

# Today's Formats for Documenting Engineering Data

Creating Engineering Documents

GLOBAL PRODUCT DATA  
INTEROPERABILITY  
**S U M M I T**  
2016



ELYSIUM

Parker Aerospace

NORTHROP GRUMMAN

BOEING

ETA2014

ETA2014

ETA2014

ETA2014



# Trevor Leeson – Theorem Solutions

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## ➤ Theorem Solutions – 1997 - today

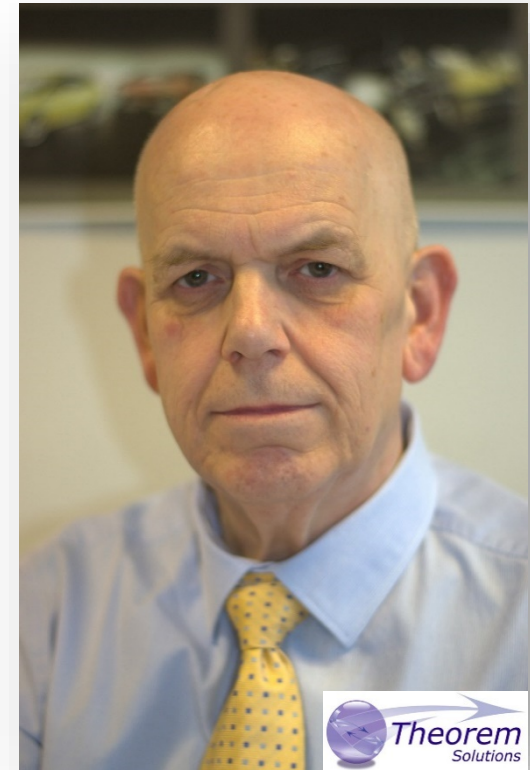
- ❖ Principal Technical Consultant
  - Product Manger
  - Marketing Manager
  - Consultancy & Services Director
- ❖ Technical account responsibility for major account
- ❖ Represented Theorem Solutions on various committees
  - ❖ JT Open Technical Review Board
  - ❖ ProSTEP JT Implementer Forum
  - ❖ PDES / ProSTEP STEP activities

## ➤ Computervision (CV) – 1985 - 1997

- ❖ Technical Program Manager (Rolls-Royce Aerospace)

## ➤ Pressac Holdings plc – 1970 - 1985

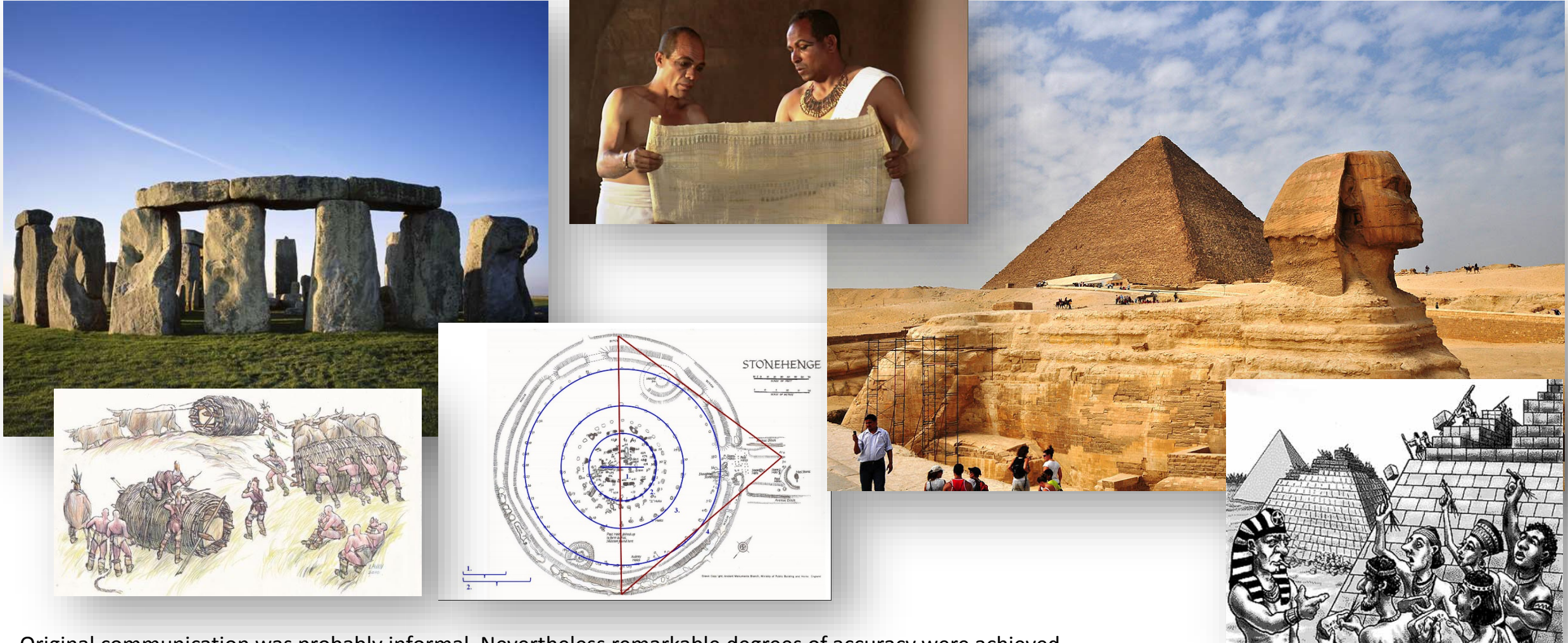
- ❖ Assistant Chief Draughtsman
- ❖ Automotive, telecommunications and white goods component manufacturer





