



NSAI

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ANNUAL REPORT 2019

NSAI TECHNICAL COMMITTEE
NSAI/TC 49/SC 02 – ADDITIVE
MANUFACTURING

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1 Chairman's Statement

NSAI currently convenes the Additive Manufacturing committee. A Chairman will be appointed by NSAI in 2020.

2 Introduction

The ISO Standards Technical Committee [ISO/TC 261](#) was created in 2011 following an agreement with the American Industrial Standards Organisation, ASTM, and the European Standards Organisation, CEN, to have one global suite of AM Standards. [ISO/TC 261](#) and the [ASTM F42](#) work in parallel to produce the AM Standards. The Secretariat of [ISO/TC 261](#) is held by the German National Standards Body DIN.



These are first ever Standards to be developed for Additive Manufacturing

The Standards being developed at present are the first generation of Standards for Additive Manufacturing.

3 Scope of TC

Standardization in the field of Additive Manufacturing (AM) concerning their processes, terms and definitions, process chains (Hard- and Software), test procedures, quality parameters, supply agreements and all kind of fundamentals.

This committee will not produce indigenous Irish Standards. The national committee will participate in the development of International Standards at an ISO level.

The International Standards published by ISO will be adopted as European Standards. NSAI will adopt these European Standards as Irish Standards.

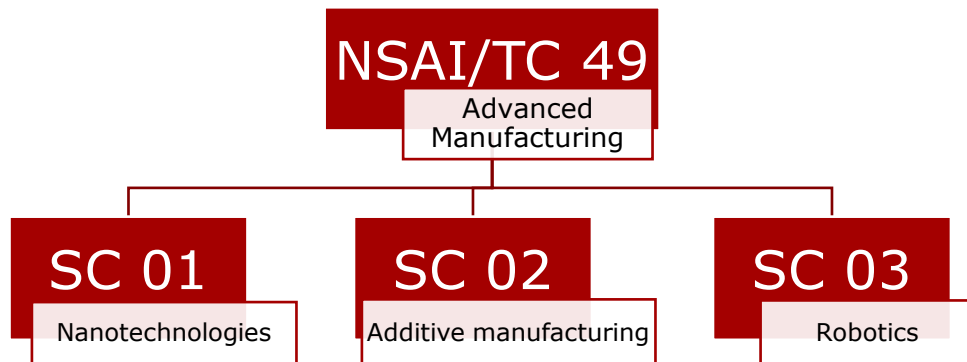
The committee mirrors the following international committees:

Committee Name	Committee Title
ISO/TC 261	Additive Manufacturing
ISO/TC 261/WG 1	Terminology
ISO/TC 261/WG 2	Processes, systems and materials
ISO/TC 261/WG 3	Test methods and quality specifications
ISO/TC 261/WG 4	Data and Design
ISO/TC 261/WG 6	Environment, health and safety
ISO/TC 261/JWG 10	Additive manufacturing in aerospace applications
ISO/TC 261/JWG 11	Joint ISO/TC 261 - ISO/TC 61/SC 9 WG, Additive manufacturing for plastics
ISO/IEC JTC 1/WG 12	3D Printing and Scanning

4 Structure and Membership

4.1 Structure

The Figure below illustrates the structure of the National Committee:



4.2 Members

The list below are the members for the year 2018:

