

ADDITIVEMINDS®
Industrial 3D printing excellence



Your Transformation to AM Success
We Enable Your People





Additive Minds Award Winning Team of International AM Experts



Thought Leadership That Puts You First

Organizations around the world are under increasing pressure to innovate faster and better than competitors. Even so, they are sometimes slow to adopt additive manufacturing (AM) because the necessary expertise is hard to find.

Additive Minds solves these problems and enables your organization to enjoy the full potential of AM by giving you all the know-how you need to outperform competitors. Our mission is to transfer the necessary expertise wherever you need it, whenever you need it. Fast.

300 successful
customer
projects in
25 countries

27 trainings
and **17**
consulting
offerings

100 AM
experts:
largest team
worldwide



Thomas Weitlaner,
Director Additive Minds &
Business Development at EOS

We prepare organizations to push innovation beyond existing boundaries through additive manufacturing. More than 300 successful customer projects prove that Additive Minds can bring your organization to the next level.

7 global
Technical and
Innovation
Centers

#1
consultancy in
AM market

Your Key Challenges



How do I start?

- Which application brings value in AM?
- What are the possibilities and restrictions of AM?
- What's the impact of AM to my organization?

Target group:

Executives, Engineers, Project Managers



How do I start production?

- What is the right facility?
- What equipment do I need?
- How to educate employees?
- How to optimize production?

Target group:

Production Engineers, Operators, Quality Engineers



How do I win in AM?

- What drives efficiency?
- What drives cost?
- How to optimize production?

Target group:

Production Engineers, Executives



How does my future application look like?

- How do I achieve radical innovations?
- What are the design guidelines?
- How to improve processes?
- Is AM financially feasible?
- How to leverage the full AM potential?

Target group:

Design Engineers, Process Engineers, Product Engineers



How to go big?

- What about validation?
- How to transfer processes?
- How do I get more efficient?
- How can I scale my production?

Target group:

Quality Engineers, Process Engineers, Executives

Ramp Up Your Production

page 24-32



Develop Your Application

page 14-23



Find Your Application

page 8-13



We Have the Answers!

Establish Your Digital Manufacturing Facility

page 42-56



Certify and Scale Your Production

page 34-41



Your Key Benefits

- Enable your people faster and better to become the next industry champions
- Face lack of competence in additive manufacturing in your existing organization
- Gain competitive advantage through additive manufacturing
- Accept economical pressure as a challenge for faster innovation

Additive Minds Portfolio



For dates and pricing
please contact us for
your individual quote.

amc@eos.info

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Certify and Scale Your Production



Establish Your Digital Manufacturing Facility



Standardized knowledge transfer in a
short time period, page 10

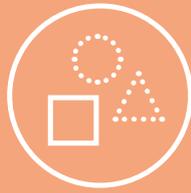
Industrialized project support on
your specific challenges, page 11

Start quickly and save time
entering AM production, page 58

Enable your engineers with extensive
hands-on educational programs, page 64

Build your AM technology hub
with the support of EOS know-
how and expertise, page 66

Jointly develop your digital factory to
increase your production efficiency,
page 47



Daimler Buses – CSP 3DD

Case Study

As part of the Daimler Buses division, EvoBus GmbH is Europe's largest omnibus manufacturer and among the leaders worldwide.

Project

Comprehensive consulting on efficiently entering the world of additive manufacturing with the aim of establishing a sustainable spare parts management system.

Starting Point

CSP 3DD – Daimler Buses, a subsidiary of the Daimler Group, is among the leading manufacturers in the omnibus segment worldwide. In order to continue expanding its pioneering role in times of increasing competitive pressure, CSP 3DD – Daimler Buses is pursuing two strategic aims: A sustainable increase in profitability and an enhanced capacity to innovate.

Consulting Services by Additive Minds

- Part screening & selection
- Agile design development

Results

- Identification of 2,600 suitable parts from more than 300,000 active spare parts
- In the first project phase, 35 metal and polymer parts were manufactured
- Development of flame-retardant polymer materials in order to comply with the strict regulations in the automotive industry
- Reproduction through special process parameters of typical structured surface of interior parts made with injection molding
- After only one year, the first parts were manufactured in July 2017, faster than expected



Project workshop with Ralf Anderhofstadt (CSP 3DD – Daimler Buses) and Additive Minds



Re-engineered spare part for Daimler Buses

Find Your Application EvoBus



Find Your Application

Training

Innovation With 3D Printing

Your fast-track to understand additive manufacturing, its possibilities and limitations.

