

Design and analysis of a test artifact according to ASTM 52902:2019 for evaluation of metrological characteristics of additive manufacturing systems using CT Scan, CMM and non-contact instrument

Ing. Luca Passani

Metrological dpt. Manager

OUR BUSINESS UNIT

INTEGRATED SERVICE TO GUARANTEE THE QUALITY AND PERFORMANCE OF
YOUR PRODUCTS



CAMPOGALLIANO, (MO) | ITALY



5000 MQ TESTING AREA



80 EMPLOYEES



TESTING



CERTIFICATION



ACADEMY

COMPANY PROFILE

SERVICES

Chemical analysis
Metallurgical analysis
Mechanical tests
Failure analysis
NDT
Industrial computed tomography
Dimensional analysis
Environmental and functional analysis
Inspections
Process and personnel certification
Academy

SECTORS

Aerospace
Automotive & Racing
Biomedical
Oil & Gas
General industries

PROCESSES

Additive manufacturing
Composites
Welding
MOCA

STAFF

Material engineers
Mechanical engineers
Chemists
Physics
Metallurgics
NDT 3rd Level
NDT 2nd Level
IWI - International Welding Inspectors
IWE - International Welding Engineers
IWT - International Welding Technologists

CERTIFICATION AND APPROVALS

ISO 9001:2015
EN 9100: 2018
17025:2018 - ACCREDIA
17024:2012 - ACCREDIA
17065:2012 - ACCREDIA
NADCAP AC 7101 for Materials Testing
NADCAP AC 7114 for Non Destructive Testing
ITANDTB CAE for NDT Qualification
GE Aviation
Leonardo Aircraft
Leonardo Helicopters

INDUSTRIAL SECTORS



AEROSPACE



AUTOMOTIVE



RACING



ELETTRONICS



BIOMEDICAL



MANUFACTURING



OIL & GAS



RAIL

INDUSTRIAL COMPUTED TOMOGRAPHY SYSTEMS



NSI X5000 CT SYSTEM

Scan volume: D = 500 mm, H = 1200 mm
Max payload: 90 kg
Max resolution: 5 μ m

SOURCE: X-Ray WorX 240	
X-Ray Tube Typology	Open, microfocus
Maximum Voltage	240 kV
Maximum Power	350 W
Focal Spot Size	5 μ m

FLAT PANEL DETECTOR: Varian 2520 DX	
Pixel pitch	127 μ m
Sensible Surface	250x200 mm
Maximum Acquisition Speed	12.5 fps - 30 binning
Greyscale resolution	16 bit
Scintillator	Cesium



NSI X7500 CT SYSTEM

Scan volume: D = 1500 mm, H = 3000 mm
Max payload: 250 kg
Max resolution: 70 μ m

SOURCE: Varian HPX 450-11	
X-Ray Tube Typology	Closed, minifocus
Maximum Voltage	450 kV
Maximum Power	1500 W
Focal Spot Size	0.4 mm

FLAT PANEL: PE XRD 1621 AN14 ES	
Pixel pitch	200 μ m
Sensible Surface	400x400 mm
Maximum Acquisition Speed	15 fps - 30 binning
Greyscale resolution	16 bit
Scintillator	DRZ + (Gadox)

LDA: Detection Technology 0.4iHE2-922	
Pixel pitch	400 μ m
Length	92 cm
Integration time	30-1550 fps

D7 6 MEV LINAC



Manipulator:	6-Axes granite-based
Variable FDD:	1500 - 4000 mm
Scanning envelope:	D = 1000 mm, H = 2000 mm
Max payload:	200 kg
Max dose rate:	2.5 Gy/min @ 3 MeV, 9.0 Gy/min @ 6 MeV
High resolution Line Detector Array:	length 600 mm, pixel pitch 200 μ m
3K Flat Panel Detector 4343 HE:	active area 417 x 417 mm, pixel pitch 139 μ m

DIMENSIONAL AND METROLOGICAL SYSTEMS

SECTORS

- Automotive
- Biomedical
- Aerospace
- Racing
- Industrial
- Mechanical processing
- Additive manufacturing
- Oil & Gas
- Electrical devices
- Ceramics
- Hydraulics
- Fasteners



