3D Intelligent Technical Data in DOD

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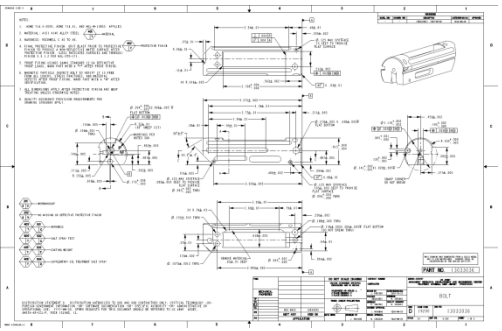
Model Based Enterprise
Consist of several sub-elements (MBx)

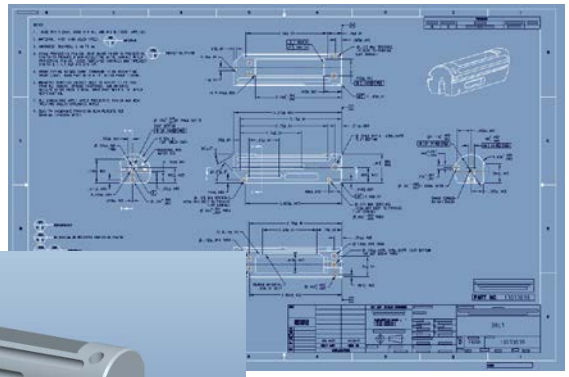
- MBSE: System Engineering.
- MBT&E: Testing & Evaluation.
- MBI: Inspection/QA.
- MBM: Manufacturing.
- MBS: Sustainment. (Operation, Maintenance & Logistics)
- MBDes /EA: Design, Engineering Analysis.
- MBDef: Model Based Definition. 