Consulting

Part Screening & Selection

Know which parts of your product portfolio can be manufactured additively and create additional value for your business.

Business Case Development

Detailed analysis of all processes that are required for production of selected parts. In the end, customers get a business case and a basis for production planning in the form of total machine hours, value streams and costs.

Dynamic Strategy Development

Understand the impact of additive manufacturing on your business and extract your strategy by simulating customized market scenarios.



Innovation With 3D Printing

Your fast-track to understand additive manufacturing (AM), its possibilities and limitations.

Objectives

- Identify and understand the key benefits of AM
- Become the AM thought leader within your company and inspire others
- Discover how to optimize for the AM production process by learning from best-in-class business cases
- Unleash your creativity and find innovative AM applications
- Analyze your value chain and see how AM can positively influence it
- Know how to screen and select parts from your portfolio

Content

Information

Duration:	1–3 days
Training level:	beginners and advanced
Seminar size:	maximum of 10 participants
Venue:	at EOS HQ or at your site

Part 1 Introduction to Additive Manufacturing

- Experiencing 3D printing
- Getting to know the different materials, systems and technologies

Part 2 Development & Production With AM

- Freedom of design and production
- Understanding the advantages and potentials of AM
- Discussing case examples taken from industry

Part 3 Analyzing the Value Chain

- The impact of AM on the participants' industries, companies and competitors

Part 4 Fundamentals of the Production Process

- Detailed consideration of the process chain in AM
- How technology works

Part 5 Design for Additive Manufacturing

- Introduction to the design rules for AM
- Design Thinking method

Part 6 Component Selection

- Introduction to the methodology of component selection
- Unit cost calculation
- Assessing the potential
- Technology trends and developments

Part 7 Technological Implementation Roadmap

- Production planning from the idea through to manufacturing
- Organization and team set-up
- Employee training
- Change management
- Technology development



Part Screening and Selection

Know which parts of your product portfolio can be manufactured additively and create additional value for your business.

Objectives

Helping customers to find the right AM application by:

- Providing methodology for part screening and selection
- Gathering know-how for prioritization and categorization of parts
- Identifying the AM benefit for customer parts and business
- Compiling the results on an AM part scorecard
- Rating selected parts by technical and economic objectives
- Developing customer AM roadmap

Modules

Module 1

Introduction to Additive Manufacturing

- Main influencing factors
- Possibilities and challenges of additive manufacturing

Module 2

Methodology of Part Selection

- Introduction to the methodology of part selection
- Unit cost calculation
- Technology outlook

Module 3

Analyzing the Value Chain

- Determining the specific customer focus
- Deriving the added value

Module 4

Part Selection

- Joint part screening
- Assessing and classifying application fields in the EcoTec matrix

Module 5

Evaluating Selected Parts

- Detailed consideration of the value chain for the application fields selected

Module 6

Principles of Design for Additive Manufacturing

- Basic principles of converting conventional engineering designs for additive manufacturing

Module 7

Summary and Outlook

- Summary of workshop
- Definition of next steps



Great tool and methodology, which enabled us to select applications out of our portfolio in a structured and efficient way.



Business Case Development

Objectives

Detailed analysis of all processes that are required for production of selected parts. In the end, customer gets a business case and a basis for production planning in the form of total machine hours, value streams and costs.

3-step approach to analyzing selected parts:

- Comparison of different production scenarios
- Planning criteria for serial AM part production
- Business case for selected applications
- **Visualization of all processes needed for part production in the form of value streams, total production time and costs.**

Modules

Module 1

AM Data Preparation

- Data preparation and orientation for specific AM build jobs

Module 2

Evaluation of Specific Build Scenarios

- Evaluation of different build scenarios on selected AM machines (single-part/batch/assembly)

Module 3

Production Setups

- Configuration and selection of production setups and sensitivity analysis

Module 4

Business Case Analysis

- Overall value analysis
- ROI calculation



Dynamic Strategy Development

Understand the impact of additive manufacturing on your business and extract your strategy by simulating customized market scenarios.

Objectives

Helping customers to understand the implementation of AM arising from a changing technological environment.

