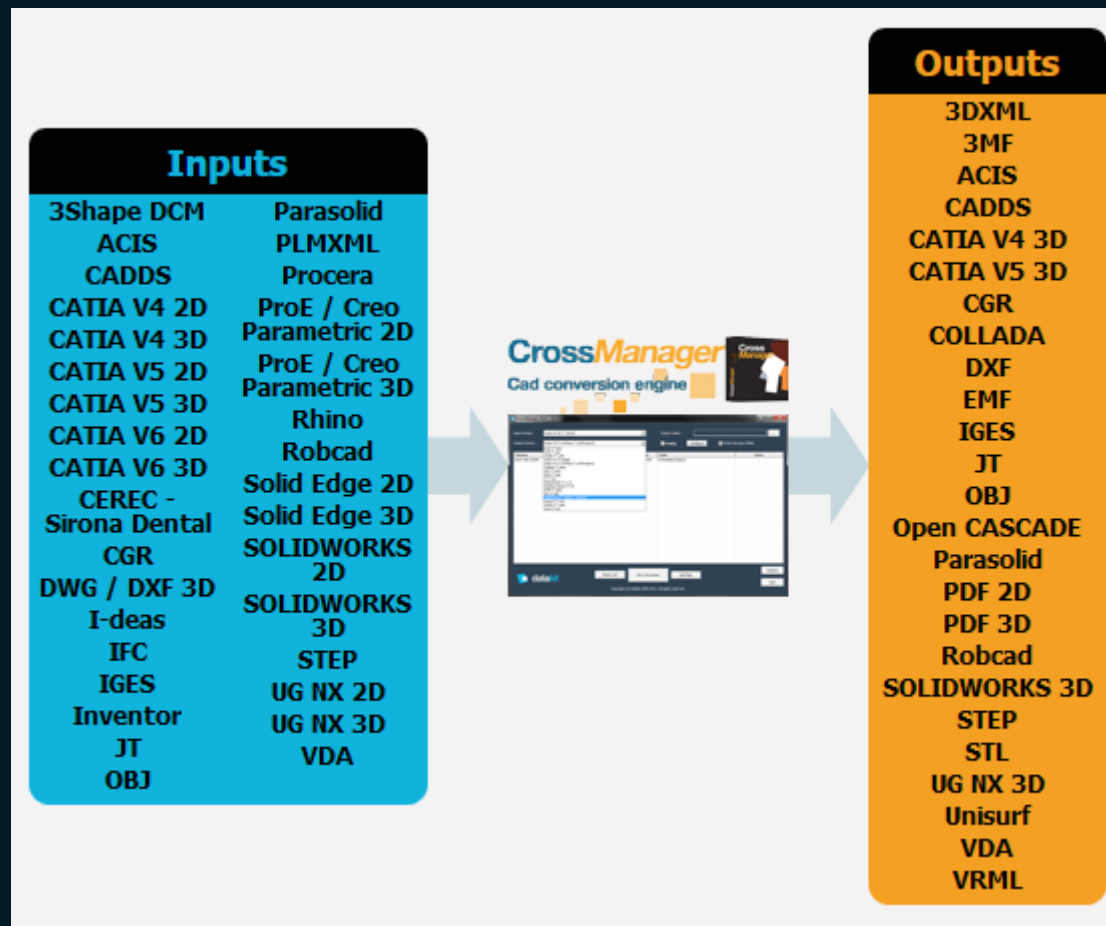
□ **CrossManager / File-To-File**: front-end translation product, from file format A to file format B

