3D Tech Data Use in Procurement

PDF Day DC

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Background

- The Defense Logistics Agency (DLA) is America's Combat Logistics Support Agency

  – Buy spare parts for >2000 weapon systems

  – Need comprehensive technical data to conduct competitive procurements

- Most weapon system technical data used by DLA is 2-dimensional (2D) drawings

- Modern Weapon System Programs designed and documented as 3-dimensional (3D) models

DLA is America's Combat Logistics Support Agency

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The Problem

- DLA's current procurement processes are built to use 2D technical data

- Industry and Services have transitioned to CAD and CAM, which produce and use 3D technical data

- DLA needs capability to routinely procure parts using 3D technical data

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The Challenge of Using 3D Technical Data for Procurement

- To successfully use 3D technical data, DLA must resolve three major challenges
  - DLA personnel must be able to fully access and view technical data
  - DLA personnel must be able to easily locate and confirm inclusion of requisite information for manufacturing and procurement
  - Technical data included in solicitations must be accessible and useable by a majority of potential suppliers without need to procure software

# Options to Solve DLA's 3D Technical Data Challenges

- **Option 1:** purchase software packages and training for each unique proprietary CAD software platform

- **Option 2:** require technical data be recorded in a single proprietary CAD format*

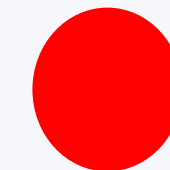- **Option 3:** require technical data be recorded in 'neutral file format'*

*DLA acquires copies of requisite software and training

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Comparison of Options

Options	Challenges		
	Full Data Access	Easily Locate Data	Supplier Accessibility to Data
(1) Purchase S/W for each CAD Platform	🟡	🟡	🔴
(2) Require TDPs in One CAD Format	🟡	🟡	🔴
(3) Require TDPs in Neutral Format	🟢	🟢	🟢
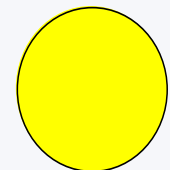
🟢 Low cost solution   🟡 High cost solution   🔴 Does not solve challenge

Only Option 3 can solve all 3 challenges!

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DLA's Preferred Format for 3D Technical Data[1] Today

- 3D PDF (PRC[2] format) + STEP[3] file (AP203 format)
- 3D PDF document can be read using Adobe Reader or Adobe Acrobat software
  - Widely available (installed on all DoD computers and ~90% of commercial computers)
  - Software is available via free web download
  - PDF format is intuitive to navigate
- 3D PDF + STEP = currently the best neutral file solution that provides full product definition with geometry to create machine code for CNC manufacturing, meets TDP 'publishing' requisites, and is a stand-alone product; solution may change in the future as other neutral formats mature

3D PDF Solution

1   Concept of Operations for DLA Procurement of Weapon System parts Using 3D Technical Data, LMI Report DL309T1, September 2014
2   Product Representation Compact
3   STEP = Standard for the Exchange of Product Data

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What DLA Did to Prove the 3D PDF Solution Works

- 3D PDF Demo R&D Project
  - Demonstrate/assess capability to acquire real parts (Class IX items)* using only 3D PDF technical data plus a STEP file (AP203)
  - Test ESA processes to develop and deliver 3D technical data to DLA
  - Test DLA ability to receive, review, and use 3D technical data in TDPs and solicitations
  - Test supplier's ability to use 3D PDF and STEP files for bidding and manufacturing
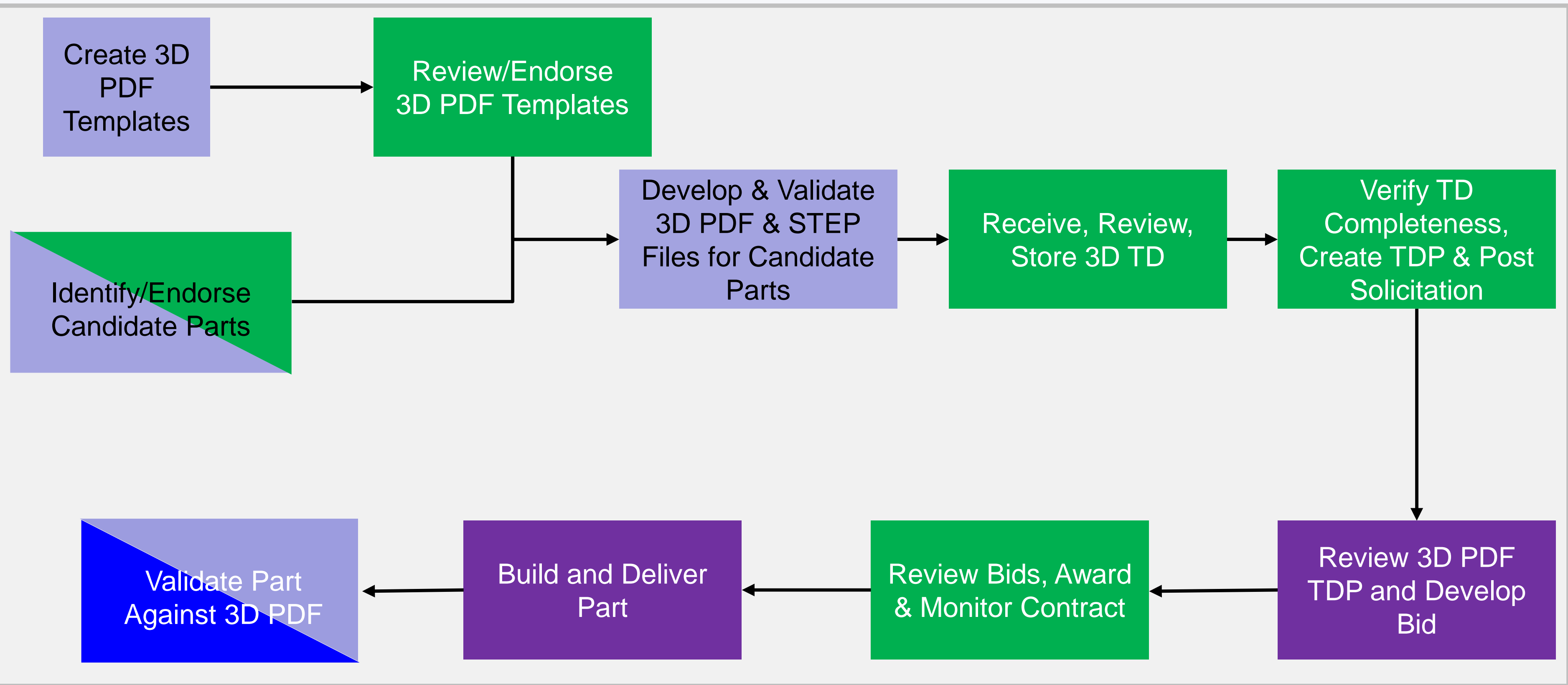
> *DLA conducted actual part procurements using only 3D PDF and STEP files (no 2D data provided to suppliers)*