SERVICES

- Dimensional measurements
- Creation of measurement programs for CMMs, also remotely; design and realization of part clamping systems on measuring machines
- Gear control
- Reverse engineering
- 3D scanning
- Ct scanning
- On-site measurements
- IATF 16949 PPAP Consulting and technical support MSA, R&R gage and creation of control procedures
- SPC, process Capability and Cp, Cpk calculation
- Tests according to UNI EN ISO 1090 for certification obtainment
- Metrological consulting
- Training

ADDITIVE MANUFACTURING STANDARDS OVERVIEW

Standards under the direct responsibility of ISO/TC 261

Document	Title
ISO 17296-2:2015	Additive manufacturing — General principles — Part 2: Overview of process categories and feedstock
ISO 17296-3:2014	Additive manufacturing — General principles — Part 3: Main characteristics and corresponding test methods
ISO 17296-4:2014	Additive manufacturing — General principles — Part 4: Overview of data processing
ISO/ASTM 52900:2015	Additive manufacturing — General principles — Terminology
ISO/ASTM DIS 52900	Additive manufacturing — General principles — Fundamentals and vocabulary
ISO/ASTM 52901:2017	Additive manufacturing — General principles — Requirements for purchased AM parts
ISO/ASTM DIS 52921	Additive manufacturing — General principles — Standard practice for part positioning, coordinates and orientation
ISO/ASTM 52921:2013	Standard terminology for additive manufacturing — Coordinate systems and test methodologies
ISO/ASTM 52903-1:2020	Additive manufacturing — Standard specification for material extrusion based additive manufacturing of plastic materials — Part 1: Feedstock materials
ISO/ASTM DIS 52903-2	Additive manufacturing — Standard specification for material extrusion based additive manufacturing of plastic materials — Part 2: Process — Equipment
ISO 27547-1:2010	Plastics — Preparation of test specimens of thermoplastic materials using mouldless technologies — Part 1: General principles, and laser sintering of test specimens
ISO/ASTM DTR 52905	Additive manufacturing — General principles — Non-destructive testing of additivemanufactured products
ISO/ASTM CD TR 52906	Additive manufacturing — Non-destructive testing and evaluation — Standard guideline for intentionally seeding flaws in parts
ISO/ASTM 52907:2019	Additive manufacturing — Feedstock materials — Methods to characterize metal powders
ISO/ASTM PWI 52913	Additive manufacturing — Process characteristics and performance — Standard test methods for characterization of powder flow properties
ISO/ASTM PWI 52928	Powder life cycle management
ISO/ASTM AWI 52908	Additive manufacturing — Post-processing methods — Standard specification for quality assurance and post processing of powder bed fusion metallic parts
ISO/ASTM AWI 52909	Additive manufacturing — Finished part properties — Orientation and location dependence of mechanical properties for metal powder bed fusion

ISO/ASTM 52910:2018	Additive manufacturing — Design — Requirements, guidelines and recommendations
ISO/ASTM 52911-1:2019	Additive manufacturing — Design — Part 1: Laser-based powder bed fusion of metals
ISO/ASTM 52911-2:2019	Additive manufacturing — Design — Part 2: Laser-based powder bed fusion of polymers
ISO/ASTM PWI 52911-3	Additive manufacturing — Technical design guideline for powder bed fusion — Part 3: Standard guideline for electron-based powder bed fusion of metals
ISO/ASTM PRF TR 52912	Additive manufacturing - Design - Functionally graded additive manufacturing
ISO/ASTM PWI 52914	Additive manufacturing — Design — Standard guide for material extrusion processes
ISO/ASTM PWI 52922	Additive manufacturing — Design — Directed energy deposition
ISO/ASTM PWI 52923	Additive manufacturing — Design decision support
ISO/ASTM 52915:2016	Specification for additive manufacturing file format (AMF) Version 1.2
ISO/ASTM 52915:2020	Specification for additive manufacturing file format (AMF) Version 1.3
ISO/ASTM WD 52916	Additive manufacturing — Data formats — Standard specification for optimized medical image data
ISO/ASTM WD 52917	Additive manufacturing — Round Robin Testing — Guidance for conducting Round Robin studies
ISO/ASTM CD TR 52918	Additive manufacturing — Data formats — File format support, ecosystem and evolutions
ISO/ASTM DIS 52950	Additive manufacturing — General principles — Overview of data processing
ISO/ASTM PWI 52951	Additive manufacturing — Data packages for AM parts
ISO/ASTM WD 52919-1	Additive manufacturing — Test method of sand mold for metalcasting — Part 1: Mechanical properties
ISO/ASTM WD 52919-2	Additive manufacturing — Test method of sand mold for metalcasting — Part 2: Physical properties
ISO/ASTM PWI 52927	Additive manufacturing — Process characteristics and performance - Test methods
ISO/ASTM DIS 52941	Additive manufacturing — System performance and reliability — Standard test method for acceptance of powder-bed fusion machines for metallic materials for aerospace application