Organisation	Name	Role
NSAI	Fergal Finn	Secretary
Confirm	Johanna Aaspollu	Committee member
HPRA	Kevin Ashton	Committee member
Dublin City University	Prof Dermot Brabazon	Committee member
Technological University Dublin	Keith Colton	Committee Member
Trinity College Dublin	Mark Culleton	Committee member
Stryker	Aoife Dooley	Committee member
University College Dublin	Prof Denis Dowling	Committee member
SteriPack Contract Manufacturing	Alejandro Espiago	Committee member
Domone Engineering	Barry Fanning	Committee member
IT Sligo	Brendan Flaherty	Committee member
Neratek	Des Forde	Committee member
NSAI NML	Rory Hanrahan	Committee member
National University of Galway	Dr Noel Harrison	Committee member
Irish Manufacturing Research	Mark Hartnett	Committee member
Johnson & Johnson	Eddie Kavanagh	Committee member
University College Dublin	Dr Shane Keaveney	Committee member
Irish Manufacturing Research	Océane Laveau	Committee member
St James Hospital	Brian Lennon	Committee member
Trinity College Dublin	Dr Rocco Lupoi	Committee member
HP	Brian McAuliffe	Committee member
Irish Manufacturing Research	Tristan McCallum	Committee member
Irish Manufacturing Research	Sean McConnell	Committee member
Johnson & Johnson	Fionnan McNamara	Committee member
Irish Manufacturing Research	Colin Meade	Committee member
Boston Scientific	Mark Mirigian	Committee member
Irish Manufacturing Research	Dr Ann o'connell	Committee member
NSAI	Elizabeth O'Ferrall	Committee member
National University of Galway	Dr Gerard O'Connor	Committee member
IT Waterford	Dr Sinéad O'Halloran	Committee member
I-Form	John Oliver	Committee member
dePuy Synthetics	John Power	Committee member
IT Waterford	Dr Ramesh Raghavendra	Committee member
Trinity College Dublin	Harry Shipley	Committee member
Trinity College Dublin	Daniel Trimble	Committee member
Laser Prototype Europe (LPE)	Thomas Walls	Committee member

5 Summary of 2019 Activities

5.1 National

5.1.1 Meetings

Last year there were no national meetings.

5.1.2 National Work

The Standards Committee will not draft any National Standards. All of the ISO/TC 261 Standards are being adopted as European Standards and will therefore be published as Irish Standards.

5.2 International/Regional

5.2.1 Meetings

Committee members attended international meetings as follows:

Committee Name	Location	Date	No. of Attendees
ISO/TC 261	Auburn, USA	25-29 th March 2019	1
ISO/TC 261	Paris, France	16-20 th September 2019	1
ISO/IEC JTC 1/WG 12	Dublin, Ireland	27-29 th August 2019	1

Irish delegates travelled to the ISO/TC 261 meetings in 2019.

5.2.2 International/Regional Work

Ireland is committed to following and inputting into the development of the AM ISO/ASTM Standards. The National Committee reviews, comments and votes on each of the public comment drafts circulated by ISO/TC 261.

Ireland has two experts participating in the Working Groups that are drafting the Standards.

Within the International Joint Technical Committee for Information Technology, [ISO/IEC JTC 1](#), there is a Working Group, WG 12 focused on 3D printing and Scanning. Ireland is represented with direct participation.

5.2.3 International/Regional Standards Reviewed

I.S. EN ISO/ASTM 52902:2019, *Additive manufacturing -- Design --Part 2: Laser-based powder bed fusion of polymers*

I.S. EN ISO/ASTM 52907:2019, *Additive manufacturing -- Feedstock materials -- Methods to characterize metal powders*

ISO/ASTM FDIS 52915, *Specification for additive manufacturing file format (AMF) Version 1.2*

ISO/ASTM WD 52920-2, *Additive manufacturing -- Qualification principles -- Part 2: Requirements for industrial additive manufacturing sites*

ISO/ASTM DIS 52921, *Additive manufacturing -- General principles -- Standard practice for part positioning, coordinates and orientation*

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 PWI 52936-1, *Additive manufacturing -- Qualification principles -- Laser-based powder bed fusion of polymers -- Part 1: General principles, preparation of test specimens*

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*

5.2.4 International/Regional Voting Results

The committee voted on twenty-five out of the fifty-seven international votes in 2019.

5.3 Regulatory Development/Update

There are no European Regulations applicable to the current suite of Standards being developed.

6 Irish Publications/Reviews

6.1 Publications

National standards will not be produced by this committee as the International Standards will be published as European Standards adopted as Irish Standards.

6.2 Reviews

The Committee does not report to any National Steering Committee. It was agreed by ISO/TC 261 and ASTM F42, that in case one organization starts to work on a new work item, it will invite the other to form a Joint Group. Only in case the other organization is not interested, the standard will be developed "alone". A Coordination Group has been established (members being the ISO experts in the JGs), which meets mainly by web-conference, and which intends, among other things, to achieve a quick flow of information from one JG to the other (at least for the ISO experts in the JGs), a quick response to questions from ASTM and quick nomination of additional ISO experts to new JGs.