- Understand the disruptive potential of additive manufacturing on your business
- Develop a base for thorough strategic decision-making
- Stay ahead of your competition by focusing on future market developments
- Differentiate yourself by conceptualizing innovative business models

Modules

Module 1

Impact of Additive Manufacturing

- Product innovation vs. supply chain improvement

Module 2

Disruption Case Study

- Experience the disruptive potential of AM

Module 3

Strategic War Game

- Disrupt your own businesses' value chain based on a customized war game

Module 4

Extraction of Key Learnings

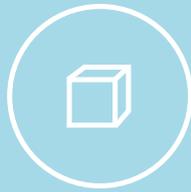
- Extract and prioritize your key strategic elements

Module 5

Strategy Implementation Report

- Revised outcome of the war game with customized recommendations for your AM journey





Linde

Case Study

The Linde Group is a world leading supplier of industrial, process and speciality gases and is one of the most profitable engineering companies.

Project

Linde faces a strong competitive environment and conventional manufacturing methods are maxed out in terms of performance and cost structures along the value chain.

Starting Point

Linde needs to build up design and manufacturing competencies for industrial 3D printing in short time. And they need to deliver quick results and present a proof of concept. Furthermore, the newly acquired know-how has to be anchored permanently in the Linde organization.

Consulting Services by Additive Minds

- AM Part Screening and Selection Workshop & Methodology Transfer
- Proof of concept: significant optimization of an existing product (gas burner)
- Linde AM Development Center

Results

Significant expansion of the own competitive position:

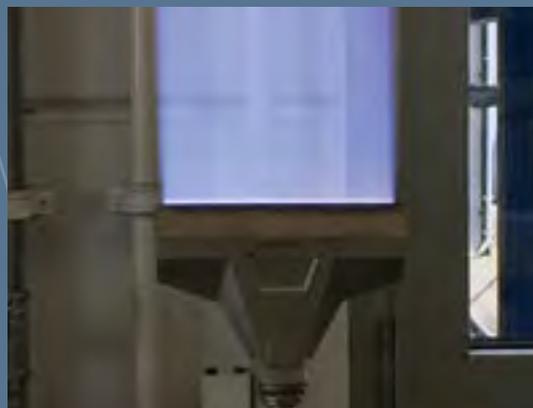
- Better performance of the Hydropox burner
- Ability for mass customization
- Total cost of ownership
- Secured IP

Competitive Strategy

- Comprehensive build-up of know-how in the fields of additive manufacturing and design within Linde
- Internal competence to spread additive manufacturing to other business units and products



Re-designed Hydropox burner: manufactured in one piece



Gas burner with homogeneous flame front, short build time, and compact appealing design, low effort in post-processing and reduction of components from 15 to 1

Develop Your Application Linde

Develop Your Application

Training

Design for AM

Learn how to design for additive manufacturing in a hands-on workshop for metal or polymer.

Topology Optimization

Learn how to design combining topology optimization for additive manufacturing in a hands-on workshop.

Parameter Editing

Unleash the full potential of additive manufacturing by tailoring and customizing exposure strategies to make great products even better.

Lattice Structures

Using lattice structures to generate the next generation of medical implants, bionic-inspired lightweight components, etc.

Advanced Orientation and Support

Learn how to master the challenge of orientation and support for best part quality and process stability.

Consulting

Agile Application Development

Get support from AM design experts to leverage the full potential of AM's "freedom of design" with the goal to redesign applications or develop radical new parts.

Applied Process Optimization

Transfer parameters or create your own parameter sets for metal materials, to meet your specific part or material requirements.

Application Sprint

Develop innovative and radical applications by leveraging on the full potential of AM within a short time period.



Design for Additive Manufacturing

Learn how to design for additive manufacturing in a hands-on workshop for metal or polymer.