# Background to Engineering Documentation

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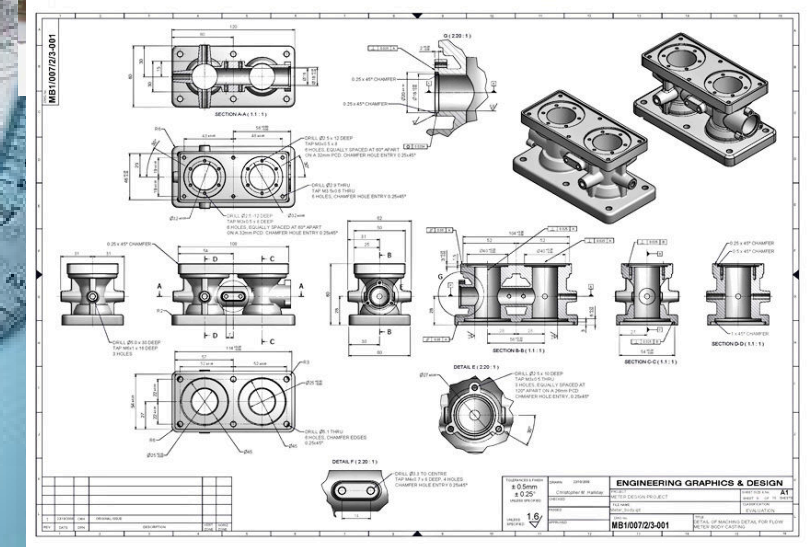
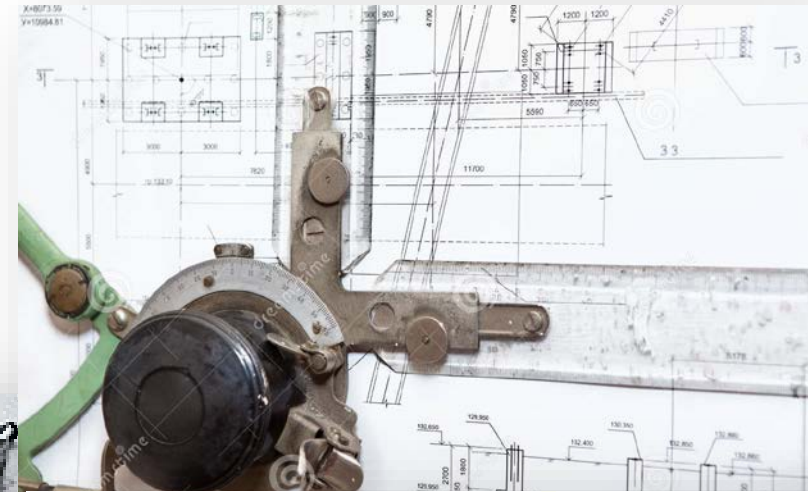
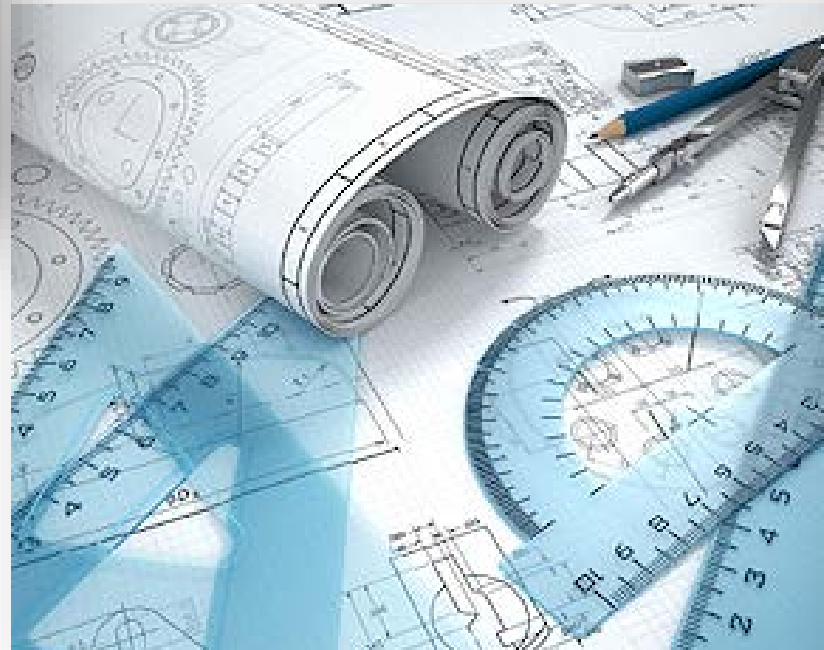
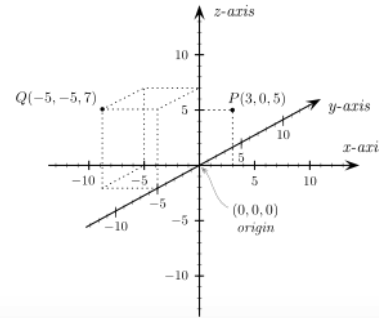
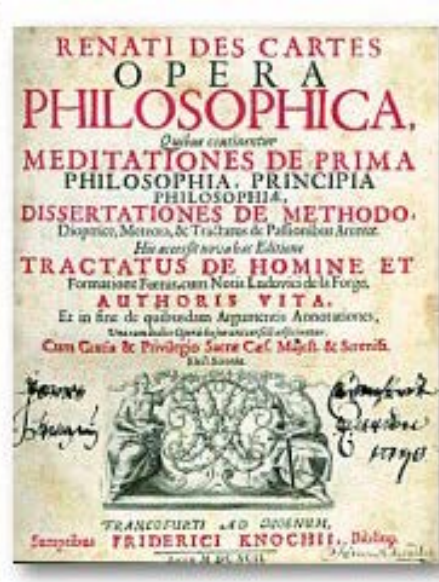


Original communication was probably informal. Nevertheless remarkable degrees of accuracy were achieved