□ **CrossCAD/Plg** : Rhino, SolidWorks, OpenCascade, ThinkDesign plugins

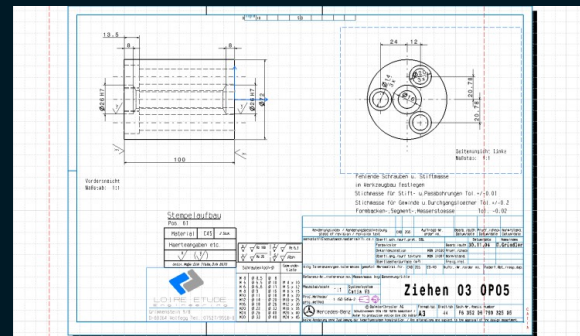
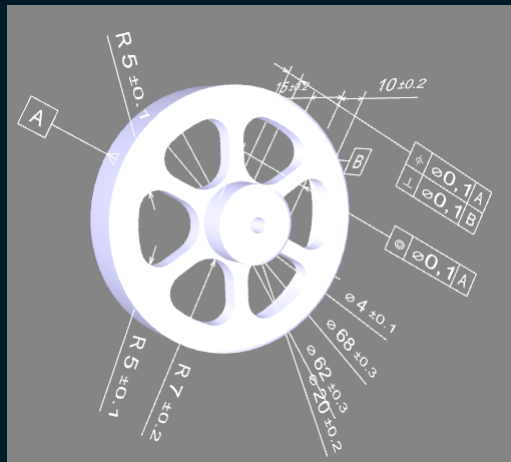
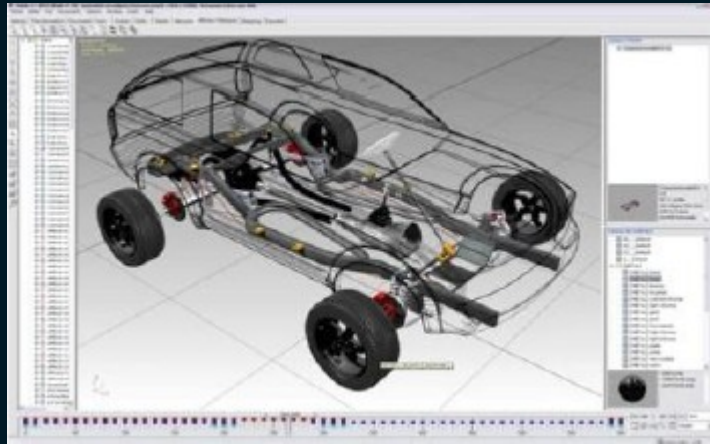
□ **CrossCAD/Ware** : embeddable CrossManager DLL components , datakit SDK / API



CrossManager http://www.datakit.com/en/cross_manager.php



Datakit Feature scope

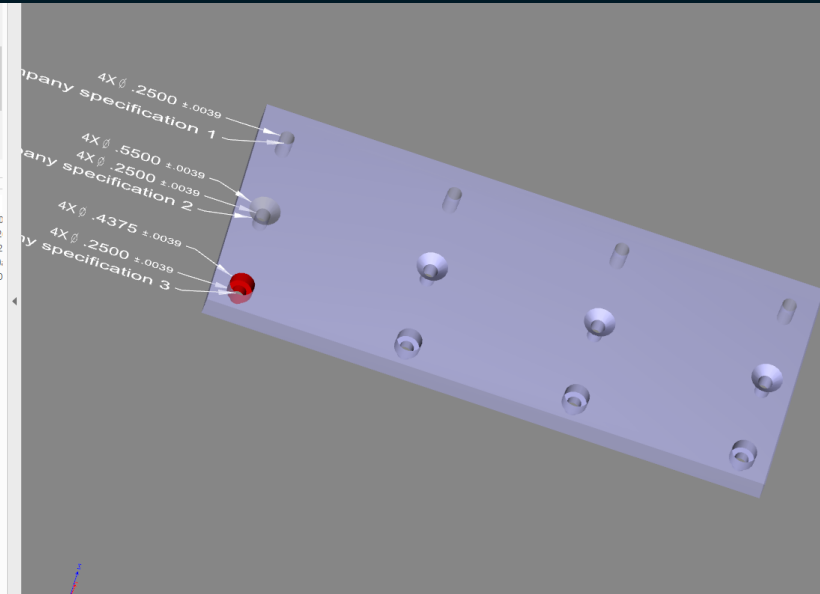
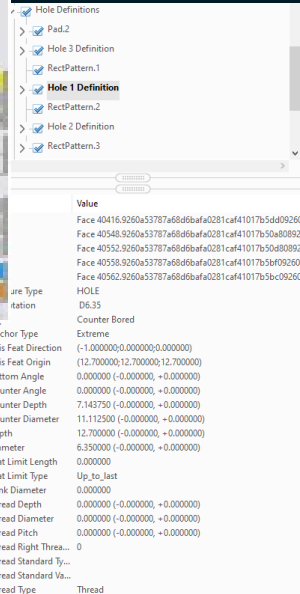
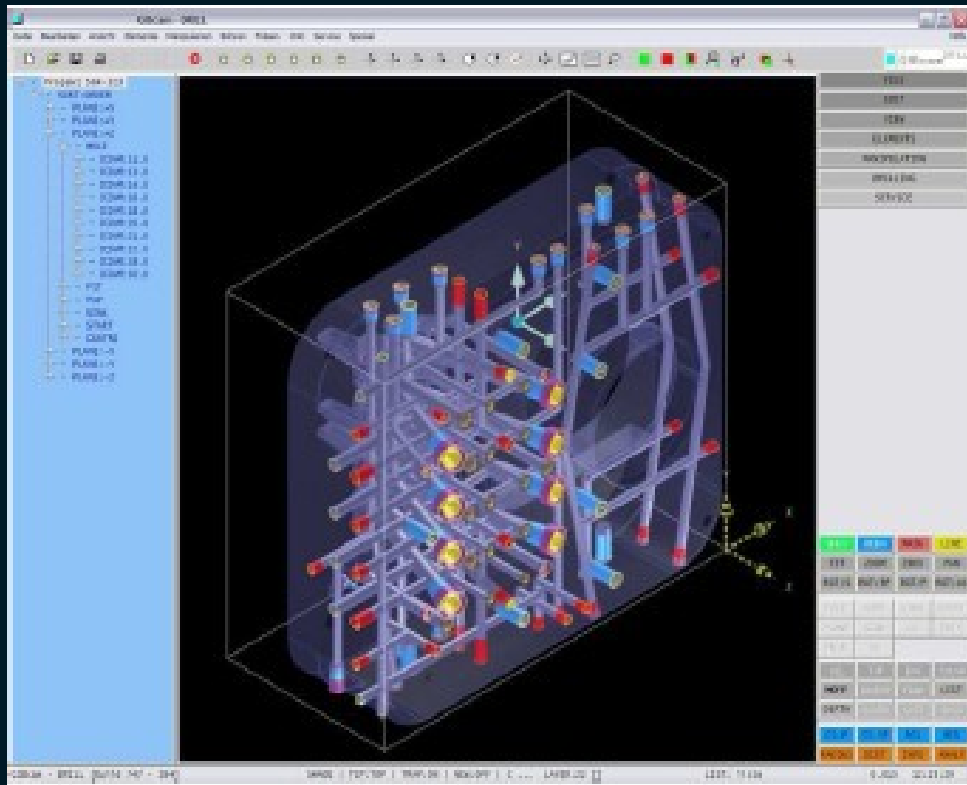