Objectives

- Knowing the possibilities and limitations of AM
- Learn how to successfully design, optimize, build and apply AM
- Discover the AM Design Thinking methodology
- Experience AM process chain with a hands-on approach
- Understanding the design workflow
- Learn technical and design guidelines
- Learn innovative designs like bionics and lightweight
- Using AM design on practical exercises

Content

Information

Duration:	2 days
Training level:	beginners and advanced
Seminar size:	maximum of 8 participants
Venue:	at EOS HQ

Part 1 Possibilities and Limitations of AM

- Functional integration
- Mass customization
- Complexity for free

Part 2 Workflow

- Design and data processing
- Job preparation and building
- Post-processing

Part 3 Material, System and Process Fundamentals

- Material properties
- System set-up
- Thermal process
- Layer building
- Shrinkage and distortion
- Laser and powder interaction

Part 4 Design Guidelines

- Wall thicknesses
- Gap dimensions
- Removability of powder

Part 5 Mindset AM Design

- Methodology
- Way of thinking
- Case examples

Part 6 Part Optimization

- Parts and job analysis
- Redesign potentials through bionic and topology optimization

Part 7 Best Practices and Insights Into the Application

- Optimized data handling
- Part quality
- Cost reduction by design



Topology Optimization

Learn how to design combining topology optimization for additive manufacturing in a hands-on workshop.

Objectives

- Knowing the possibilities and limitations of AM
- Learn innovative design approaches and processes applicable to AM technology
- Learn how to apply simulation technology in order to design lightweight structures
- Learn the background and theory of design optimization
- Understand the design workflow
- Learn and apply organic design approaches to produce bionic like structures
- Learn technical and design guidelines
- Using AM design on practical exercises

Content

Part 1

Awareness Session

- Design challenges and opportunities for AM
- Optimization-driven design and use cases

Part 2

Introduction to Stress Analysis

- Theoretical background
- Setting up a linear static stress analysis and practical exercises

Part 3

Introduction to Optimization

- Theoretical background of computational optimization
- Optimization types
- Application of topology

Part 4

Topology Optimization for AM 1/2

- Common strategies
- Generation of concepts
- Practical exercises

Part 5

Topology Optimization for AM 2/2

- Evaluation of concepts
- Orientation definition and manufacturing process design

Part 6

Introduction to Topology Re-engineering

- Organic design
- Approach to organic design
- Software
- Practical exercises optimization

Part 7

Practical Session for Organic Design

- Apply concepts learned regarding organic design approaches

Part 8

Open Lab and Conclusion

- Open discussion
- Q/A session

Information

Duration:	2 days
Training level:	advanced
Seminar size:	maximum of 8 participants
Venue:	at EOS HQ



Parameter Editing

Unleash the full potential of additive manufacturing by tailoring and customizing exposure strategies to make great products even better.

Objectives

- Enabling use of the parameter editor and understanding the cause and effects of parameter modifications
- Helping to develop individual problem-solving strategies for challenging objects

Content

Part 1 Getting Started With Parameter Editing

- Enabling use of parameter editing functionalities, optimized to customer's application goals (surface roughness/strength of material/stress management/...)

Part 2 Overcoming Challenging Objects With Parameter Editing

- Helping customers to help themselves by utilizing parameter editing functionalities to develop individual problem-solving strategies for challenging objects

Information

Duration:	2 days
Training level:	beginners and advanced
Seminar size:	maximum of 4 participants
Venue:	at EOS HQ or at your site



Lattice Structures

Using lattice structures to generate the next generation of medical implants, bionic-inspired lightweight components, etc.

Objectives

- Analyzing the customer's application goal
- Definition of the optimization potentials
- Selection of critical parameters for test scope
- Definition of test scope based on several iterations and execution of test
- Documentation of results and follow-up

Content

Part 1

Possibilities and Limitations of Lattice Structures

- Lattice design
- Cleaning methods
- Software packages

Part 2

Analysis of Customer's Application Goal

- Understand specific needs
- Highlight limitations of standard parameters

Part 3

Highlight Lattice Exposure Strategies

- Parameter modification cause and effect
- Limitations and optimization opportunities
- Manufacturability
- Laser-driven design

Part 4

Definition of Optimization Potential Related to Selected Application Levers

- Build rate
- Mechanical properties
- Surface roughness

Part 5

Selection of Critical Parameters for Test Scope

- Lattice design
- Exposure strategies
- Cleanability
- Mechanical properties
- Manufacturability

Part 6

Definition of Test Scope Based on Several Iterations and Execution of Test

- Lattice porosity
- Lattice roughness
- Manufacturability
- Mechanical properties

Information

Duration:	2–4 days
Training level:	advanced, EOS metal system installed, Parameter Editing Training completed
Seminar size:	maximum of 5 participants
Venue:	at EOS HQ or at your site



Advanced Orientation and Support

Learn how to master the challenge of orientation and support for best part quality and process stability.