7 Work programme for 2020 onwards

7.1 ISO/TC 261

ISO/ASTM PWI 52951, *Additive manufacturing -- Data packages for AM parts*

ISO/ASTM PWI 52944, *Additive manufacturing -- Process characteristics and performance -- Standard specification for powder bed processes 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 52933, *Additive manufacturing -- Environmental 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 PWI 52927, *Additive manufacturing -- Process characteristics and performance - Test methods*
- ISO/ASTM PWI 52926-1, *Additive manufacturing -- Qualification principles -- Part 1: Qualification of machine operators for metallic parts production*
- ISO/ASTM PWI 52923, *Additive manufacturing -- Design decision support*
- ISO/ASTM PWI 52922, *Additive manufacturing -- Design -- Directed energy deposition*
- ISO/ASTM PWI 52920-1, *Additive manufacturing -- Qualification principals -- Part 1: Conformity assessment for AM System in industrial use*
- ISO/ASTM WD 52920-2, *Additive manufacturing -- Qualification principals -- Part 2: Requirements for industrial additive manufacturing sites*
- ISO/ASTM WD 52917, *Additive manufacturing -- Round robin testing -- Guidance for conducting Round Robin studies*
- ISO/ASTM PWI 52914, *Additive manufacturing -- Design -- Standard guide for material extrusion processes*
- ISO/ASTM PWI 52913-1, *Additive manufacturing -- Test methods for characterization of powder flow properties for AM applications -- Part 1: General requirements*
- 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 CD 52931, *Additive manufacturing -- Environmental health and safety -- Standard guideline for use of metallic materials*
- ISO/ASTM DIS 52925, *Additive manufacturing processes -- Laser sintering of polymer parts/laser-based powder bed fusion of polymer parts -- Qualification of materials*
- ISO/ASTM DIS 52924, *Additive manufacturing -- Qualification principles -- Classification of part properties for additive manufacturing of polymer parts*
- ISO/ASTM AWI 52909, *Additive manufacturing -- Finished part properties -- Orientation and location dependence of mechanical properties for metal powder bed fusion*
- 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 DIS 52942, *Additive manufacturing -- Qualification principles -- Qualifying machine operators of metal powder bed fusion machines and equipment used in aerospace applications*
- 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 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 52916, *Additive manufacturing -- Data formats -- Standard specification for optimized medical image data*
- ISO/ASTM CD TR 52912, *Additive manufacturing -- Design -- Functionally graded additive manufacturing*
- ISO/ASTM CD TR 52906, *Additive manufacturing -- Non-destructive testing and evaluation -- Standard guideline for intentionally seeding flaws in parts*

ISO/ASTM DIS 52950, *Additive manufacturing -- General principles -- Overview of data processing*

ISO/ASTM DIS 52921, *Additive manufacturing -- General principles -- Standard practice for part positioning, coordinates and orientation*

ISO/ASTM DTR 52905, *Additive manufacturing -- General principles -- Non-destructive testing of additive manufactured products*

ISO/ASTM FDIS 52903-1; *Additive manufacturing -- 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/ASTM DIS 52900 rev, *Additive manufacturing -- General principles -- Fundamentals and vocabulary*

ISO/ASTM DIS 52915, *Specification for additive manufacturing file format (AMF) Version 1.2*

ISO/ASTM FDIS 52903-1 *Additive manufacturing -- 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/ASTM AWI 52909, *Additive manufacturing -- Finished part properties -- Orientation and location dependence of mechanical properties for metal powder bed fusion*

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*

7.2 ISO/IEC JTC 1/WG 12 – 3D Printing & Scanning

ISO/IEC/WD 23510, *Information technology -- 3D Printing and Scanning -- Framework for Additive Manufacturing Service Platform (AMSP)*

8 Additional Information

Ireland hosted the 3rd meeting of ISO/IEC JTC 1/WG 12 between the 27-29th of August 2019. Over thirteen of the world's experts on 3D printing and scanning convened on NSAI in Dublin, where they continued drafting ISO/IEC/WD 23510.