iFAB Foundry Data Specification

The iFAB Foundry Data Specification is a collection of XML schemas that describe the information required to analyze, procure, and manufacture a design. The information can be divided into two groups, component information and assembly information. Textual descriptions of the information are provided in the sections below and the xsd schemas are provided as appendices.

Manufacturing Related Component Information

In general, there are 3 types of components: Commercial Off the Shelf (COTS), Make to Order (MTO), and custom manufactured. Each of these component types require specific information that is used to analyze, source, procure, and manufacture. Each component type will be defined and a schema that can be used to fully define the component is provided in the following sections.

Commercial Off the Shelf

Commercial Off the Shelf (COTS) components refer to components that can be purchased from a vendor, or a set of vendors, as a fully defined component with published/quoted purchasing, cost, lead time, and qualification information. An example of a COTS component would be an engine in a catalogue with known contact information for the manufacturer or supplier.

Included in the COTS component type are components that are already owned by the designer/government that are labeled as Government Off the Shelf (GOTS). Also known as Government Furnished Equipment (GFE), these components are similar to COTS components in that all of the purchasing information is known and can be readily provided to analyze, procure, and manufacture the component.

Make to Order

Make to order components are defined as components with an established manufacturing/vendor base that produce parameterized components. For example drive shafts with specified lengths and diameters. Where the drive shaft material and available lengths and diameters are given in a catalogue and can be purchased from the vendor or manufacturer.

Both COTS and MTO components are considered purchased components and follow the purchased component schema. There are several data elements required for purchased components.

Commercial Off the Shelf and Make to Order Required Information

- Cost - for a specified order quantity
- Lead time - for a specified order quantity

- Packaging – Pallet, box, crate, pieces
- Transportation Needs – temperature controlled, hazardous material, or both
- Vendor/Manufacturer contact information – CAGE code, catalogue number part description, shipping dimensions, shipping mass, shipped from address

Custom manufactured Components

Custom manufactured components are the components that are to be made in the iFAB Foundry distributed manufacturing environment and include things like brackets, sheet metal boxes, hoses, plate metal, etc. In order to properly analyze and construct a custom manufactured part, this type has been further subdivided into several classes. These part classes include machined, casting, forging, plate, pipe bar and tube, additive, polymer, and plastic.

Common Custom Manufactured Component Required Information

- Material – Aluminum, alloy steel, carbon steel, stainless steel (Specific alloys are further specified)
- Inorganic Coating – Black chrome, sulfuric acid anodized, hard coat anodized, manganese phosphate, black oxide, nickel, zinc phosphate
- Organic Coating (Painted) – CARC, non-CARC
- General tolerance information
    - Curved Surface Tolerances – General (mm), Surface Roughness (um).
    - Curved Wall Tolerances – General (mm), Surface Roughness (um).
    - Simple Hole Tolerances – Diametrical (mm), Positional (mm), Surface Roughness (um)
        - Holes threaded (yes/no)

Machined Part Class Required Information

- Covered by the common information

Plate/Sheet Part

- Common information
    - Material, Coatings, Simple Hole Tolerances
- Tolerance information
    - Planar Face Tolerances – General (mm), Surface Roughness (um).
    - Complex Hole Tolerances – General (mm), Surface Roughness (um).
    - Bend Angle Tolerance

Pipe/Bar/Tube Components

- Common information
    - Material, Coatings, Simple Hole Tolerances
- Tolerance information
    - Ends Tolerances – General (mm), Surface Roughness (um).
    - Complex Hole Tolerances – General (mm), Surface Roughness (um).
    - Bend Angle Tolerance

Manufacturing Related Assembly Information

Manufacturing assembly information describes how any two or more components are joined together in the context of an assembly. This information is used to analyze and manufacture a given design using the iFAB Foundry manufacturing capabilities.

Two components can be joined together in several different ways. This specification document describes a subset of the total number of joining mechanisms, which represent the most common mechanisms for military ground vehicle manufacturing.

The assembly joining operations include, mechanical, welded, soldered, brazed, and glued.

Mechanical Joins refer to connections that are fastened by bolts, fasteners, rivets, or compression fits.

Mechanical Join Required Information

- Common information
    - Material, Coatings, Simple Hole Tolerances
- Tolerance information