SS 708:2024
(ICS 25.030; 49.025)

SINGAPORE STANDARD

# Additive manufacturing for aerospace — Filament layer manufacturing process specifications

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## Foreword

This Singapore Standard was prepared by the Working Group on Additive Manufacturing for Aerospace set up by the Technical Committee on Additive Manufacturing under the purview of the Manufacturing Standards Committee.

This Singapore Standard establishes a common framework for filament layer manufacturing (FLM) parts producers to carry out process specifications for filament layer manufacturing to become qualified to produce non-critical FLM-printed parts for the aerospace industry.

It is presupposed that in the course of their work, users will comply with all relevant regulatory and statutory requirements. Some examples of relevant regulations and acts are listed in the Bibliography. The Singapore Standards Council and Enterprise Singapore shall not be responsible for identifying all of such legal obligations.

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## 0 Introduction

Filament layer manufacturing (FLM) is a form of additive manufacturing (AM), categorised under material extrusion (MEX) per the ISO/ASTM 52900 classification. It involves the layer-by-layer deposition of polymer materials. The use of polymers in MEX manufacturing facilitates a high degree of customisation and offers the potential for efficient market delivery of new products.

This standard establishes a framework for FLM parts producers to carry out process specifications and describes the requirements for defining and documenting the necessary processes to control potential variables in low-criticality parts manufacture for the aerospace industry. It also highlights practices and requirements specific to this industry used to demonstrate that the FLM processes are reliable, repeatable, and robust.

By establishing a common framework, this standard aims to foster advancements and diversification in FLM processes, accommodating various applications to serve wider market needs. Defining the manufacturing processes within a common framework and using standardised terminology allows FLM parts producers to demonstrate their capabilities and facilitates fair and easy evaluation of new entrants to the industry.

## 1 Scope

This standard aims to create a framework to clearly define the hardware, systems and controls required in FLM to fabricate parts for aerospace applications.

The following aspects of FLM are crucial for ensuring the reliability, repeatability and robustness of the output:

a) FLM hardware set-up:
   - machine specification; and
   - deployment;

b) Raw material:
   - selection;
   - sourcing; and
   - management;

c) Facilities management;

d) Printing processes;

e) Software:
   - selection;
   - set-up; and
   - management;

f) Material and fabrication processes;

g) Maintenance regimes.

The performance requirements for additive manufacturing processes for aerospace components depend on their criticality toward aircraft operational safety, including safe flights and landings. This