- Geometries : analytical, NURBS conversions, topologies
- Assemblies, design trees, metadata
- Product Manufacturing Information (PMIs), 2D Drawings

Datakit Feature scope

❑ Machining & Design features : holes/patterns etc ... (CAM)

❑ Specific modules : Piping, Tubing, Harness, Kinematics, Composite Design, Sheet metal...



Datakit Feature scope



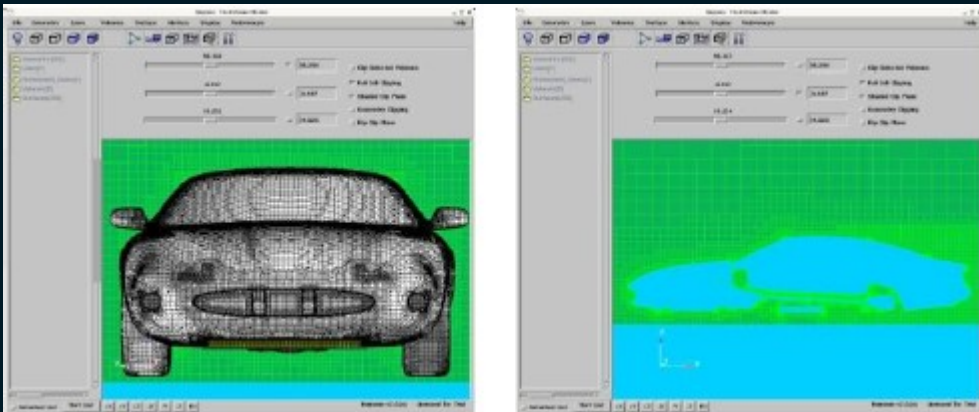
Reading / Writing Visualization Files

Computing Tessellation

Original solid normals

Custom LODs

(Rendering, CFD, FEA, Rapid Prototyping etc.)



Position of Datakit on standardization

- Standards for Interoperability : WHY
- Standards for Interoperability : HOW
- Standards for Interoperability : Make them known
- Involvements and Activities of Datakit in Standards, implementation of STEP AP242
- Some cases
 - 3D MBD : PMI
 - CAD-CAM data flow : Machining Features
 - BIM : IFC
- Conclusion

Standards for Interoperability : WHY

- ❑ Market needs, Customer demand
 - *access to data as native or standard*
 - *standard : see diffusion of the format, case coverage, level of implementation (what about real files)*
- ❑ Technology Watch (R&D)
 - *to follow evolutions, emerging notions, trends*
 - *to adopt a standard approach whenever possible,*
 - *or work on a mapping for it*
- ❑ Watch on hard points
 - *to avoid a technological bottleneck*
 - *to check adequation of a standard (mapping, case coverage)*

Standards for Interoperability : HOW

- Participation in standardization works :
ISO (STEP working teams), AFNOR
on dedicated domains : LOTAR working groups
- Prototyping
LOTAR pilots
research projects (about data exchange)
- Participation in implementor forums, benchmarks
for case coverage, mapping
for interoperability between software

Standards for Interoperability : Make them known (case of STEP)

- ❑ STEP : scope is regularly increasing

Need for wide involvement among software editors

With commonly agreed scope, between users and implementors

=> participation in implementor forums

=> users to express their needs

- ❑ Make capabilities of STEP known (our customers / market)