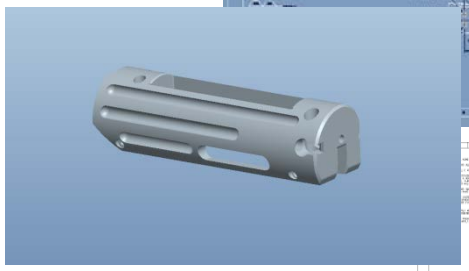
Tech Data Evolution



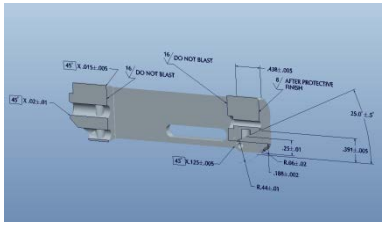
2D Drawing

3D TDP

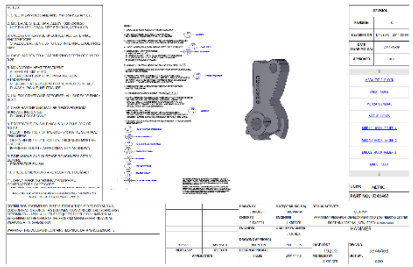


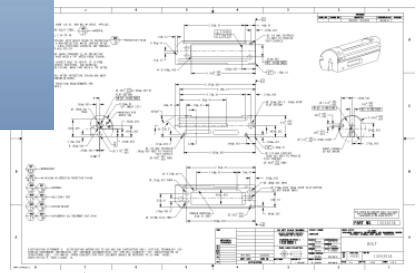


Fully Annotated Models



3Di pdf



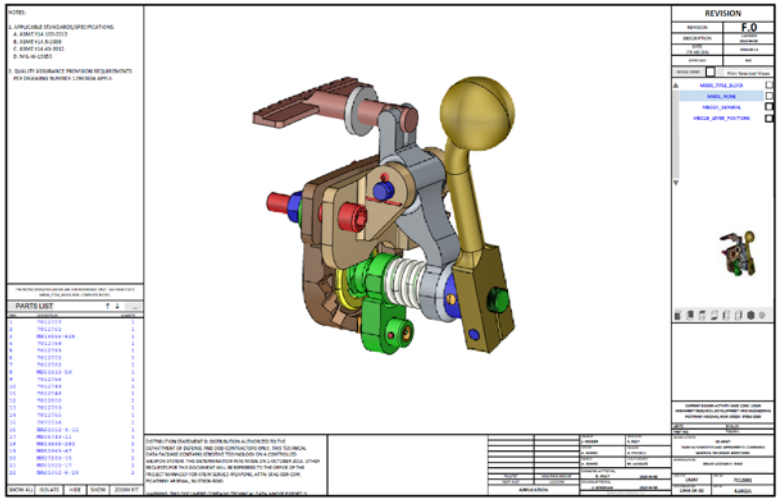


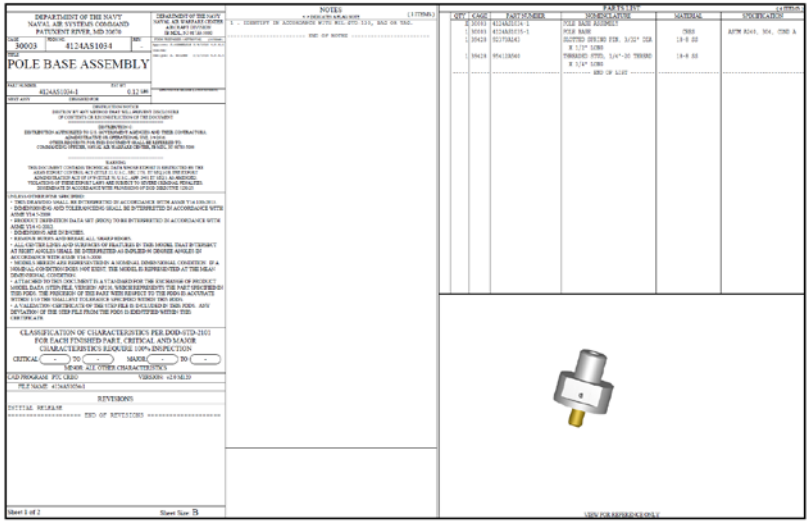
Past

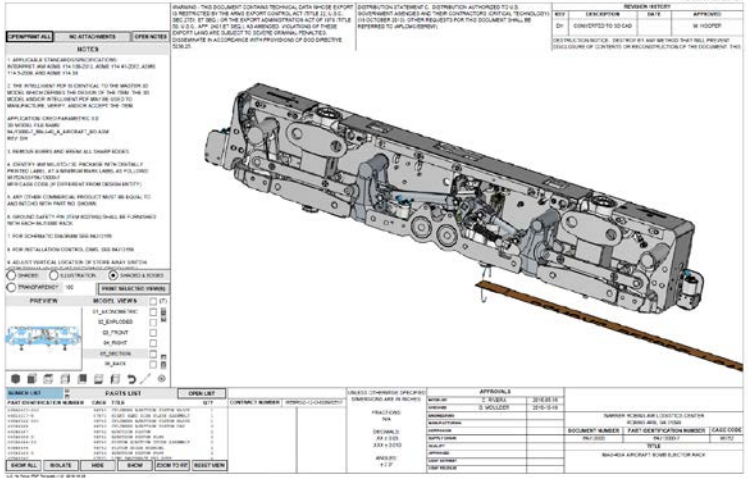
Present

Future

3Di PDF Examples







- Our goal to transform DOD to a modern technical data infrastructure based on 3Di (3D Intelligent) .pdf models.

Why 3Di based TDPs?

- 3Di based TDPs are better than 2D, black line art, third angle projection, “front-top-side”.
- 3Di based TDPs are a subset of the overall Model Based Enterprise (MBE) effort.
- The technology is here today, all we need are the standards, business processes, and training to implement it.

3Di: Not your Grandfather's TDP.

- **PAST/PRESENT:** TDPs based on 2D, black line art, third angle projection, "front-top-side", paper based.
  - Didn't matter how you got there, as long as you delivered the 2D drawing.
  - 2D drawing was universally understood.
  - Form and format didn't matter because everything could be rendered to paper.

- **FUTURE:** Much more complex.
  - Data form and pedigree matters.
  - Multiple formats being used likely.
  - Programs will vary in how they operate.
  - Need to understand possible use cases.
  - We need a common language.

3Di TDP Implementation: What do we need to do?

- Standardize processes across DOD where it makes sense.
- Implement the processes in real world programs.
- Grow the capability such that is standard business.
- Update of MIL-STD-31000 to allow for and encourage 3Di based TDPs.

Update of MIL-STD-31000.

- Incorporate the concept of 3Di models in the MIL-STD-31000.
- Make other corrections and updates as needed.
- A draft version of MIL-STD-31000 is out for review internal to DOD. Public draft will be available for comment in the next few months.

MIL-STD-31000

- MIL-STD-31000 is a high level document which defines what a TDP is suppose to be.