Objectives

- Know different support types in Magics
- Learn which support to use for which purpose
- Learn how to avoid job crashes
- Use a workflow to approach complicated parts
- Practice on lots of cases
- Build a job over night, do hands-on post-processing and evaluate it

Content

Information

- Duration:** 3 days
- Training level:** beginners and advanced with basic data preparation experience with Magics
- Seminar size:** max. 4 participants
- Venue:** at EOS or at your site*

**(if an EOS M machine is available)*

Part 1

Theoretical Background

- Different purposes of support

Part 2

Find the Best Orientation

- For least time and powder consumption
- For process stability
- For surface quality
- For post-processing

Part 3

Preparation for Support

- Data fixing in Magics
- Practical part

Part 4

Basic Support Structures

- Cones
- Volume support
- Base rounder
- Editing surfaces
- 2D edit
- Angled and scaled support

Part 5

Advanced Support Structures

- Block support settings
- Hybrid support
- Prop support
- Two block supports
- CAD support

Part 6

Workflow

- Approaching complicated parts
- Choosing the right support

Part 7

Troubleshooting

- Detecting common mistakes
- Tips and tricks

Part 8

Practical Part

- Job preparation
- Building over night
- Removing support
- Evaluating support



Agile Application Development

Get support from AM design experts to leverage the full potential of AM's "freedom of design" with the goal to redesign applications or develop radical new parts.

Objectives

- Implement the full design potential of AM into your application
- Leverage AM value chain optimizations by considering the whole supply chain within your design
- Go beyond conventional design methodologies by using machine parameters as a design element
- Get full support with your specific application development

Modules

<p>Module 1 Laser Driven Design</p> <ul style="list-style-type: none"> → Achieve highest possible resolution → Develop new part properties → Reduce part weight and material consumption 	<p>Module 3 Topology Optimization</p> <ul style="list-style-type: none"> → Rethink your system → Experience functional-driven design → Apply AM design rules for the radical new design concept 	<p>Module 6 Textures</p> <ul style="list-style-type: none"> → Apply any texturing to complex surfaces → Increase visual and haptical part performance → Reduce manufacturing complexity
<p>Module 2 Agile Application Development</p> <ul style="list-style-type: none"> → Experience a fast and innovative methodology → Think additively 	<p>Module 4 Biomimicry</p> <ul style="list-style-type: none"> → Apply problem solving inspirations from nature → Transform ideas to an applicable design approach 	<p>Module 7 Functional Integration</p> <ul style="list-style-type: none"> → Observe micro and macro part environment and integrate parts → Increase part performance → Reduce manufacturing complexity
	<p>Module 5 Lattice Structures</p> <ul style="list-style-type: none"> → Apply different lattice structures to any part → Reduce part weight and material consumption 	



Applied Process Optimization

Develop your own parameter sets for metal materials to meet your specific production requirements.

Objectives

Allowing the customer to apply parameter editing strategies:

- Understand how to transfer parameter sets between different machine types
- Learn strategies to create new parameter sets for existing materials or new applications
- Understand the cause and effects of parameter modification
- Create robust processes
- Qualify own materials

Modules

Module 1 Definition of Development Targets

- Clarifies targets and scope of parameter development
- Initial planning of complete project

Module 2 Methodology of Parameter Transfer

- Shows how to transfer processes between different machine types

Module 3 Methodology of Parameter Development

- Explains how to create new parameter set to meet customer-specific targets like increased productivity or special surface properties, mechanical properties, etc.

Module 4 Methodology of Material Development

- Teaches tips and tricks for creating processes for new materials

Module 5 Practical Examples and Test Jobs

- Applies know-how to diverse test jobs to show cause and effects of different parameter modifications

Module 6 Definition of Development Roadmap

- Contains the planning of the whole development cycle including test jobs
- Evaluation procedures and validation processes

Module 7 Qualifying for Serial Production

- Shows approach of how to qualify optimized parameters or own materials
- Re-qualification scope due to process optimization

Module 8 Quality Correlation Matrix

- Interdependencies of parameter variation and effects on different features

Module 9 Lean Testing Methodologies

- Approach to optimize testing effort



Now I have a deep understanding of the parameters and how I can apply them to my process.