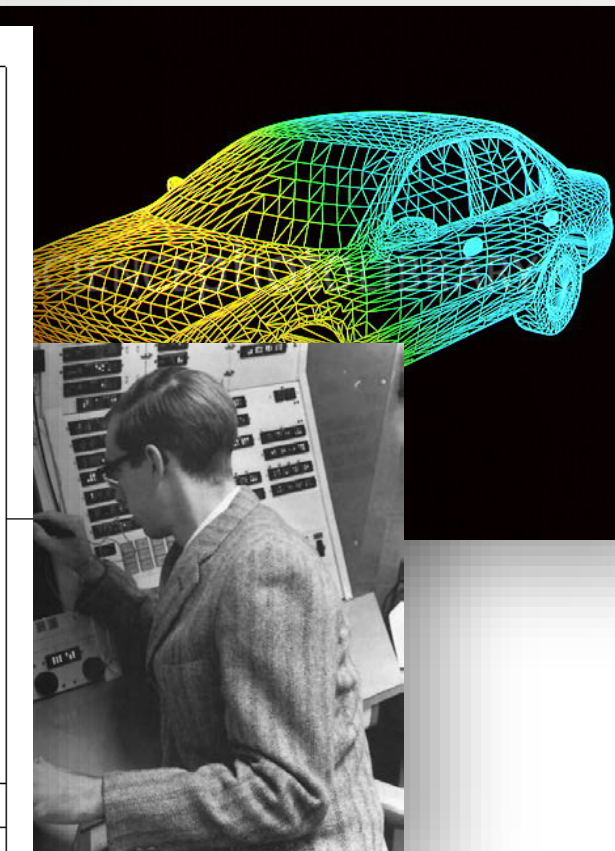
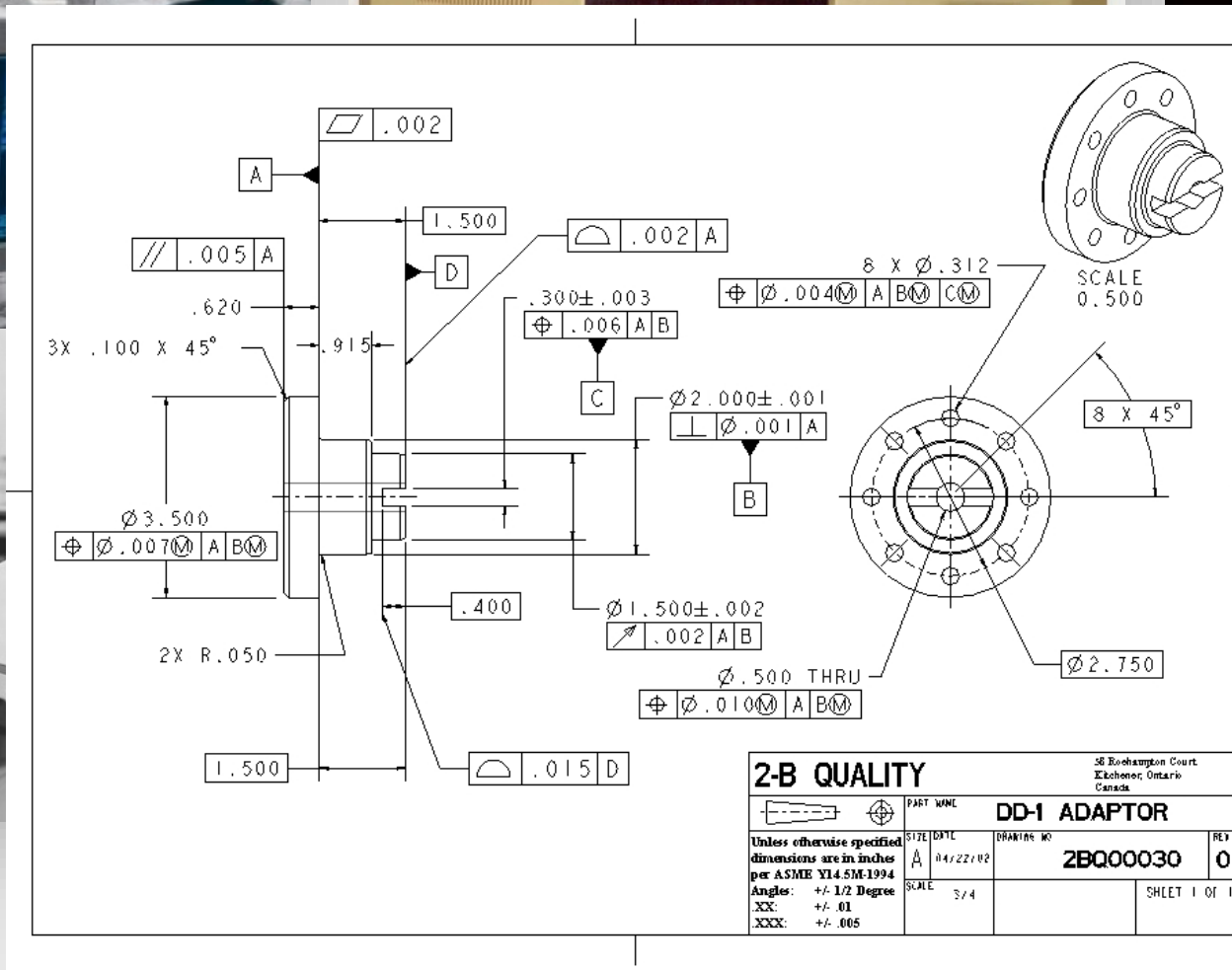
# Background to Engineering Documentation

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As sketches and drawings were used to communicate design intent, more formal methods were adopted. It was Rene Descartes (1596-1650) French philosopher, mathematician, and scientist who gave us Cartesian Geometry

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**Computer-aided design**

digitizing technical animation modelling programming strength capabilities associative modern rendering geometrically prototyping compass release graphical feature construction application software gold modelling parametric platform computational calculation constraint representation creation object engineer product operator stereoscopic drawing graphics protorectors



# Model Based Definition

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The use of Model Based Definition defines product manufacturing information including 3D Dimensions & Annotations, annotated sections, non-graphical manufacturing instructions