By ourselves , by benchmarks

Feedback from users about needs

Involvements of Datakit in STEP (implementation, forums, research)

- Long term commitment in support of STEP
- Comprehensive coverage of STEP AP242 (read-write)
- Participation in CAX-IF from start, in STEP PDM-IF
- Participation in LOTAR group (implementation, expertise, pilot projects)
- Member of AFNOR CP/IDMI (french mirror of ISO TC184)
- Participation in AP242 working teams
- STEP-NC : project ANGEL (french research founding)
- Also member of 3D PDF Consortium

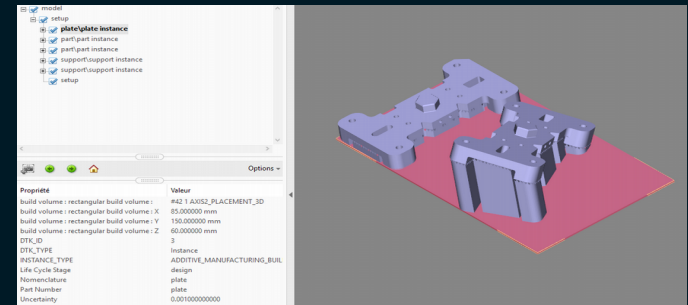


Datakit CrossCADWare : STEP AP242

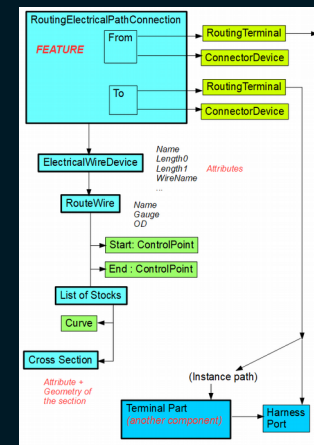
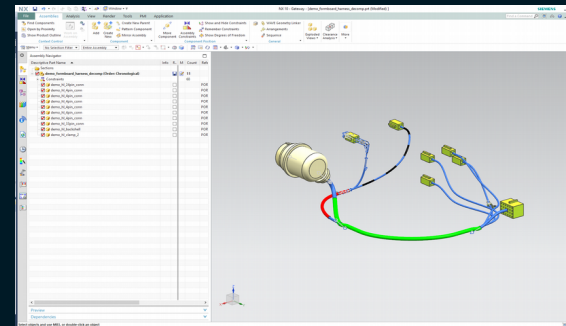
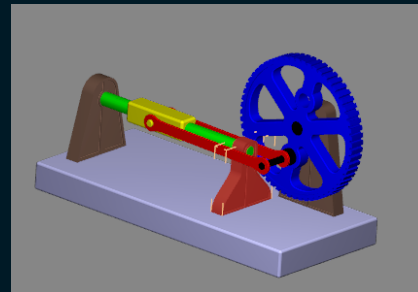
- STEP AP242 : Continuation of AP203/214 for 3D models
- Now AP242 Edition 2 is supported
- User defined attributes
- Validation properties : compute+write, read+compute+check
- Tessellation 3D (AP242)
- PMI : graphic, semantic ; pilot projects (presentation, vues ..)
- AP242 XML DM (PDM, Kinematics, Electrical Harness)
- External References ; external element references
- Machining Features, parametric geometry : advanced projects
- Holes & Fastener : LOTAR work group
- ...

Some works on STEP

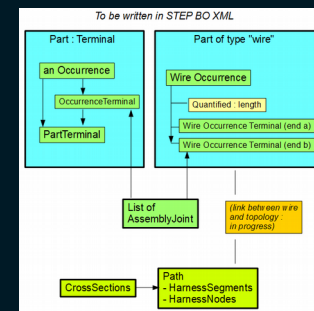
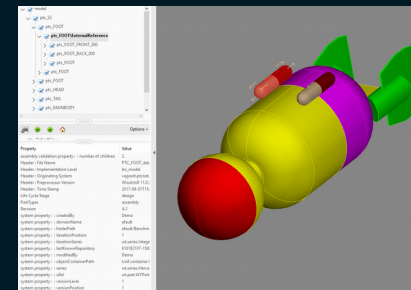
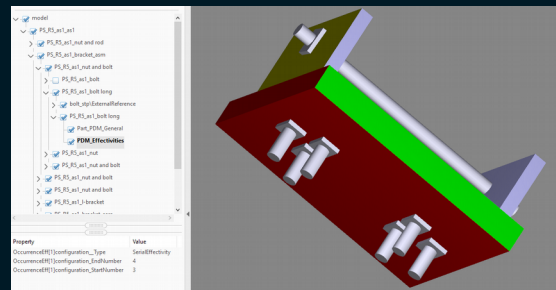
- ❑ 3D MBD : PMI : next slides
- ❑ Machining features : next slides
- ❑ Additive Manufacturing