Application Sprint

Develop innovative and radical applications by leveraging the full potential of AM within a short time period.

Objectives

Supporting customers to develop radical AM applications by:

- Providing a unique method to completely rethink your application approach
- Developing an innovative customer- and user-centric application in a very short time
- Transferring know-how of the AM technology and identifying the AM benefit for applications and business
- Working iteratively to get a prototype and many iterations within a short time
- Developing an AM roadmap to become successful with the new application concept

Modules

Module 1

Understand Application "Problem Space"

- Clarify relevant requirements
- Involve different stakeholders to understand real needs and gain insights

Module 2

Sketching the Idea

- Introduction to idea sketching methodologies
- Develop first concept of new design

Module 3

Decide

- Determining evaluation criteria
- Evaluate various concepts
- Final decision of concept

Module 4

Prototype

- Capture specific design requirements
- Build a prototype

Module 5

Feedback

- Interview stakeholders
- Analysis of requirement fulfillment
- Evaluate feedback

Module 6

Summary and Outlook

- Summary of workshop
- Definition of next steps or iterate parts of application sprint if required





ArianeGroup

Case Study

ArianeGroup formerly known as Airbus Safran Launchers is responsible for the development and production of the new European launch vehicle, Ariane 6.

Project

Production of a propulsion part for rocket engines with as few components as possible and lower unit costs. The challenge was to qualify a mission critical part for rocket launches.

Starting point

The injection head is one of the core elements of the propulsion part. Its traditional design consists of 248 components, produced and assembled in various manufacturing steps: casting, brazing, welding, and drilling. It is a time-consuming and complex process.

The ArianeGroup achieved a new design that integrates 122 nozzles into 1 part. The challenge was to calculate the optimal production setup from the right EOS system and factory layout to part orientation and post-processing.

Consulting Services by Additive Minds

Business Case Development

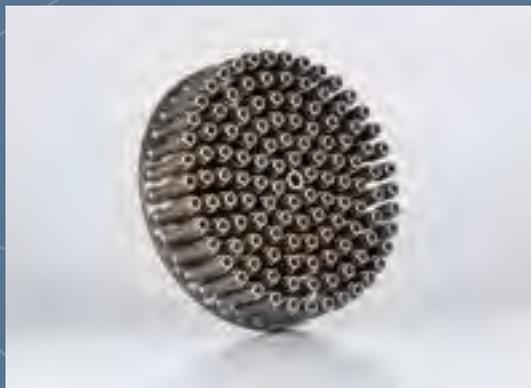
- Risk analysis
- Cost-per-part optimization
- Scenario analysis and total cost calculation
- Production layout planning & visualization
- Production flow planning & optimization

Results

- Cost benefit of more than 60 %
- Very economic AM production setup taking into account multiple variables
- Higher quality in comparison to casting and welding
- Lead time reduction of ~ 80 %
- Insourcing of production



Ariane 6 will probably be the first rocket launching with the new injection head built on the EOS M 400-4



New design of injection head, built as one part

Ramp Up Your Production ArianeGroup

Ramp up Your Production

Training

Advanced User Training Level 1

Cross check your first AM experiences with our experts for a deeper understanding of the system, material and process.

Advanced User Training Level 2

Expand your skills to build successful AM parts by choosing the modules you are most interested in.

EOSTATE MeltPool Monitoring

Implement EOSTATE MeltPool monitoring in your quality assurance chain to generate true value-add.

EOSTATE Exposure OT (Optical Tomography)

Implement optical tomography in your quality assurance chain to generate true added value.

Consulting

Manufacturing Facility Planning

Define a facility layout customized to your specific process chain and production site.

EOSTATE Exposure OT and MeltPool Process Phenomena

Implementing process monitoring tools in existing QA/QC frameworks and on providing a deep understanding of the DMLS process and its possible effects on defects.

Subject Specific Modules

Reference Point Calibration

Enable customer to carry out absolute placement of parts, using the EOS reference point calibration functionality in PSW/EOSPRINT.

EOS Technical Training

New machine operators receive intense training on the safe and efficient operation of EOS polymer or metal systems.



Advanced User Training Level 1

Cross check your first AM experiences with our experts for a deeper understanding of the system, material and process.

