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# Construction of a PSPP Map of Stainless-Steel Alloy Fabricated by Additive Manufacturing

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# PSPP Map of Stainless Steel by Additive Manufacturing

***PSPP maps are a standard tool to effectively communicate materials knowledge critical for advancing materials design***

## What does PSPP stand for?

| | |
|---|---|
| **PROCESSING** | Materials processing is defined as the series of steps or "unit operations" used in the manufacture of raw-materials into finished goods. |
| **STRUCTURE** | The structure of a material usually relates to the arrangement of its internal components. |
| **PROPERTIES** | A material property is an intensive property of a material, that is, a physical property that is independent of the amount of the material. |
| **PERFORMANCE** | Capabilities that it is necessary to demonstrate, as a minimum, for material to satisfy the criteria of an International Standard. |

## Roadmap for Constructing a PSPP Map

- Identify the performance requirements of the desired application.
- In the Properties column, list the essential material properties required for the application, as determined by the materials' performance profiles.
- The Processing column is generated after the Properties column
- The boundary conditions constrained by the desired application and known processing routes for the materials system are provided by the characteristics of the Properties and Processing columns, respectively.
- You should start by identifying all accessible processing steps of the material defined by the system suitable for the desired application under the Processing column.
- Each processing step should be blocked, and the variable parameters involved in the phase should be stated within each block.

## 316L Stainless Steel Map

### 1. PROCESSING

Additive manufacturing (AM), also known as 3D printing, is a transformative approach to industrial production that enables the creation of lighter, stronger parts and systems.

### 2. STRUCTURE

The stainless steel 316L possesses a hierarchical microstructure. Its primary crystalline structure is austenite (face-centered cubic), The microstructure consists of grains with a size of 10–50 μm and fine subgrains within single grains.

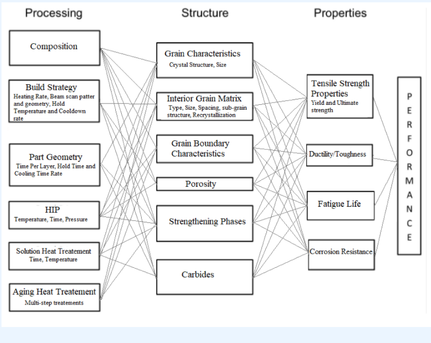
### 3. PROPERTIES

316L stainless steel offers high creep strength, stress-to-rupture and tensile strength at high temperatures, as well as excellent corrosion resistance and strength properties.

### 4. PERFORMANCE

Austenitic 316L stainless steel alloy is an attractive industrial material combining outstanding corrosion resistance, ductility, and biocompatibility, with promising structural applications and biomedical uses.

## What does a PSPP map of stainless steel by additive manufacturing look like?




***PSPP Mapping is a helpful tool that serve as a standard means of communication on the physical and chemical mechanisms that regulate the performance of a materials system***