- Detailed information (e.g. drawing format, revision information, GD&T, etc.) generally left to other standards.

The terminology

FORMAT

Native
-CREO
-CATIA
-SolidWorks
-NX
-Solid Edge
-AutoCAD Inventor

-Authoring software.
-Can generate Neutral and Viewable (directly or via third party software.)

or

Neutral
-STEP
-IGES
-STL

-High fidelity model.
-Typically non-annotated.
-Can be imported into Native.

or

Viewable
-3Di pdf
-JT
-X3D

-Lightweight
-Fully annotated
-Widely available and/or free viewer

PEDIGREE

Master

-Source for all other data.
-File from which all changes must originate.
-Almost always Native format.

or

Derivative

-Generated from Master.
-Cannot be directly changed.

VALIDATION STATUS

Authoritative

-Validated to be correct.
-Can “build to” and ”Inspect to”.
-Implied warranty as good data.

or

Reference

-For Information only.
-Can not ”Inspect to”.
-No Implied warranty.

USAGE CASES:

-Buys TDPs for Things.
-Maintains TDPs for Things.

Govt Acquiring Activity (PM-Engineering Activity)

-Use TDPs to buy Things.

Govt Logistics Activity (DLA-Contracting Command-Logistics Activity)

Design Contractor (OEM)

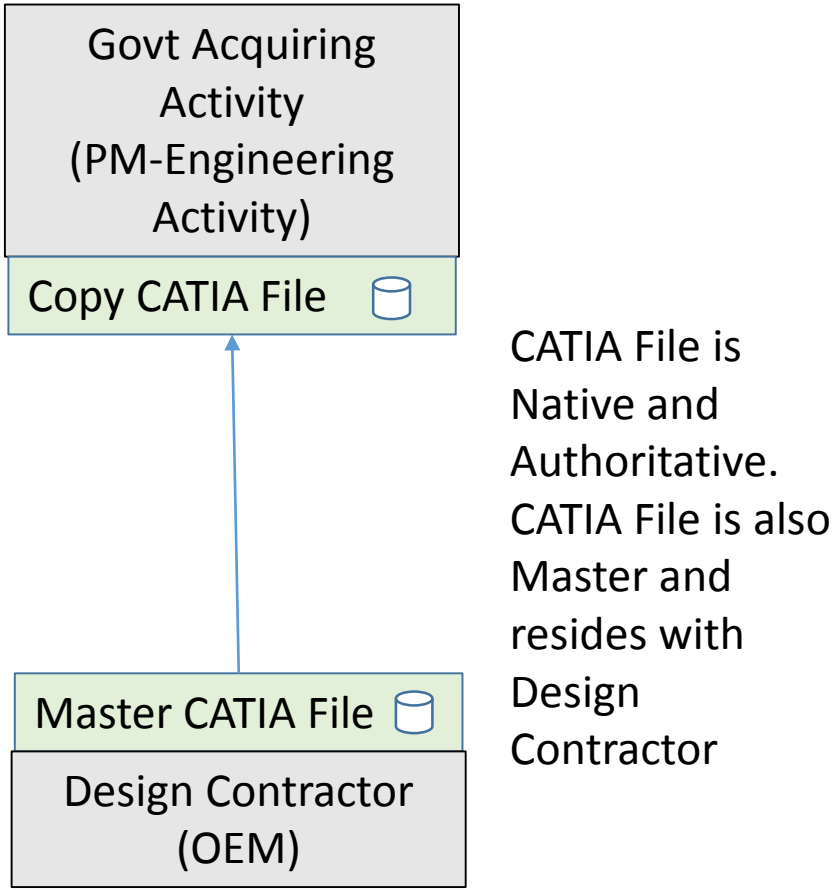
-Creates TDPs for Things.
-Maintains TDPs for Things.

Manufacturing Contractor

-Mfgs Things IAW TDPs.