* Parts were for R&D purposes only and were not inserted into the operational supply chains

3D PDF Demo Procurements

- Demo included three different parts
  - Cable Sheave Guide, NSN 5340-01-608-4916
  - Brake Shoe Cam, NSN 1005-00-701-2756
  - Retaining Bearing Plate, NSN 3110-01-003-1296
- Parts managed by three different ESAs
  - NAWC Lakehurst
  - ARDEC Rock Island
  - Warner Robins
- Parts procured by three different DLA Supply Chains
  - Troop Support; Industrial Hardware (Philadelphia)
  - Land & Maritime (Columbus)
  - Aviation (Richmond)
- *Solicitations and contracts included only 3D PDF and STEP files* (no 2D drawings provided to suppliers)

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Demo tested end-to-end process

DLA 3D PDF Demo: Process for Procuring Parts

Create 3D PDF Templates → Review/Endorse 3D PDF Templates

Identify/Endorse Candidate Parts → Develop & Validate 3D PDF & STEP Files for Candidate Parts → Receive, Review, Store 3D TD → Verify TD Completeness, Create TDP & Post Solicitation → Review 3D PDF TDP and Develop Bid → Review Bids, Award & Monitor Contract → Build and Deliver Part → Validate Part Against 3D PDF

Key
- ESA
- DLA
- DCMA
- Supplier

Cable Sheave Guide Contract Results

- Small Midwest fabrication shop built parts
  - Never before used 3D PDF technical data
  - Set up time and cost were not impacted by 3D PDF data
  - 3D PDF slightly more difficult; personnel normally use 2D drawings
  - Ability to roll and zoom the part in space was a positive feature
  - Didn't use STEP file; CNC system uses 'conversational programming'
- Two test articles delivered to ESA on time
- Test articles validated against data of record (3D PDF file); two minor non-conformances noted
  - Non-conformances did not disqualify parts
  - Non-conformances did not result from 3D PDF errors/issues

Supplier successfully built parts even though it'd never before seen or used 3D PDF files

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Brake Shoe Cam Contract Results

- Picatinny Arsenal PIF* (organic manufacturing capability) used 3D PDF file to build parts
- Three test articles delivered on time to L&M mechanical test lab
- Test articles validated against data of record (3D PDF file); one minor non-conformance noted
  - Non-conformance did not disqualify parts
  - Non-conformance did not result from 3D PDF errors/issues

Organic manufacturing facility successfully built parts using only 3D PDF and STEP files

*Production Integration Facility

Retaining Bearing Plate Contract Status

- Contract awarded 6 Sept to small Western hardware manufacturing company

- Three test articles delivered to Warner Robins (ESA) on time (11 Dec 2017)

- Test articles undergoing validation by ESA against data of record (3D PDF file); results TBD

Supplier built parts using only 3D PDF and STEP files

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Conclusions from DLA 3D PDF Demo R&D Project

- *DLA can easily and successfully handle 3D PDF and STEP files in daily procurement operations*

- *Suppliers can easily and successfully use 3D PDF and STEP files to develop quotes and manufacture parts*

- ESA 3D PDF templates* meet all technical data requirements to support DLA procurement actions

- No process changes are required for transfer of 3D PDF and STEP files from ESA to DLA

- No procurement process changes are required for DLA use of 3D PDF and STEP files

3D PDF Solution Works!!!!

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POCs

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Presentation
Back-Up Slides

Data Elements and Attributes Required by DLA as part of 3D Technical Data Package (TDP)* for Procurement

- Specifications
- Dimensions
- Tolerances
- Welding requirements
- Materials (ballistics)
- Temper
- Heat treatments
- Finishes
- Rights in Data
- License Agreement
- Distribution Statement
- Document Type−Parts List, Detailed Drawing, Assembly List, Quality
- Assurance Provision, etc.
- Security code
- Tech data availability code
- Foreign secure
- Nuclear
- Subsafe
- Control code

- Legibility
- Completeness
- Restrictions
- Document approval
- Document title
- Document number
- Revision and date
- Revision type
- Expiration date
- Document data code
- Size of drawing, number of sheets, frames
- Call outs
- Sources
- First Article Test requirements
- Inspection requirements
- Higher level contract quality requirements
- Part number
- NSN
- Export control
- Commercial and government entity (CAGE) code

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Service POCs for 3D PDF Information

US Army

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