- ❑ Kinematics



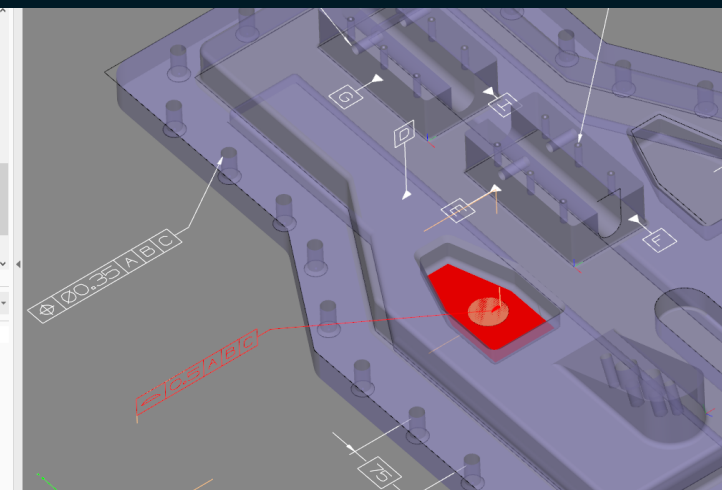
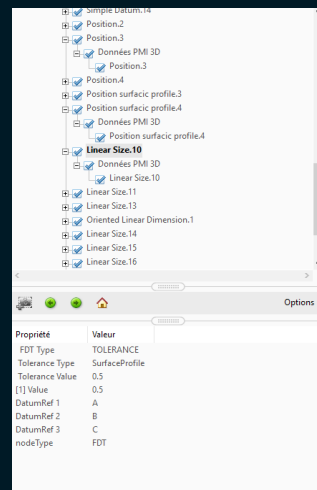
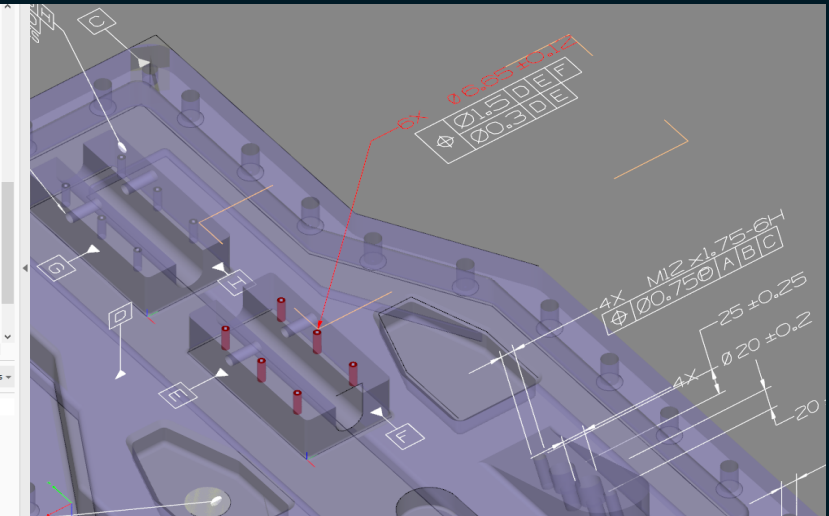
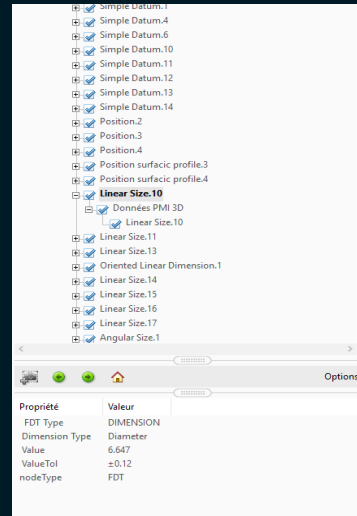
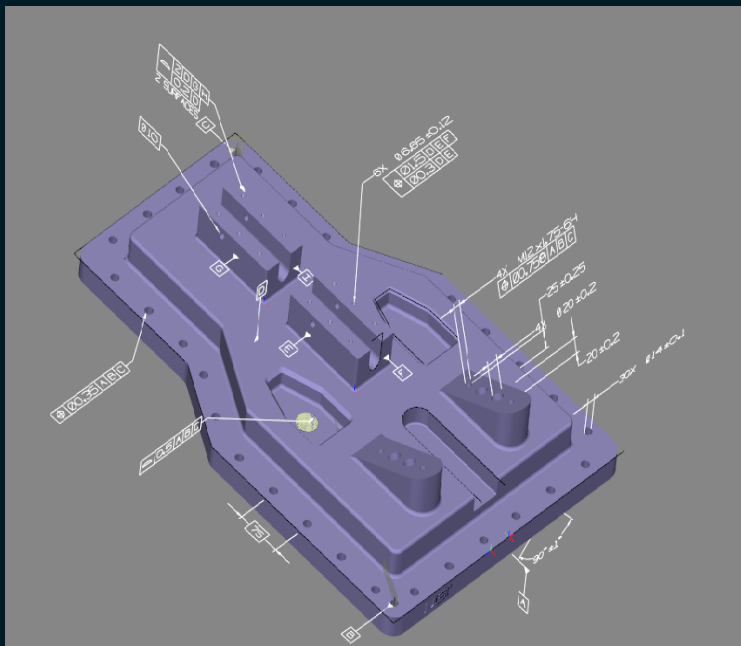
- ❑ Electrical Harness