USAGE CASE 1:

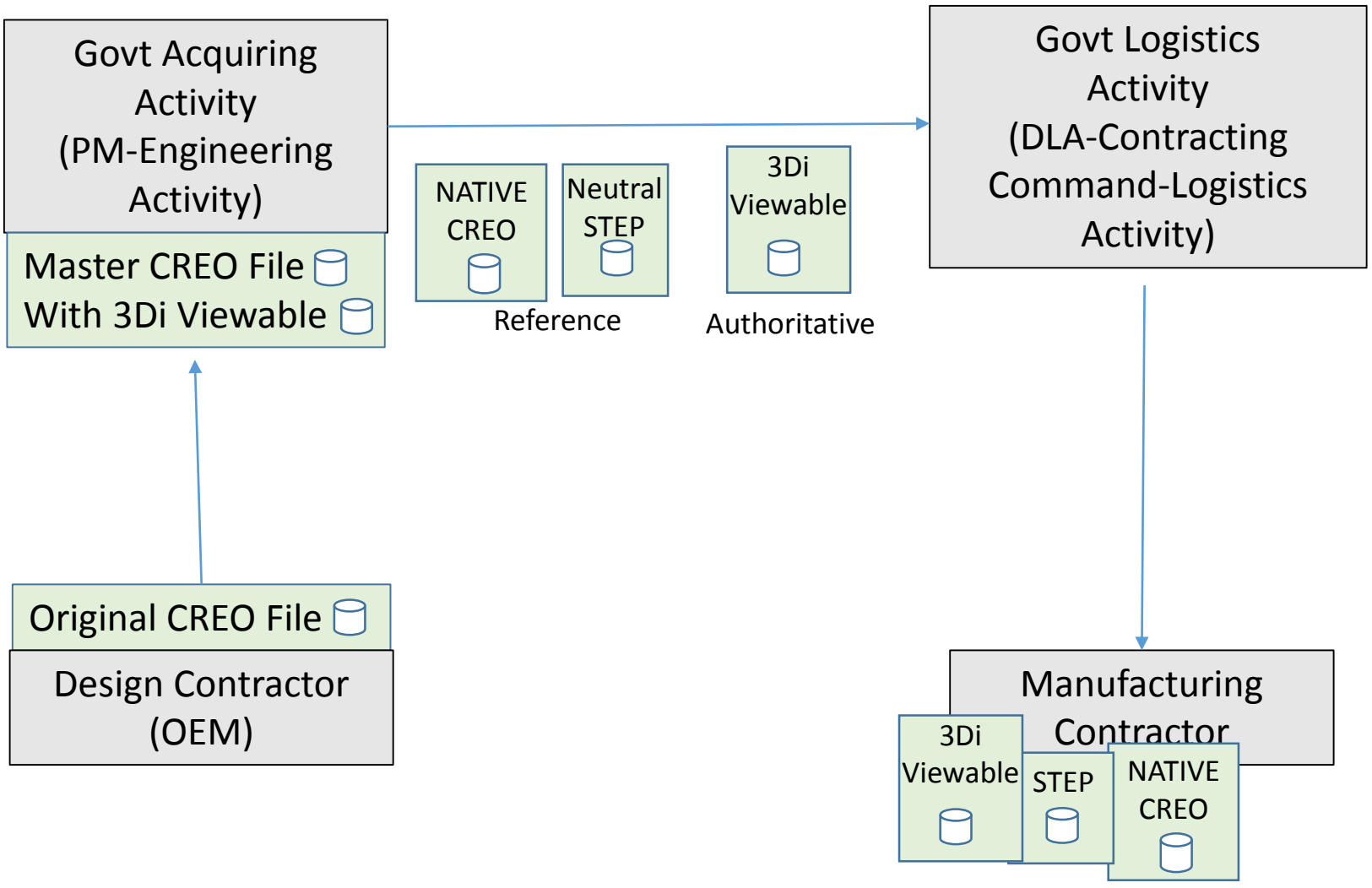
Govt Activity sole source with OEM Design contractor. No intent to manufacture outside OEM. Both OEM and Govt Acquiring Activity are CATIA capable. OEM will maintain data.



CATIA File is Native and Authoritative. CATIA File is also Master and resides with Design Contractor

