From Legacy PDFs to Simulation-Ready 3D Models: Accelerating Obsolescence Recovery and Manufacturing Throughput

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Defense sustainment is increasingly constrained by a quiet but critical problem: the technical data required to manufacture, repair, or replace legacy parts is often incomplete, outdated, or trapped in static formats. Across depots, shipyards, arsenals, and supplier networks, many mission-critical components are supported by aging PDF drawings, scanned technical data packages, fragmented notes, obsolete supplier records, and limited institutional knowledge. When a part becomes unavailable, a vendor exits the market, or a legacy system faces an urgent repair need, organizations are often forced into a slow manual process: interpret the drawing, reconstruct the geometry, validate dimensions, identify manufacturing requirements, source qualified suppliers, estimate production time, and determine whether industrial throughput can meet operational demand.

This presentation introduces an emerging workflow for converting legacy PDF technical data into simulation-ready 3D manufacturing intelligence to support obsolescence recovery, sustainment planning, and industrial base resilience. The objective is not simply to digitize a drawing. It is to transform static engineering records into actionable manufacturing intelligence: inferred geometry, feature recognition, material and tolerance extraction, process classification, inspection requirements, supplier-fit criteria, and manufacturability assessment. Once converted into a structured 3D model or manufacturability profile, the data can be used to simulate production pathways, estimate cycle times, identify bottlenecks, evaluate alternate manufacturing methods, and assess whether existing supplier capacity can support sustainment demand under surge or disruption conditions.

The workflow begins with a PDF drawing or legacy technical data package. AI-assisted parsing identifies views, dimensions, callouts, material specifications, tolerances, notes, and inspection-relevant characteristics. Where possible, the system reconstructs a 3D representation or structured part model that can be paired with manufacturing process intelligence and supplier capability data. The resulting digital manufacturing profile can evaluate machine constraints, tooling requirements, certification burdens, material availability, and alternate sourcing options. This creates not only a production pathway, but also greater visibility into supply chain concentration risk, single points of failure, and dependency on fragile or obsolete suppliers.

This is especially relevant to obsolescence and Supply Chain Risk Management (SCRM). When a supplier exits the market or an end-of-life component must be replaced, the limiting factor is often the organization's ability to rapidly regenerate the manufacturing knowledge required to produce the part again. PDF-to-3D model generation can reduce that latency by transforming dormant technical data into simulation-ready production options. It enables teams to compare make-versus-buy decisions, identify alternate suppliers, forecast throughput, and evaluate industrial resilience before committing resources.

The presentation aligns with MODSIM World 2026's focus on speed, integration, and mission impact by demonstrating how modeling and simulation can move upstream into sustainment and the defense industrial base. The central thesis is clear: obsolescence is not only a

parts problem; it is a manufacturing knowledge problem, a supply chain resilience problem, and a throughput problem. By converting legacy PDFs into simulation-ready 3D manufacturing intelligence, defense organizations can accelerate recovery from unavailable parts to executable production pathways while strengthening readiness in contested and resource-constrained environments.