- ❑ PDM

- ❑ ...

Standardization of PMI in STEP AP242

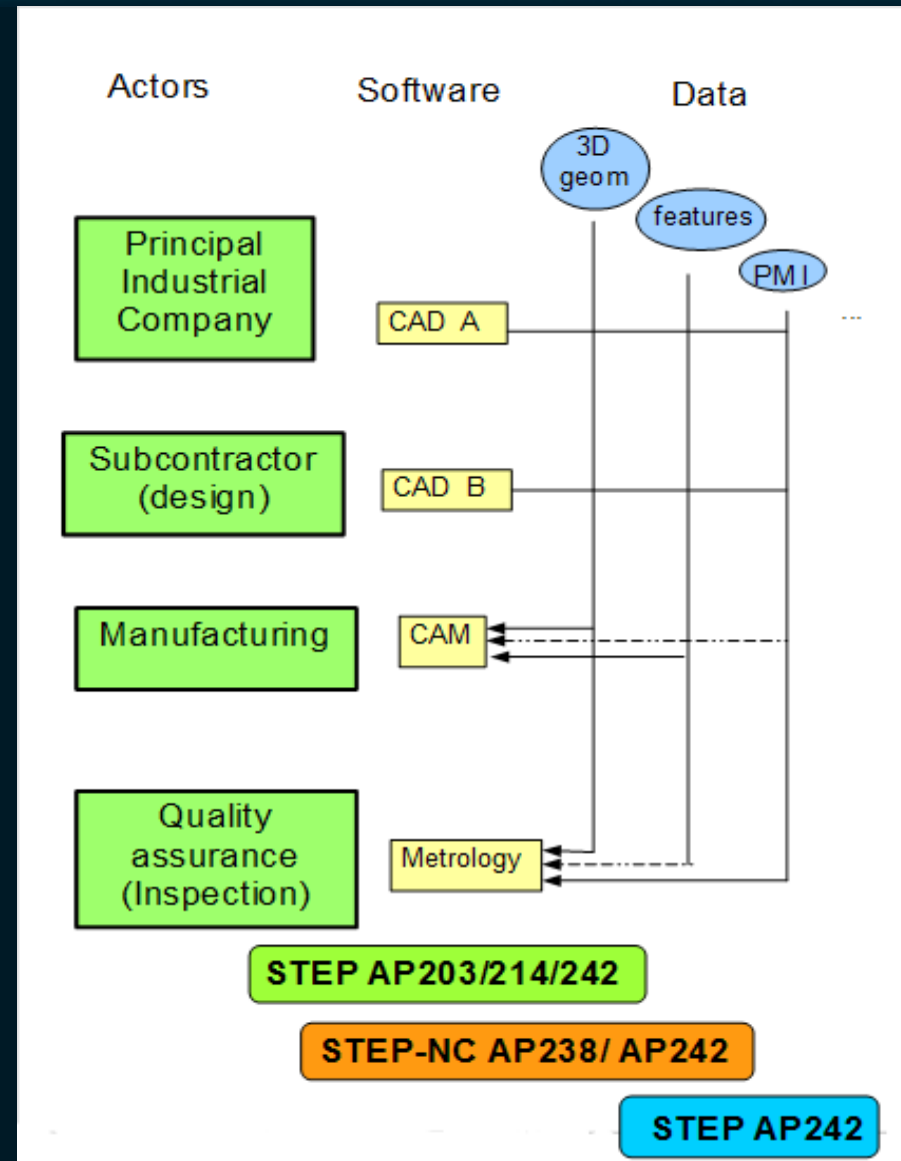


Standardization of PMI in STEP AP242

- Datakit's work started before STEP emerged
 - *access based on definitions of native CAD model*
 - *graphic display : compliant with the original model*
 - *semantic data : from the content of native CADs*
- Works on Specification : in ISO Step working groups
- Tests in frame of LOTAR (pilots), CAX-IF (test rounds)
- Exchange with our customers (especially metrology)
 - *case coverage , various standards ISO/ASME ..*
 - *interaction with works on standardization and tests*
 - *more and more customer requests on PMI in STEP*

STEP in CAD-CAM data flow

- ❑ In use for geometry
- ❑ Growing use for PMI (AP242)
- ❑ Preliminary for features (STEP-NC AP238, works on AP242)
- ❑ PDM data : looking for AP242 BO XML



Works on machining features

❑ Starting with STEP-NC/AP238

- *the whole data schema for features is rich but not simple*
- *current state : no use/need for exchange of features by STEP*
- *access favors native definitions*

❑ New need : holes & fasteners => hole feature

*various types of holes (round, counterbore ..)
with toleranced values*

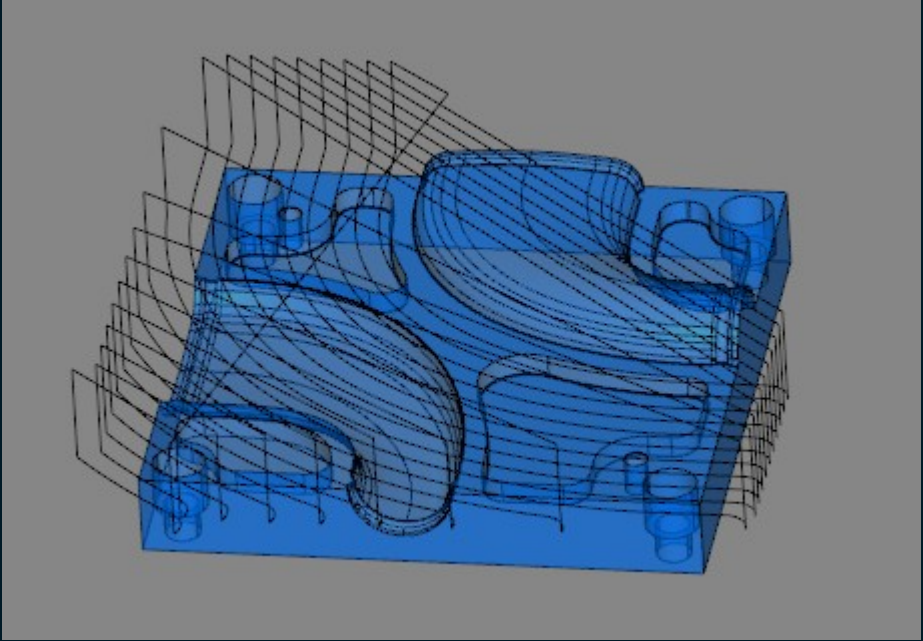
❑ Work initiated by industrial users, in frame of LOTAR

- use cases, data schema, prototyping*
- *Goal : to validate and provide this capability as soon as possible*

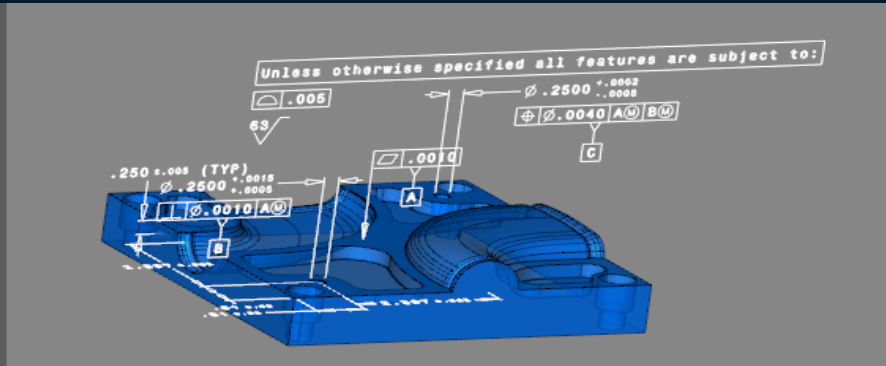
STEP-NC/AP238 : 3D model, machining, tool paths

The image shows a hierarchical tree structure on the left and a corresponding table on the right. The tree structure includes folders for 'NThing', 'Relationship', and 'RelationItem', with various attributes like 'rank', 'ID', 'type', 'num', and 'ThingNum'. The table lists the following data:

308793
308802
MACHINING_WORKINGSTEP
MACHINING_OPERATION_Relationship
1
2016
307200
307209
FREEFORM_MILLING_OPERATION
MACHINING_FUNCTIONS_Relationship
MACHINING_TECHNOLOGY_Relationship
MACHINING_FEATURE_Relationship
1
2274
308800
308809
MACHINING_FEATURE_PROCESS
body (112)
311251

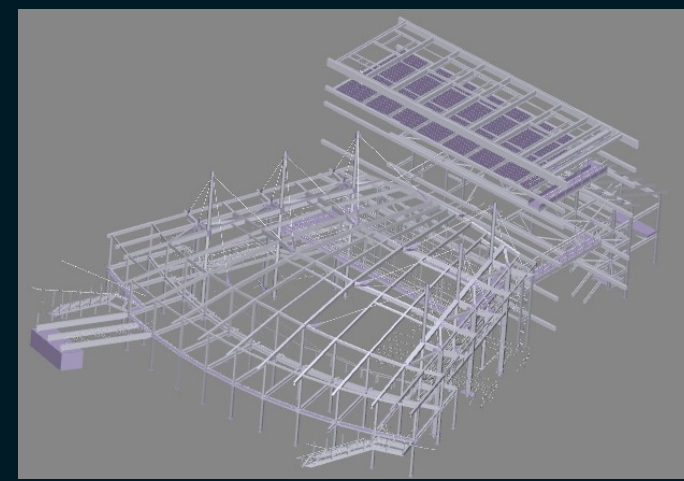
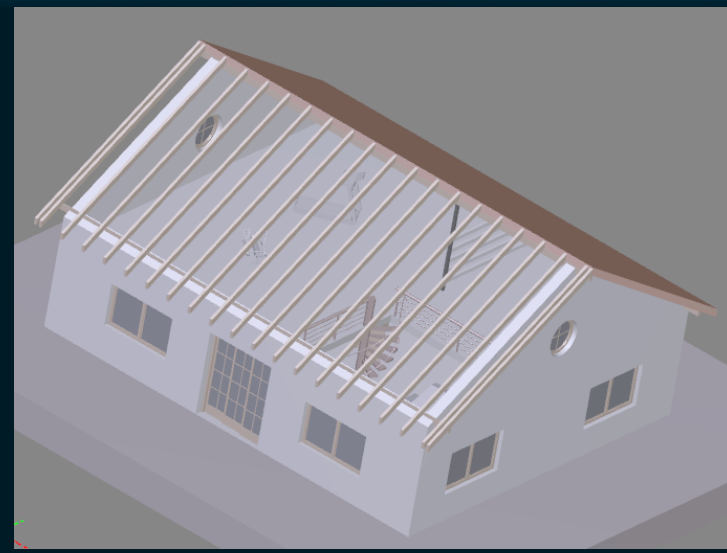


- Dimension.1
- Dimension.2
- Dimension.3
- Dimension.4
- Dimension.5
- Dimension.6
- Geometrical Toler
- Simple Datum.1
- Flatness.1

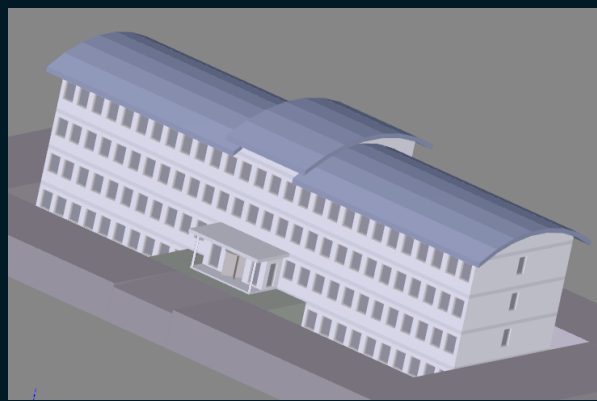
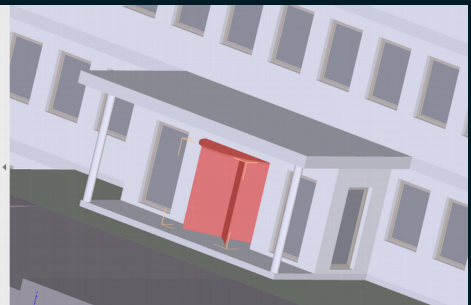


BIM : IFC standard

- ❑ Geometries, properties, product data, assemblies
- ❑ Computation of resulting geometry ready to use
- ❑ Read up to IFC4
- ❑ Write : on work



Property	Value
IFC TYPE	IFCDOOR
GlobalId	1B9C9FEE4E8A1M40truf
IfcRelDefinesByType	IFCDOORSTYLE
Name	Tor-019
OverallHeight	2.300000 mm
OverallWidth	2.200000 mm
Plist_DoorCommon_IfcExternal	T
Plist_DoorCommon_ThermalTransmittance	1.400000
Tpy	91029F19-3F74-40E4-9A-19-4262728



Standards for Interoperability : Conclusion

- As a editor and implementor of PLM data exchange solutions, we are strongly involved in standardization works.
- Our efforts in this domain are related to market needs and customer demand.
- To obtain a good adequation of standards with expectations of users, also requires users' involvement.

Questions
&
Answers



6th and 7th October

<http://standardsdays.afnet.fr>