SLOVENSKI STANDARD
oSIST prEN ISO/ASTM 52910:2022

01-september-2022

Aditivna proizvodnja - Načrtovanje - Zahteve, smernice in priporočila (ISO/ASTM DIS 52910:2022)

Additive manufacturing - Design - Requirements, guidelines and recommendations

Additive Fertigung - Konstruktion - Anforderungen, Richtlinien und Empfehlungen

Fabrication additive - Conception - Exigences, lignes directrices et recommandations

Ta slovenski standard je istoveten z: **prEN ISO/ASTM 52910**

ICS:

25.030	3D-tiskanje	Additive manufacturing

oSIST prEN ISO/ASTM 52910:2022 **en,fr,de**

DRAFT INTERNATIONAL STANDARD

ISO/ASTM DIS 52910

ISO/TC **261**

Secretariat: **DIN**

Voting begins on:
2022-08-17

Voting terminates on:
2022-11-09

Additive manufacturing — Design — Requirements, guidelines and recommendations

Fabrication additive — Conception — Exigences, lignes directrices et recommandations

ICS: 25.030

This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING

Reference number
ISO/ASTM DIS 52910:2022(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11

Email: copyright@iso.org
Website: www.iso.org

ASTM International
100 Barr Harbor Drive, PO Box C700
West Conshohocken, PA 19428-2959, USA
Phone: +610 832 9634
Fax: +610 832 9635
Email: khooper@astm.org
Website: www.astm.org

Published in Switzerland

Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by ISO/TC 261, *Additive manufacturing*, in cooperation with ASTM F42, *Additive Manufacturing Technologies*, on the basis of a partnership agreement between ISO and ASTM International with the aim to create a common set of ISO/ASTM standards on additive manufacturing.

Additive manufacturing — Design — Requirements, guidelines and recommendations

1 Scope

This document gives requirements, guidelines and recommendations for using additive manufacturing (AM) in product design.

It is applicable during the design of all types of products, devices, systems, components or parts that are fabricated by any type of AM system. This document helps determine which design considerations can be utilized in a design project or to take advantage of the capabilities of an AM process.

General guidance and identification of issues are supported, but specific design solutions and process-specific or material-specific data are not supported.

The intended audience comprises three types of users:

— designers who are designing products to be fabricated in an AM system and their managers;

— students who are learning mechanical design and computer-aided design;

— developers of AM design guidelines and design guidance systems.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/ASTM 52900 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Purpose

4.1 This document provides requirements, guidelines and recommendations for designing parts and products to be produced by AM processes. Conditions of the part or product that favour AM are highlighted. Similarly, conditions that favour conventional manufacturing processes are also highlighted. The main elements include the following:

— the opportunities and design freedoms that AM offers designers (Clause 5);

— the issues that designers should consider when designing parts for AM, which comprises the main content of these guidelines (Clause 6);

— warnings to designers, or “red flag” issues, that indicate situations that often lead to problems in many AM systems (Clause 7).

4.2 The overall strategy of design for AM is illustrated in Figure 1. It is a representative process for designing mechanical parts for structural applications, where cost is the primary decision criterion.

The designer could replace cost with quality, delivery time, or other decision criterion, if applicable. In addition to technical considerations related to functional, mechanical or process characteristics, the designer should also consider risks associated with the selection of AM processes.

4.3 The process for identifying general potential for fabrication by AM is illustrated in Figure 2. This is an expansion of the "identification of general AM potential" box on the left side of Figure 1. As illustrated, the main decision criteria focus on material availability, whether or not the part fits within a machine's build volume, and the identification of at least one part characteristic (customization, lightweighting, complex geometry) for which AM is particularly well suited. These criteria are representative of many mechanical engineering applications for technical parts, but are not meant to be complete.

4.4 An expansion for the "AM process selection" box in Figure 1 is presented in Figure 3, illustrating that the choice of material is critical in identifying a suitable process or processes. If a suitable material and process combination can be identified, then consideration of other design requirements can proceed, including surface considerations and geometry, static physical and dynamic physical properties, among others. These figures are meant to be illustrative of typical practice for many types of mechanical parts, but should not be interpreted as prescribing necessary practice.

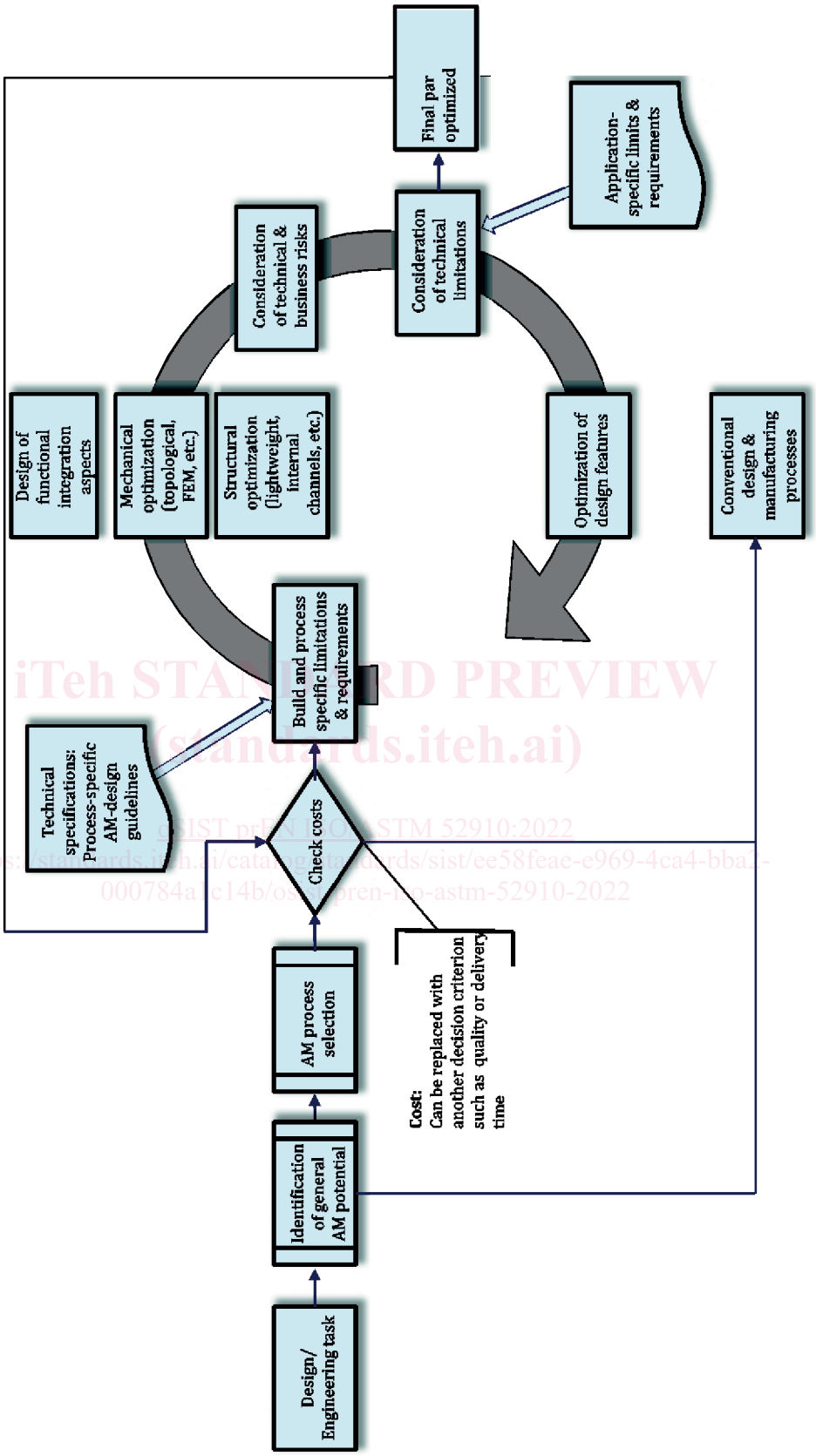


Figure 1 — Overall strategy for design for AM

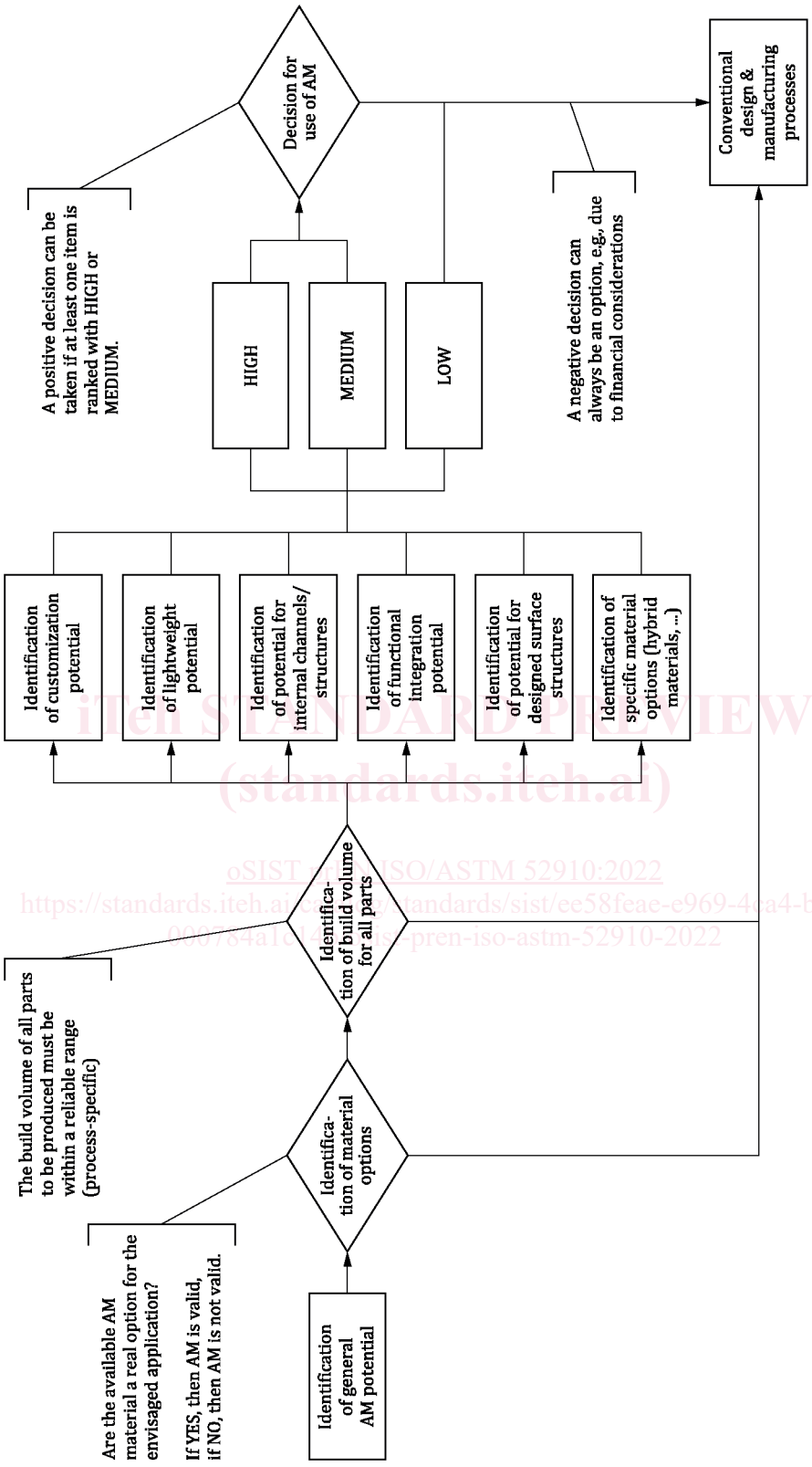
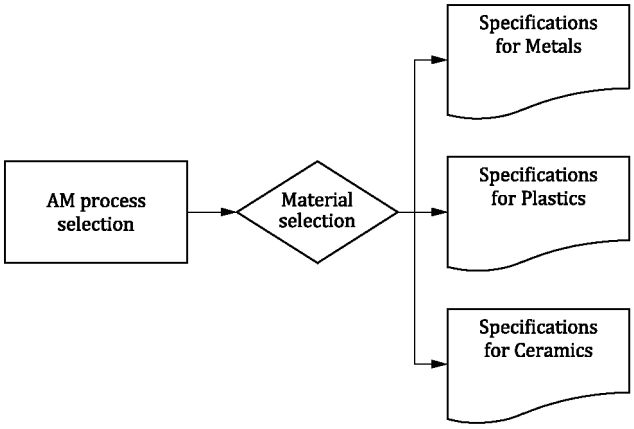


Figure 2 — Procedure for identification of AM potential



Material: metal				
Main technical issues	**Powder bed fusion**	**Material jetting**	**Material extrusion**	**Sheet lamination**
Surface				
Roughness				
Staircase effect				
Geometrical properties				
Geometrical accuracy				
Static physical properties				
Porosity				
Tensile strength				
Ductility				
Dynamic physical properties				
Life cycle fatigue				

Figure 3 — Parameters for the AM process selection

5 Design opportunities and limitations

5.1 General

Additive manufacturing differs from other manufacturing processes for several reasons and these differences lead to unique design opportunities and freedoms that are highlighted here. As a general rule, if a part can be fabricated economically using a conventional manufacturing process, that part should probably not be produced using AM. Instead, parts that are good candidates for AM tend to have complex geometries, custom geometries, low production volumes, special combinations of properties or characteristics, or some combination of these characteristics. As processes and materials improve, the emphasis on these characteristics will likely change. In Clause 5, some design opportunities are highlighted and some typical limitations are identified.