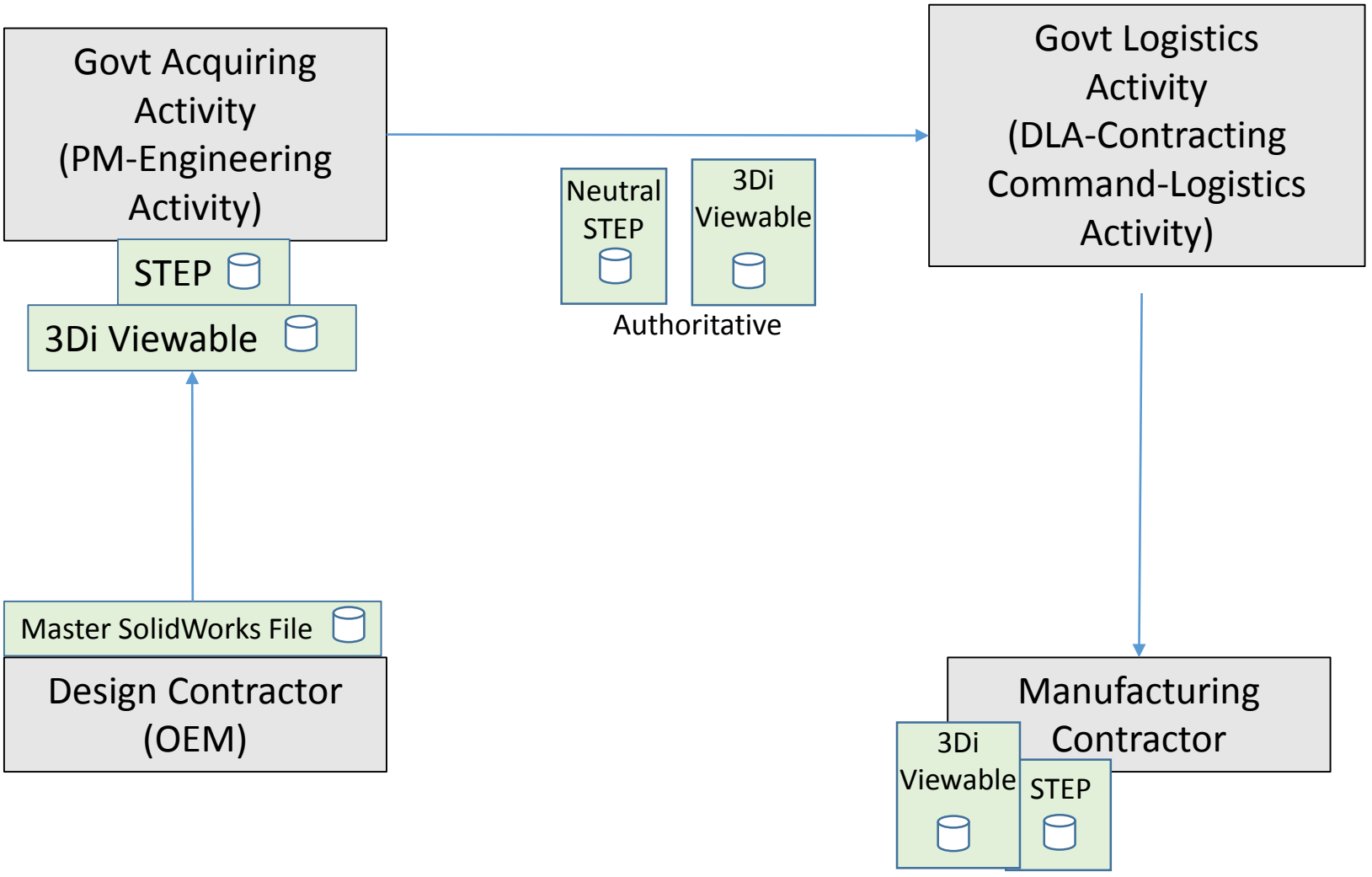
USAGE CASE 2:

Govt Activity procuring TDP from Design Contractor. Govt activity will maintain the master and procure from multiple sources using Govt Logistics Activity. Design Contractor and Govt Acquiring Activity are both CREO capable.



USAGE CASE 3:

Govt Activity procuring design from Design Contractor. Design Ctr will maintain the Native master and provide validated neutral and viewable to Govt Acquiring Activity. Design Contractor is Solid Works capable. Govt Acquiring Activity is CREO capable.



Summary

- 2D drawing based TDPs are the past.
- 3Di pdf based TDPs are the future.
- DOD organizations and our OEMs/suppliers need to establish the ability to deliver and use 3Di based TDPs.
    - Training
    - Infrastructure
    - Standards
    - Procedures

BACKUP SLIDES

- A TDP does not exist for the purpose of manufacturing the item.

- A TDP exists for purposes of defining the item.

  (Its an engineering document, not a manufacturing document.)

- As such, it has many uses … manufacturing, inspection/QA, provisioning, repair, tech manual development, configuration mgt, engineering analysis, …

- Anything which allows better communication of design intent is good.
- Anything which detracts from communication of design intent is bad.