Implemented in the majority of CAD authoring systems

International standards ASME 14.41 / ISO 16792

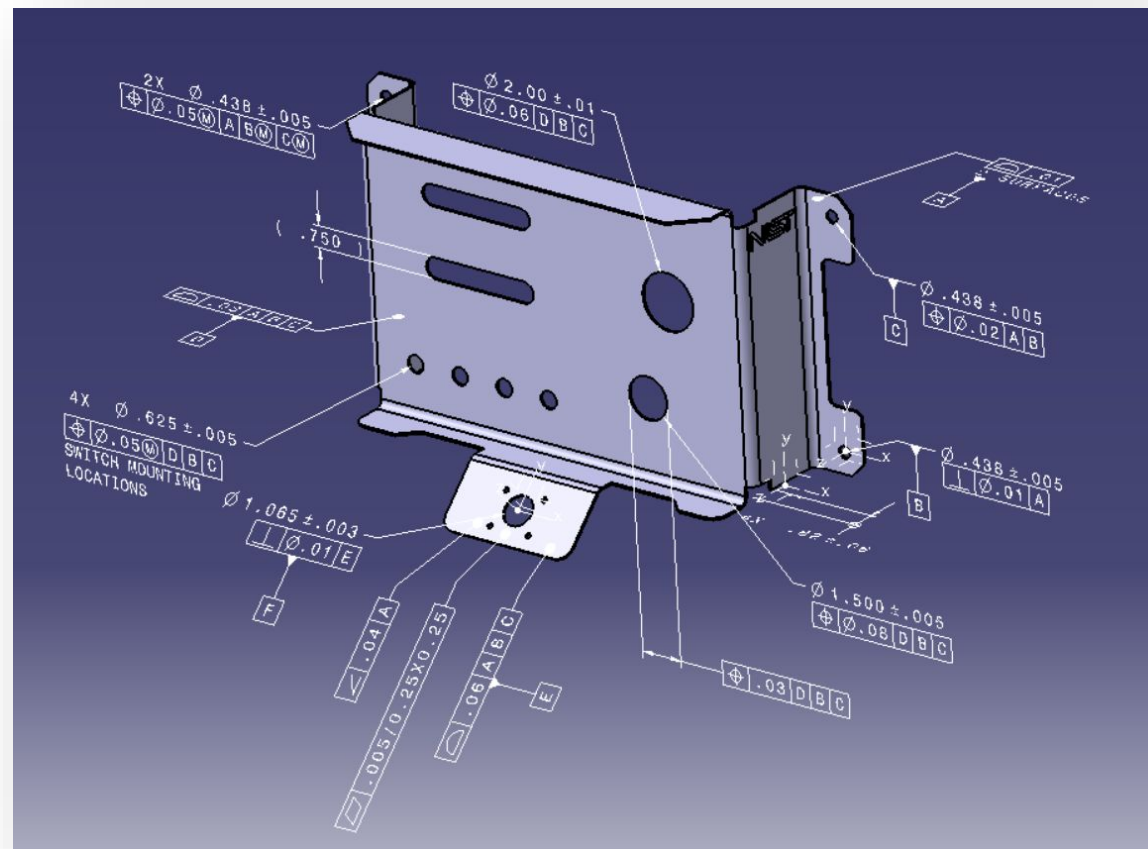
Potentially eliminates the need to define conventional 2D drawings

Requires a viewable mechanism to share the definition to a wider audience other than the original CAD tool

Freely available viewers for all major CAD data

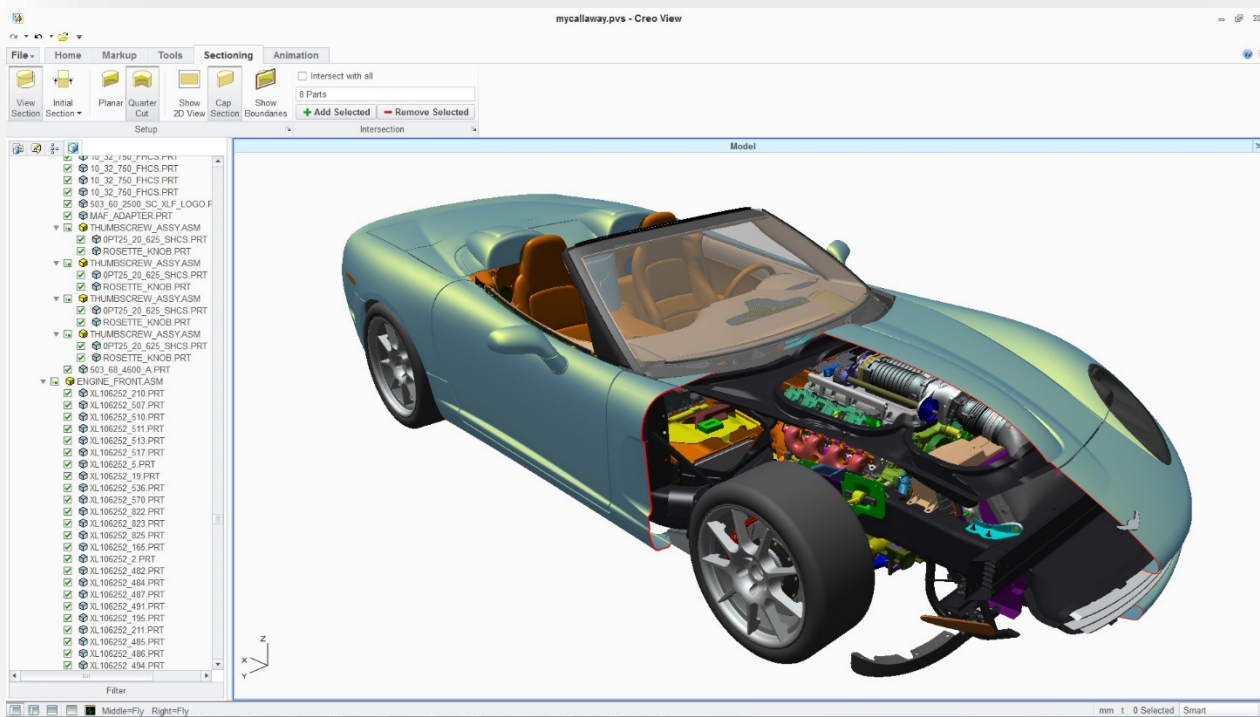
Neutral international representations including STEP, JT & PDF