Objectives

- Deepen your skills of machine setup
- Evaluate the cause-effect relationship of build jobs
- Gain insight application knowledge through our AM experts
- Broaden your knowledge of orientation, part placement and support
- Review your AM build experiences so far and get practical tips and techniques
- Experience a hands-on workshop with 1 build job over night

Content

Information

- Duration:** 1.5 days
- Training level:** beginners and advanced, EOS metal system has been installed 4-6 weeks before, basic training completed
- Seminar size:** maximum of 4 participants
- Venue:** at your site

Part 1

Advanced System Handling

- Repetition of machine setup
- Efficient handling of EOS laser sintering systems and their peripheral components
- Improve dimensional-accuracy with fine-tuning
- Powder handling
- Only metal: understand the dosing factor and how to adjust it properly

Part 2

Advanced Data Preparation

- Match orientation with technical requirements
- Efficient and productive part placement
- Choose the right parameters / best fitting for part demands
- Advanced handling of EOSPRINT processing software
- Only metal: broaden your skills of support structure generation e.g. cones, volume, angled support

Part 3

Basic Trouble Shooting

- Learn how to find underlying causes for application problems
- Build a fine-tuning or customer job
- Measurement topics – dependency on process and data preparation
- Time for questions on parts you have built so far



Advanced User Training Level 2

Expand your skills to build successful AM parts by choosing the modules you are most interested in.

Objectives

- Use your system more efficiently
- Get quickly your newest part up and running
- Discuss your AM experience with our AM experts and get direct feedback
- Learn the most common mistakes and techniques how to avoid them
- Experience a hands-on workshop

Content

Part 1

Evaluation of Existing Parts

- Bring your existing part and discuss the success and improvements with our AM experts
- Focus on machine and data preparation (excl. parameter)

Part 2

Troubleshooting

- Learn about the most common mistakes in machine handling and how to avoid them
- Get help to build challenging parts

Part 3

Support and Orientation for Customer Specific Applications

- Understand advanced data preparation in Magics
- Learn how to achieve better results for your requirements
- Enable easier support removal
- Reduce powder consumption

Part 4

Deep Dive EOS Software

- Upgrade from EOSPRINT 1.0 to EOSPRINT 2.0, understand the new features
- Be able to use EOSPRINT 2.0 for your application
- Understand EOSTATE

Part 5

Post-processing for AM

- Learn about the possibilities of post-processing specific to AM
- Understand the implications it has on building parts
- Discuss options for post-processing chains for your application

Information

Duration:	depending on the chosen modules
Training level:	advanced, EOS metal system has been installed
Seminar size:	maximum of 4 participants
Venue:	at EOS HQ or at your site



EOSTATE MeltPool Monitoring

Implement EOSTATE MeltPool monitoring in your quality assurance chain to generate true added value.

Objectives

- Knowing what EOSTATE MeltPool monitoring is and how it works
- Introduction to the physics of the melt pool, signal theory and algorithms
- Understanding the complexity of correlations between part quality, process and MeltPool data
- Awareness of evaluation job geometries, design of experiments and possible pitfalls
- Strengthening basic knowledge about analysis and correlation. Know-how, including destructive and non-destructive test methods

Content

Part 1

First Steps

- Software setup and calibration
- Introduction to EOSTATE MeltPool online software

Part 2

Analysis Toolbox

Expert Training Day 1

- Introduction, revision
- Algorithms, theory
- First steps
- General parameters and settings

Part 3

Analysis Toolbox

Expert Training Day 2

- Visualizations
- Analysis parameters
- Indications
- 3D visualization
- Extra features

Information

Duration:	2–3 days
Training level:	advanced, EOS metal system installed, Parameter Editing Training completed
Seminar size:	maximum of 4 participants
Venue:	at EOS HQ or at your site



EOSTATE Exposure OT

Implement optical tomography in your quality assurance chain to generate true added value.

Objectives

- Knowing what EOSTATE Exposure OT is and how it works
- Introduction to the physics of the process, detection mechanisms and analysis methods
- Holistic understanding of usage of the OT client
- Awareness of evaluation job geometries, design of experiments and possible pitfalls
- Strengthening basic knowledge of analysis and correlation. Know-how, including introduction to common destructive and non-destructive test methods

Content

Part 1

First Steps

- Software setup and calibration
- Introduction to EOSTATE Exposure OT

Part 2

Analysis Toolbox

Expert Training Day 1

- Introduction, revision
- