



International Personnel Qualification for Additive Manufacturing



THE ONLY INTERNATIONAL HARMONISED SYSTEM IN MANUFACTURING

ONE SYSTEM



FORTY SIX COUNTRIES

25 YEARS OF INTERNATIONAL QUALIFICATIONS



Training Personnel in Welding & Joining



Qualification of Personnel in Welding & Joining



Certification of Personnel / Companies



Technical Information



Technical Products



Collaboration Projects

3 AREAS
OF COMPANIES'
CERTIFICATION



23
TRAINING
GUIDELINES

52 
COURSES
QUALIFICATIONS
& CERTIFICATIONS

MORE
THAN
650
AUTHORISED
TRAINING
CENTRES

MORE
THAN

300.000
INDUSTRIAL PERSONNEL QUALIFIED





EWF



EWF's Strategy for AM

Create and Implement an International Additive Manufacturing Qualification System



But... why?



To modernize Qualifications in Manufacturing, starting with
Additive Manufacturing!

Skills needs identified New Job Profiles in Metal AM



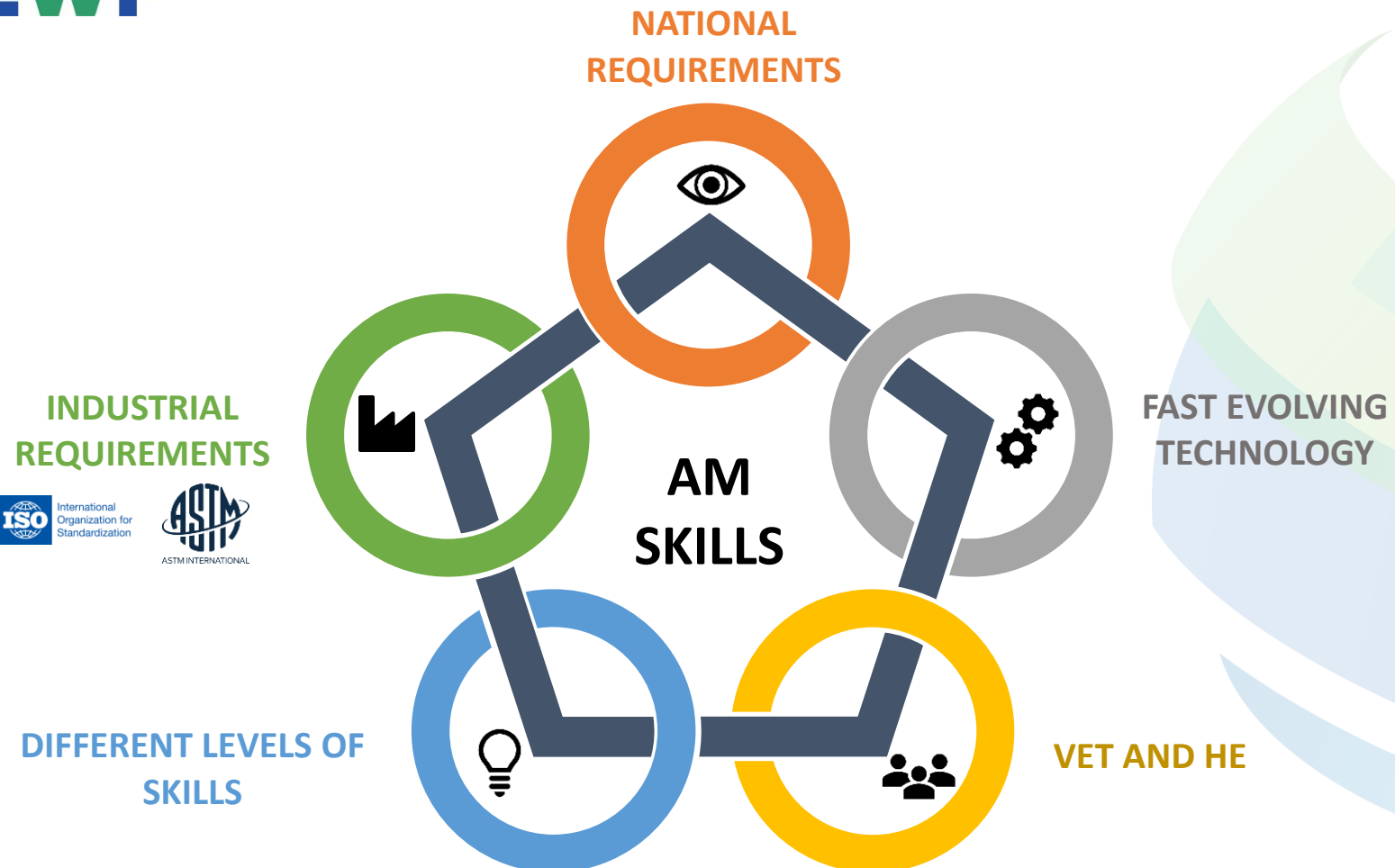
Defined by:

— Skills needs on Metal Additive Manufacturing

More than 300 Answers



Tackling Skills/Qualifications in AM





Skills Addressing in AM - Involving Industry

Foster + Partners



UNIVERSITY OF
BIRMINGHAM



Helmholtz-Zentrum
Geesthacht
Zentrum für Material- und Küstenforschung

RENISHAW
apply innovation™



BCT.



Universität Bremen

BAE SYSTEMS
INSPIRED WORK

+GF+ GF Machining Solutions

Scuola universitaria professionale
della Svizzera italiana
SUPSI

GLOBALROBOTS
automation for every nation

AUTODESK.



Rolls-Royce®



Altair

DePuySynthes *People inspired™*



INDUSTRIAL DATA
SPACE ASSOCIATION

zabala
innovation consulting

PRODTEC
FABRICA DE FUTURO

Fraunhofer
ISST

aimen
CENTRO TECNOLOGICO

DANISH
TECHNOLOGICAL
INSTITUTE

Keen Bull

inspire



mtc
Manufacturing
Technology Centre



POLITECNICO
DI TORINO

sirris
driving industry by technology

esi
get it right®

TNO innovation
for life



Vestas®



CRF CENTRO
RICERCHE
FIAT

ifl TÉCNICO
LISBOA



Politechnika
Wroclawska

IK4 LORTEK
Research Alliance

Fraunhofer
IGCV

LR Lloyd's
Register

Laser
AKADEMIE

FREDERICK
RESEARCH CENTER



Skills Addressing in AM - Involving Industry



GE Additive

DMG MORI

EWI
We Manufacture Innovation



eos
e-Manufacturing Solutions

NPL
National Physical Laboratory



aimen
CENTRO TECNOLÓGICO



IK4 LORTEK
Research Alliance

ITP
the power of talent

CRF
CENTRO RICERCHE FIAT



EPMA
European Powder Metallurgy Association



CONCEPTLASER

inspire

LMS
Laboratory for
Manufacturing Systems
& Automation

mtc
Manufacturing
Technology Centre



3D MATTERS
ADDITIVE MANUFACTURING

PRODITEC
FABRICA DE FUTURO

SINTEF

SIEMENS
Ingenuity for life



esi
get it right®

ArcelorMittal

BOEING

aitiip
centro tecnológico



DVS GERMAN WELDING SOCIETY

GEFERTEC
Generative Fertigungstechnik

IHI

3D SYSTEMS

POLITECNICO
MILANO 1863

böhlerwelding
by voestalpine

TÉCNICO
LISBOA

Arcam
A GE Additive Company

Fronius

ASTM
ASTM INTERNATIONAL

MTU
Aero Engines

Lloyd's Register

Laser
AKADEMIE

cecimo
European Association of
the Machine Tool Industries

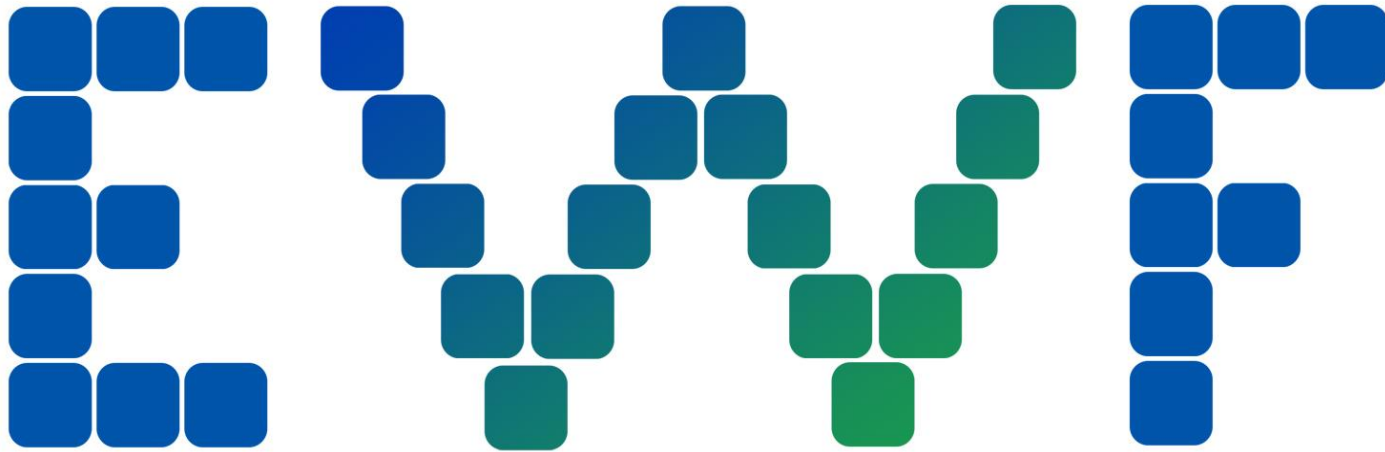
Nadcap
Accredited
Aerospace Quality Systems

GRANTA
MATERIAL INSPIRATION

cea

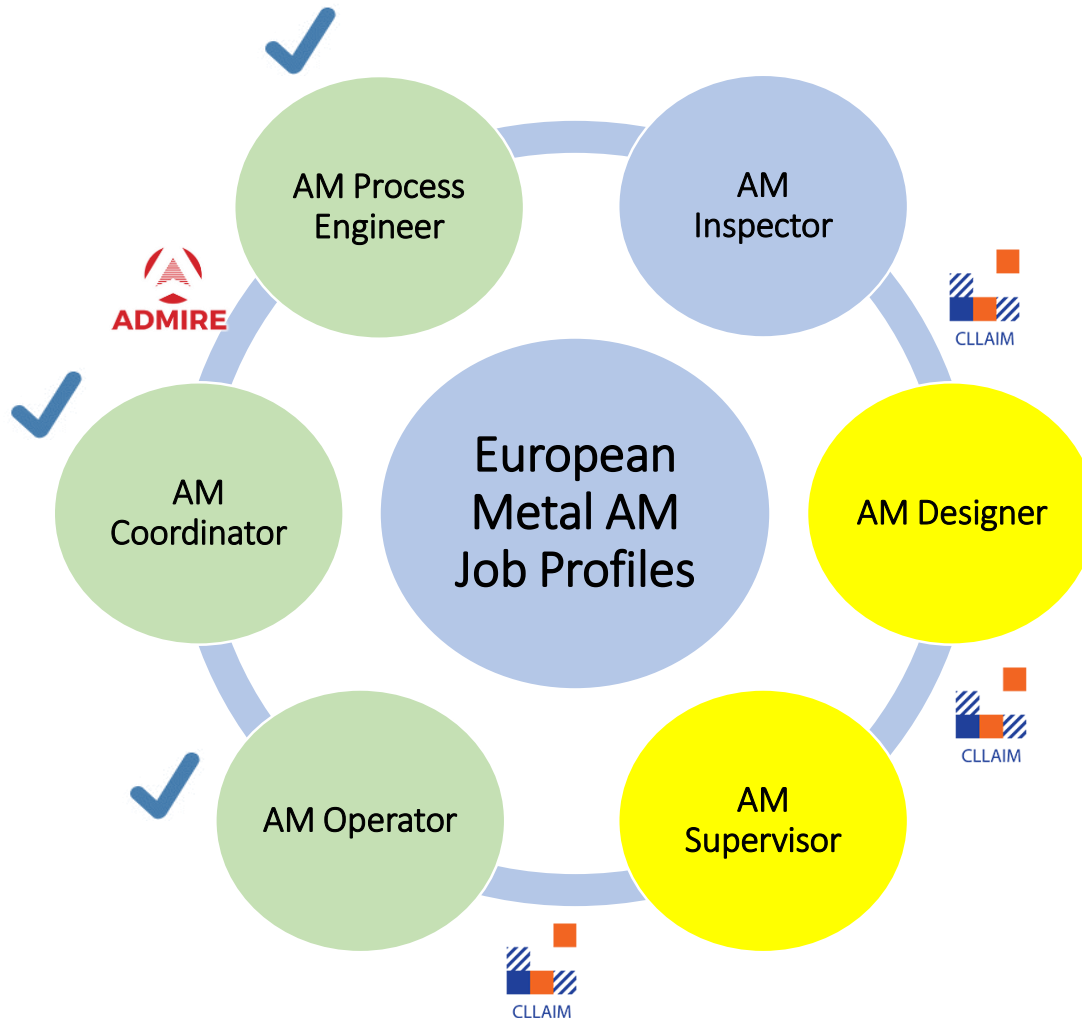
AEROTITANIUM

AM MODULAR SYSTEM



PRESS START

Metal AM Qualifications Development



Directed Energy Deposition - Arc

Directed Energy Deposition - Laser Beam

Powder Bed Fusion - Laser Beam

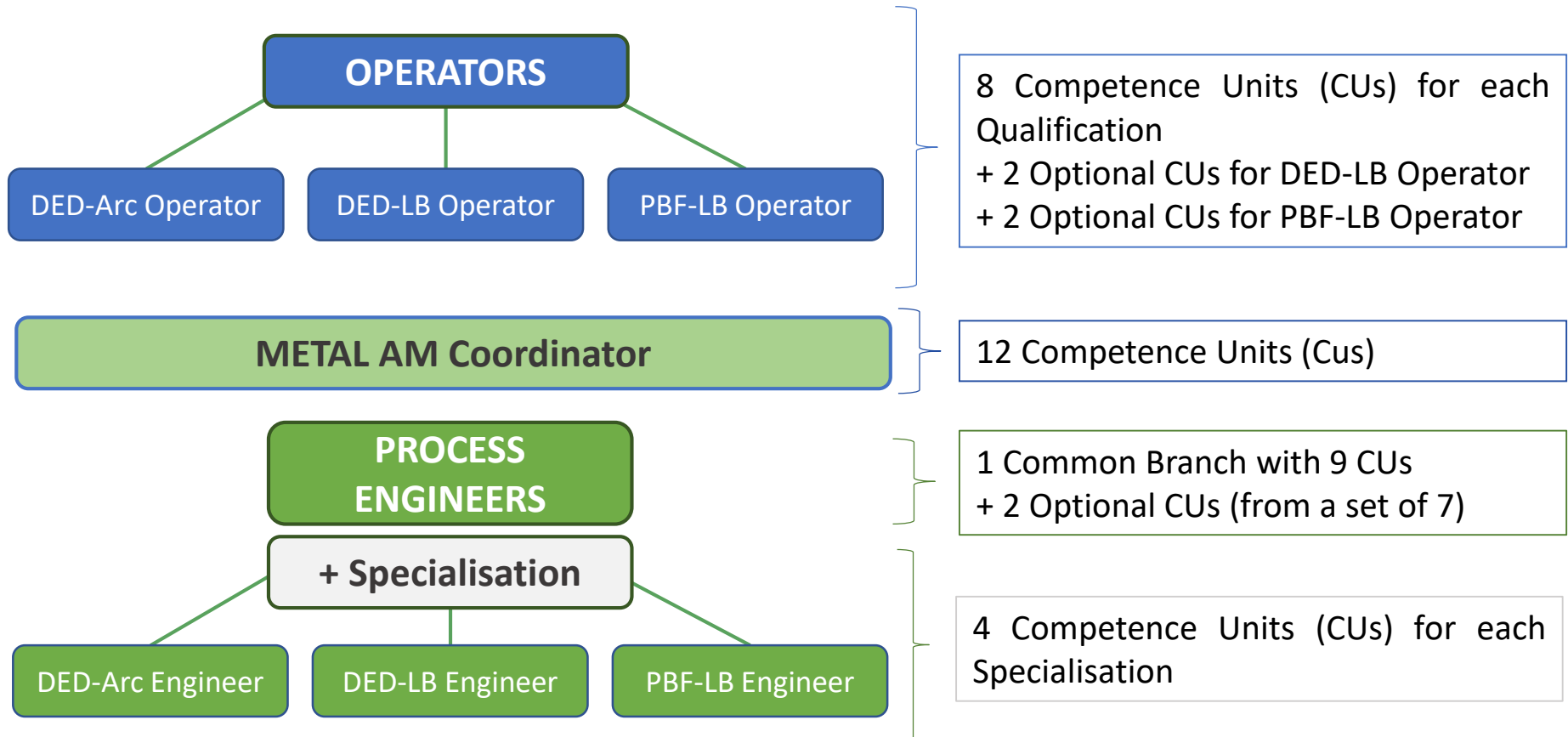
Powder Bed Fusion - Electron Beam

Vat photopolymerization

Material jetting

Binder jetting

Metal AM Qualifications Development



Side-by-side with different Industrial Sectors

EDUCATION, TRAINING AND CERTIFICATION SYSTEM

Quality Assurance System

Training Guidelines

Learning Outcomes

Harmonised Assessment

Flexible Learning

Modularity

Criteria and methods

CREATING SECTOR SPECIFIC QUALIFICATIONS



Aerospace

Medical

Railway



Sector Skills Strategy in Additive Manufacturing

- Implement the AM Qualification System
- Develop a Strategy for Skills needs
- Identification and Validation of Skills
- Identification of new Skills/Qualifications
- Amplify the Network of the AM Qualification System



Co-funded by the
Erasmus+ Programme
of the European Union

SAM Current project Status

Strategy for Skills identification and update of Professional Profile/ Qualifications



AM Observatory

**Real Case
Scenarios**
(6 months)

**Short Term
Scenarios**
(2 years)

**Foresight
Scenarios**
(10 years)

Data collection on required Professional and skills in AM and it's validation



Global and societal milestones



Skills Roadmap



Survey



Validation Workshops milestones

What ?



Development or review of Professional Profiles/Qualifications/Training Units



How to be involved ? How to support ?

- Participation in Surveys
- Participation in Interviews
- Participation in AM Workshops
- SAM Project Associated Partners
- Joining Pool of Experts of AM System
- Participation in AM Industry Council

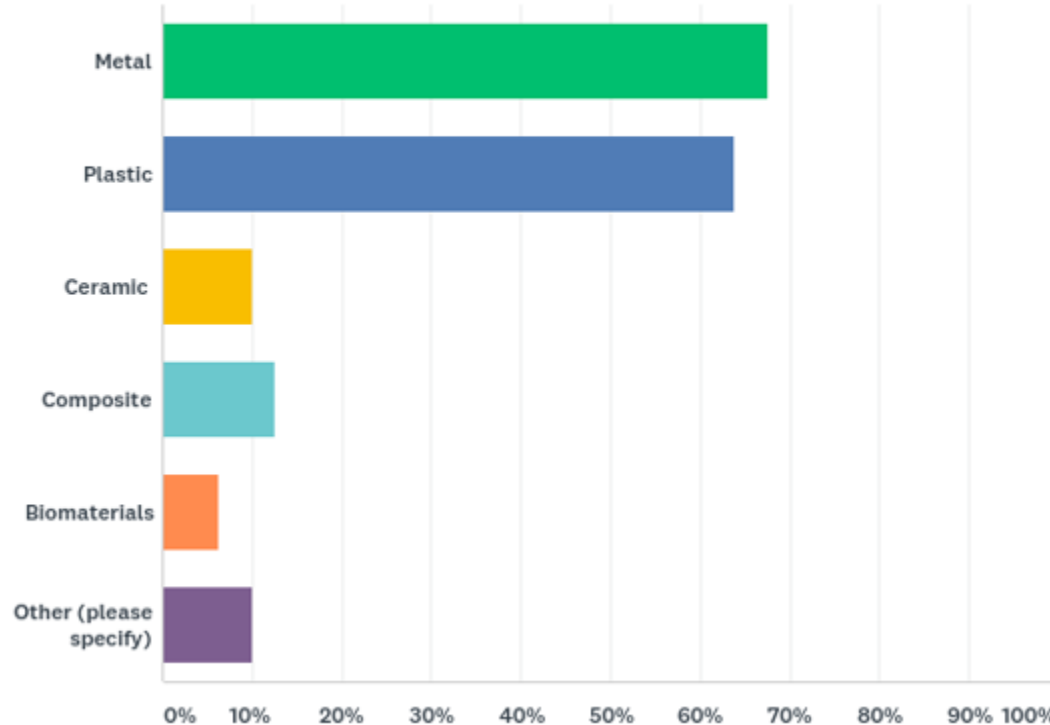
If you want more information please contact:

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Preliminary Results – How fast industry is changing

Which AM material(s) do you mainly use ?



Implementation of the AM Qualification System

Implement an International Additive Manufacturing Qualification System!

AM

Create an International Network of AM Training Centres!





ISO/TC 261 – Additive Manufacturing

- Joint Group 74 – Personnel Qualifications





Skills Addressing in AM Involving Industry

- EWF's work on the development of new Qualifications in Metal AM is in line with the standardisation activities currently in place by ISO/ASTM
- The conclusions of this work are being referred back to ISO/TC 261/JG 74 Personnel Qualification, where EWF is the convenor



International
Organization for
Standardization





ISO/TC 261/JG 74 – Recent Developments

5 Preliminary Work Item (PWI):

AM Qualification Principles – Qualification of Operators for metallic parts production

- ISO/ASTM PWI 52926-1, Additive manufacturing – Qualification principles – Part 1: Qualification of machine operators for metallic parts production;
- ISO/ASTM PWI 52926-2, Additive manufacturing – Qualification principles – Part 2: Qualification of machine operators for metallic parts production for **PBF-LB**;
- ISO/ASTM PWI 52926-3, Additive manufacturing – Qualification principles – Part 3: Qualification of machine operators for metallic parts production for **PBF-EB**;
- ISO/ASTM PWI 52926-4, Additive manufacturing – Qualification principles – Part 4: Qualification of machine operators for metallic parts production for **DED-LB**;
- ISO/ASTM PWI 52926-5, Additive manufacturing – Qualification principles – Part 5: Qualification of machine operators for metallic parts production for **DED-Arc**;



ISO/TC 261/JG 74 – Future Work

This Year:

Approved in September (ISO/TC 261) the registration of two PWIs:

- ISO/ASTM PWI 52935 “Additive manufacturing — Qualification principles – Qualification of coordinators for metallic parts production”
- ISO/ASTM PWI 52937 “Additive manufacturing — Qualification principles – Qualification of designers for metallic parts production”



ISO/TC 261/JWG 5 (now JWG 10) – Recent Developments

- **ISO/ASTM DIS 52942 : Additive manufacturing — Qualification principles — Qualifying machine operators of metal powder bed fusion machines and equipment used in aerospace applications**



Aerospace AM Qualifications

- PRI administers the Nadcap critical process audit program and through the eQualified program also delivers personnel qualifications for aerospace manufacturing personnel
- EWF and PRI are collaborating in several areas including exploring the potential for aerospace specific AM modules and assessments



PERFORMANCE REVIEW INSTITUTE



EWF-PRI Collaboration on Personnel Qualifications for AM

Develop a joint Training Module (EWF+PRI) that covers the parts that are missing (if any)



PRI Exam

New Trainee:

EWF
Guideline



Joint
Training
Module (if
needed)

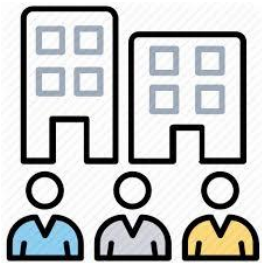


EWF Exam
+ PRI
Exam



EWF Diploma +
PRI Diploma

AM Surveys



- Directed to Industry – Skills Needs Identification

<https://www.surveymonkey.com/r/SAM-Industry>



- Directed to R&T&D – Technology Trends and Skills Needs

<https://www.surveymonkey.com/r/AMTechnologyTrends>





EWF

Thank You

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www.ewf.be