Long term data archive implications



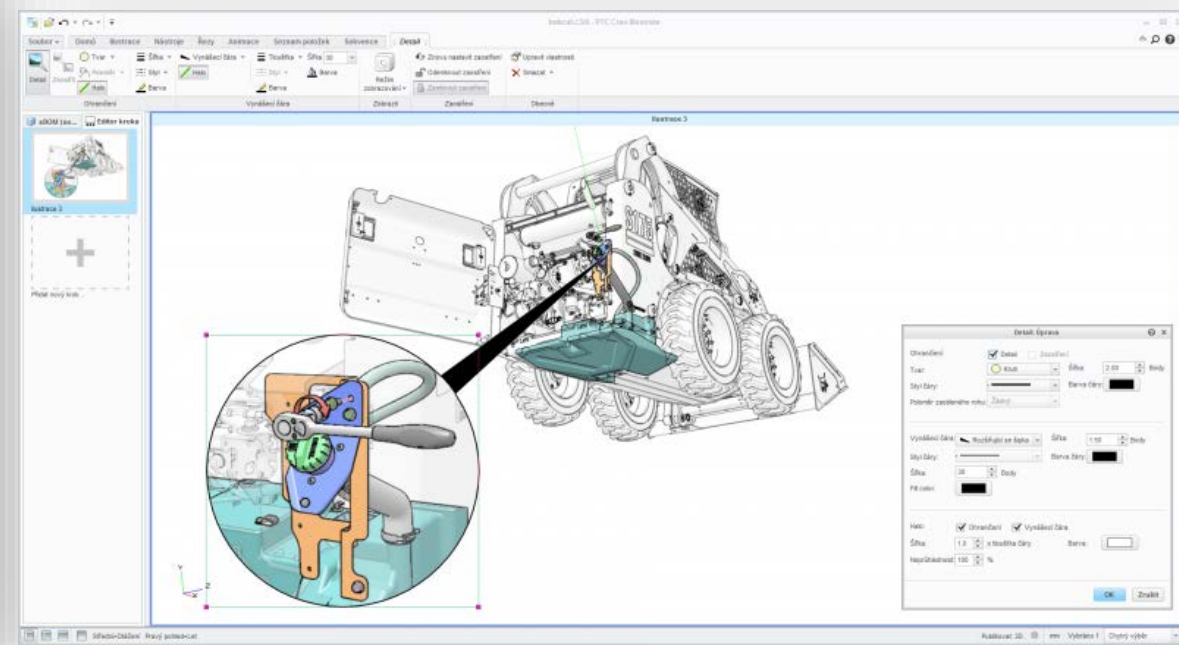
# Explosion of Viewable Formats

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## creo™ view

Visualization format supports assembly structure, geometry, 3D dimensions & annotations, animations. Integrated viewer for Windchill PLM system



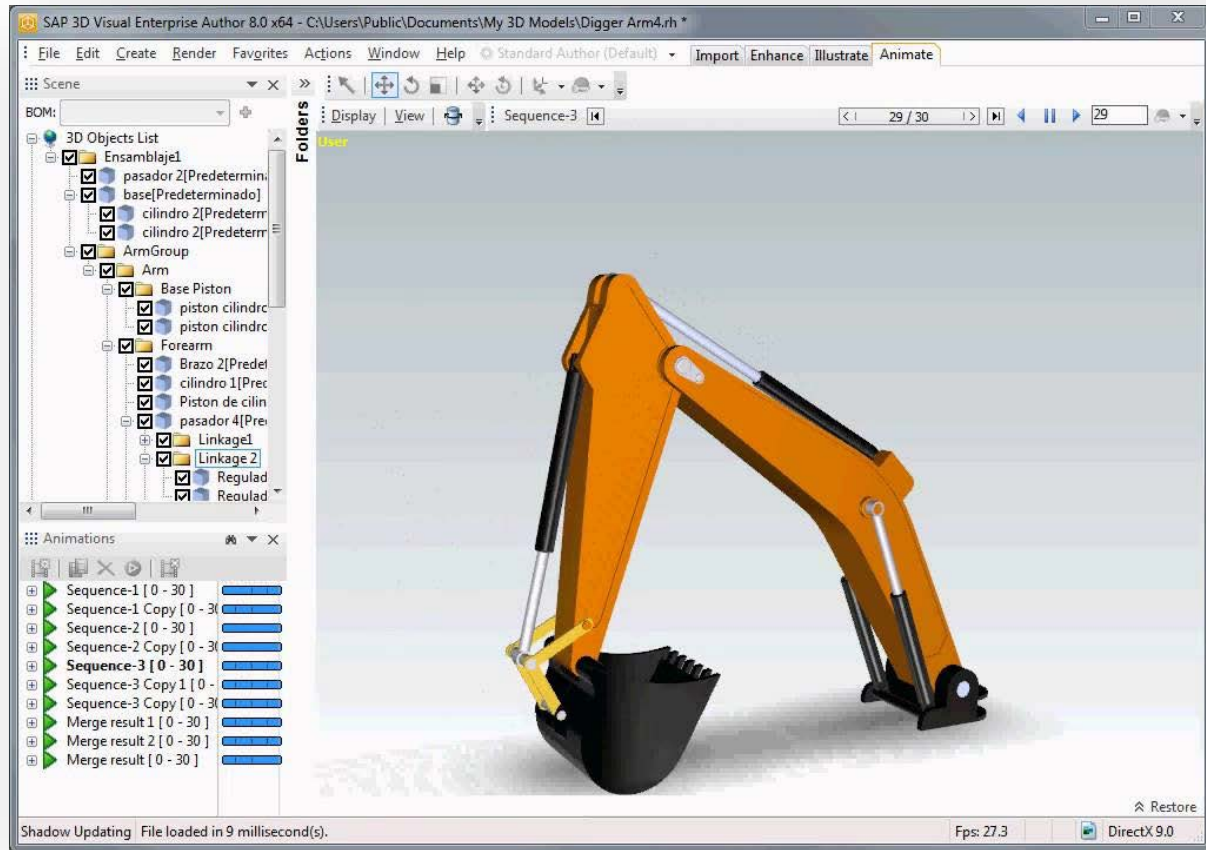
## creo™ illustrate

Illustration tool integrates with Windchill Arbor Text



# Explosion of Viewable Formats

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Supports multiple CAD formats and exports both 2D and 3D documents including 3D PDF



SAP Visual Enterprise Author

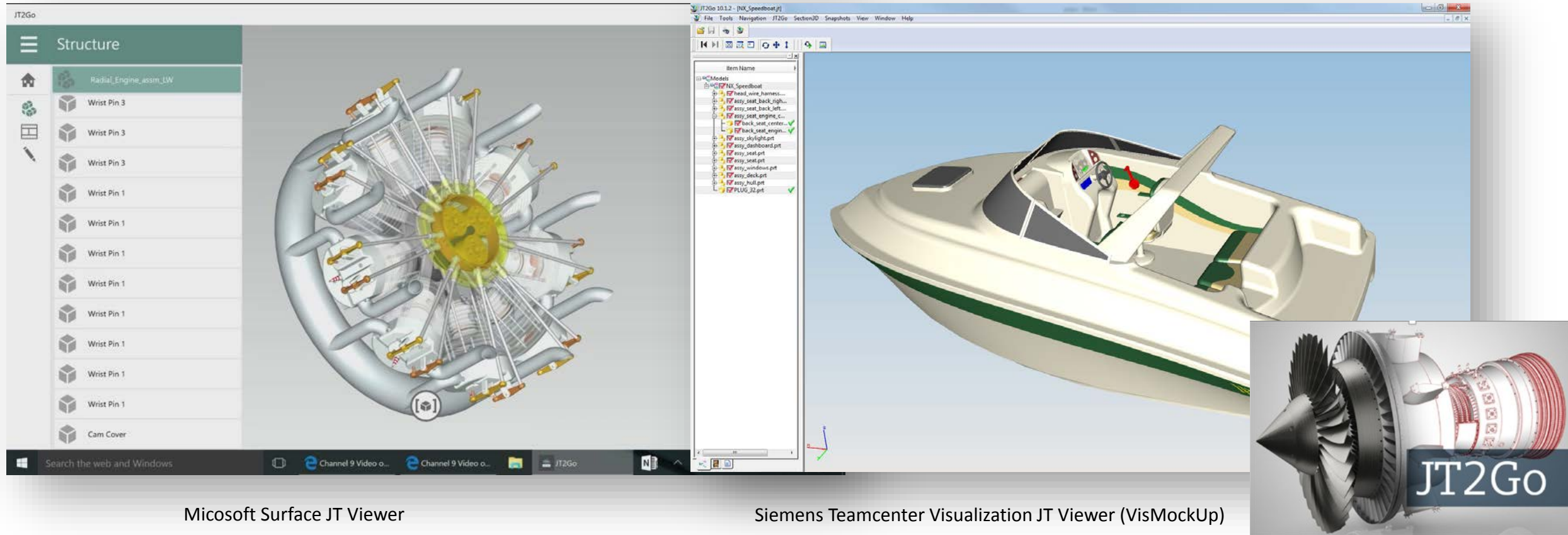
Was formerly known as Right Hemisphere's Deep Exploration CAD





# Explosion of Viewable Formats

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Microsoft Surface JT Viewer

Siemens Teamcenter Visualization JT Viewer (VisMockUp)

Both freestanding and integrated Siemens Teamcenter JT viewer with additional freely available JT2Go.

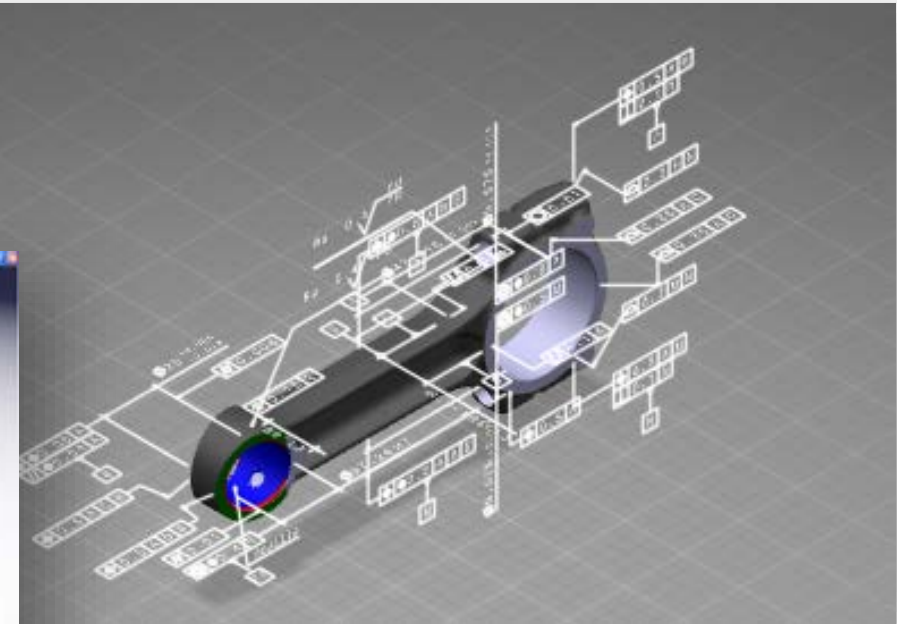
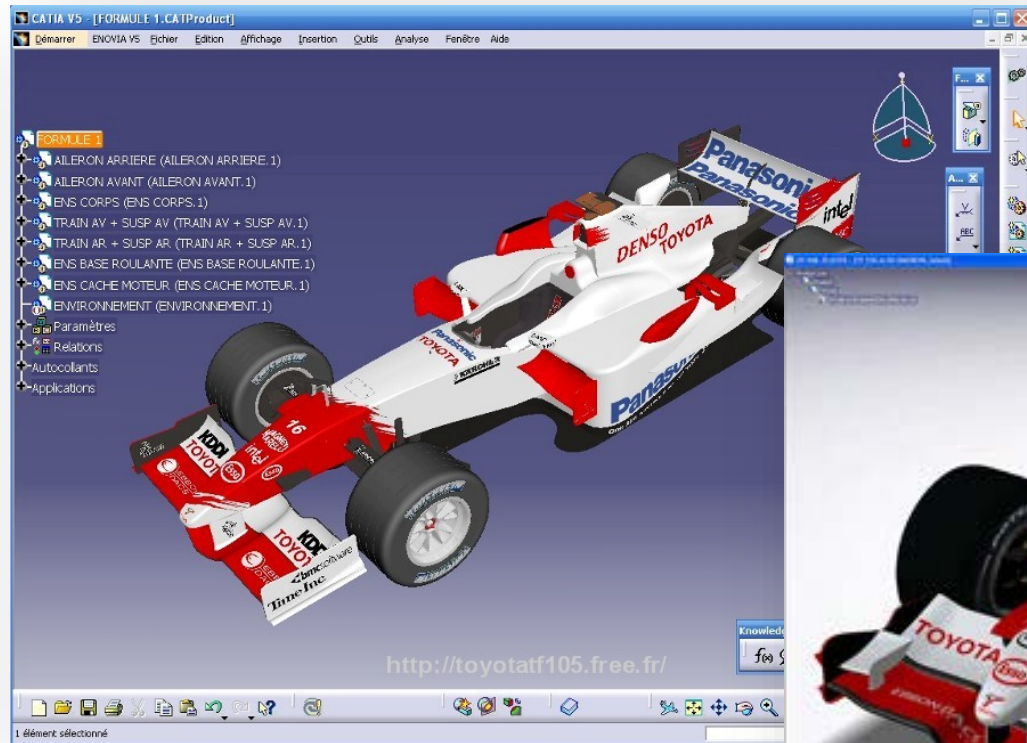
Widely adopted by automotive industry for visualization and supplier collaboration

Engineering desktop visualization format

International standard ISO 14306:2012 Edition 1

# Explosion of Viewable Formats

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3DXML for Review / for Authoring. Freely available viewer. Integrates with CATIA V5 and CATIA 3D EXPERIENCE

Get free 3DXML Player

3DXML PLAYER



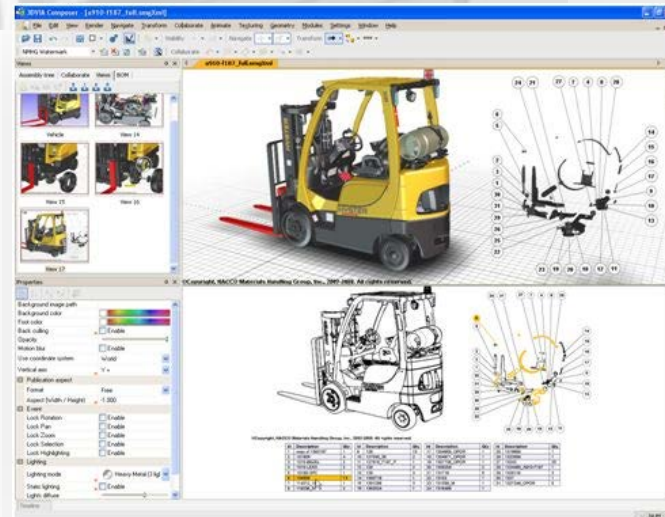


# Explosion of Viewable Formats

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Dassault Systemes technical publications solution. Illustration and animation tool.  
Freely available player  
Imports native SolidWorks, CATIA, 3DXML & JT data.



**CATIA** | Composer



# Explosion of Viewable Formats

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3D PDF



Adobe Acrobat 3D

3D data supported since Acrobat 7.0 (

ISO standard ISO 19005, ISO 24517, ISO 32000

Freely available viewer widely available for multiple platforms

Document centric not just visualization

Rich document features and embedded actions e.g. carousel

view section and dynamic BOM's including Java scripted actions

Supports both interactive 3D viewing and display of dynamic

animations / build sequences

Technical Data Package – attach multiple documents of differing formats

Support for a wide variety of CAD and visualization formats

Part No.	Quantity	Designed By	Designer	Source	Cage Code	Cost	Manufactured By	Weight
Rear Suspension - Damper Support	1	Smiths	R.Smith	UK	31	20.00	purchased	1.3kg
Rear Suspension - Support	1	A.J Autos	A.S. Lock	UK	3	1.50	in house	0.4kg
Rear Suspension right	1	SB Automotive	J.C. Cook	UK	4A	119.00	in house	3.4kg
Wheel Framing	2	BOCZ-Sen	Dr Harris	USA	86Z	2.50	purchased	99g
Wheel Nut	2	SB Automotive	R.Smith	UK	86Q	5.67	in house	250g
Drive Train Threaded rod	2	Smith & Harris	Unknown	France	6C	19.99	purchased	30g
Rear Suspension - Lower Triangle pin	2	SB Automotive	Dave Davis	Germany	2K	45.25	in house	165g
Rear Suspension - Axle Pivot Lower pin	2	SB Automotive	Dave Davis	UK	2K	10.50	in house	45g
Rear Suspension - Axle Pivot Upper Pin	2	SB Automotive	Jane Jones	UK	2K	10.28	in house	345g
Rear Suspension - Upper Triangle pin	2	SB Automotive	Jane Jones	Germany	2K	10.28	in house	345g
Rear Suspension - Lower Triangle	2	A.J Autos	P. Charles	UK	8AA	11.00	in house	45g
Rear Suspension - Upper Triangle	2	BOCZ-Sen	J.C. Cook	UK	4A	7.09	in house	3.4kg
Rear Suspension - Pivot Housing	2	Dr Harris	Dr Harris	USA	86Z	13.95	purchased	99g
Rear Suspension - Upper Triangle Head	2	ACME Fasteners	R.Smith	UK	86Q	20.80	in house	250g

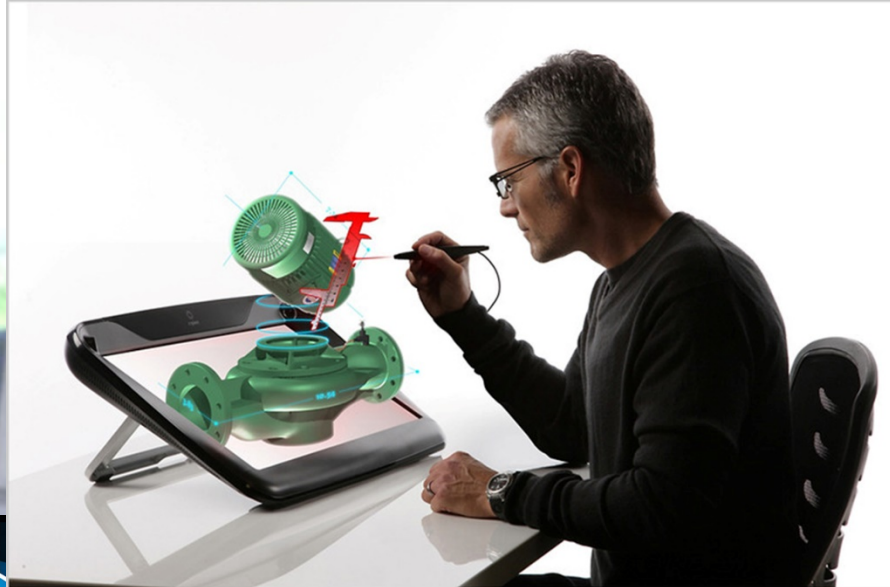
Example 3D PDF documents

PART NUMBER	QTY
SUPPORT - SLIDING BASE EXTENSION	1
ROD - SLIDING BASE EXTENSION	4
Socket Set Screw Cup Point_DIN	4
Lock Washer for Shafts_din	4
SUPPORT - SLIDING BASE EXTENSIONRH	1
Table1	
Table-blade guide	
Sliding Plate	2
Bevel Adj guide bracket	1
bevel adjust bracket	1
bevel adj cam	1
bevel adj bushing	1
washer-thin	1
bevel adj knob	1
bevel adj pin	1
Curved Spring Lock Washer_DIN	4
Pan Head Cross Recess Screw_DIN	4
Miter Lock Rod Guide	1
Miter Lock rod	1
Micro adj housing	1
Micro Adj Locking Tang	1



# View into the Future

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Minority Report 2002

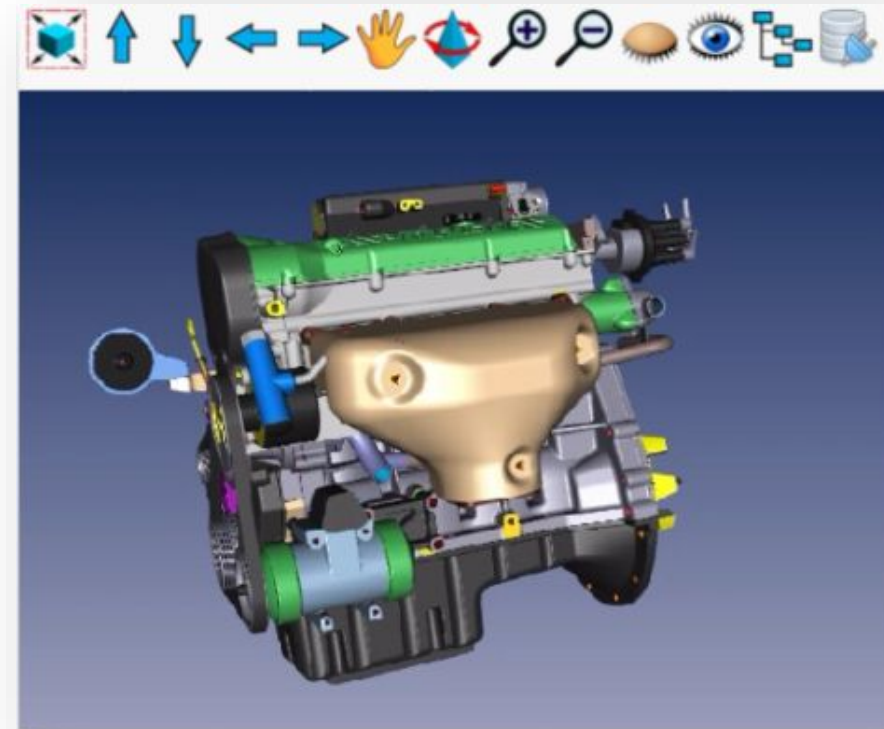


Future viewable technologies??

# Web Streaming

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- **Server Side Rendering**
  - Bitmap Streaming
- **No Client Side Software**
  - Browser Client Interface
- **IP Protection**
  - Expose 3D View Only
    - Manipulate
    - Hide/Show
  - Structure view if required
  - View MetaData
    - Embedded
    - Or Via Web Services
- **Controllable User Access**



Web Streaming AVI





# Augmented Reality

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- **Prototype Development Underway**
- **Augmented Reality in Engineering Applications**
- **Focus on 3D Geometry and Structure in an Engineering IoT Context**
- **Use Case Focus:**
  - Serviceability and Maintenance
  - Education (AR Guides)
  - Design Review
- **Multi-Interface Development**
  - Tablet Support
  - Lens Devices



Augmented Reality AVI



# Any questions?

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# For further information please contact Theorem Solutions

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