ADDITIVE MANUFACTURING STANDARDS OVERVIEW

Standards under the direct responsibility of ISO/TC 261

ISO/ASTM PWI 52920-1	Additive manufacturing — Qualification principles — Part 1: Conformity assessment for AM System in industrial use
ISO/ASTM WD 52920-2	Additive manufacturing — Qualification principles — Part 2: Conformity assessment at Industrial additive manufacturing centers
ISO/ASTM DIS 52924	Additive manufacturing — Qualification principles — Classification of part proper- ties for additive manufacturing of polymerparts
ISO/ASTM DIS 52925	Additive manufacturing — Qualification principles — Qualification of polymer materials for powder bed fusion using a laser
ISO/ASTM WD 52926-1	Additive manufacturing — Qualification principles — Part 1: Qualification of ma- chine operators for metallic parts production
ISO/ASTM WD 52926-2	Additive manufacturing — Qualification principles — Part 2: Qualification of ma- chine operators for metallic parts production for PBF-LB
ISO/ASTM WD 52926-3	Additive manufacturing — Qualification principles — Part 3: Qualification of ma- chine operators for metallic parts production for PBF-EB
ISO/ASTM WD 52926-4	Additive manufacturing — Qualification principles — Part 4: Qualification of ma- chine operators for metallic parts production for DED-LB
ISO/ASTM WD 52926-5	Additive manufacturing — Qualification principles — Part 5: Qualification of ma- chine operators for metallic parts production for DED-Arc
ISO/ASTM WD TS 52930	Guideline for installation/ operation/ performance qualification (IQ/OQ/PQ) of laser-beam powder bed fusion equipment for production manufacturing
ISO/ASTM CD 52931	Additive manufacturing — Environmental health and safety — Standard guideline for use of metallic materials
ISO/ASTM WD 52932	Additive manufacturing — Environmental health and safety — Standard test method for determination of particle emission rates from desktop 3D printers using material extrusion
ISO/ASTM WD 52933	Additive manufacturing — Environment, health and safety — Consideration for the reduction of hazardous substances emitted during the operation of the non-industrial ME type 3D printer in workplaces, and corresponding test method

ISO/ASTM DIS 52941	Additive manufacturing — System performance and reliability — Standard test method for acceptance of powder-bed fusion machines for metallic materials for aerospace application
ISO/ASTM FDIS 52942	Additive manufacturing — Qualification principles — Qualifying machine operators of metal powder bed fusion machines and equipment used in aerospace applications
ISO/ASTM PWI 52943-1	Additive manufacturing — Process characteristics and performance — Part 1: Standard specification for directed energy deposition using wire and beam in aerospace applications
ISO/ASTM PWI 52943-2	Additive manufacturing — Process characteristics and performance — Part 2: Standard specification for directed energy deposition using wire and arc in aerospace applications
ISO/ASTM PWI 52943-3	Additive manufacturing — Process characteristics and performance — Part 3: Standard specification for directed energy deposition using laser blown powder in aerospace applications
ISO/ASTM PWI 52944	Additive manufacturing — Process characteristics and performance — Standard specification for powder bed processes in aerospace applications
ISO/ASTM 52904:2019	Additive manufacturing — Process characteristics and performance — Practice for metal powder bed fusion process to meet critical applications
ISO/ASTM 52902:2019	Additive manufacturing — Test artifacts — Geometric capability assessment of additive manufacturing systems

Se vuoi saperne di più
partecipa al nostro
webinar sul tema.
[ISCRIVITI QUI](#)

ISO/ASTM 52902:2019(E)



Additive manufacturing — Test artifacts — Geometric capability assessment of additive manufacturing systems¹

This standard is issued under the fixed designation ISO/ASTM 52902; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision.

Per ricevere la presentazione integrale scrivi a
marketing@tec-eurolab.com

GRAZIE PER L'ATTENZIONE
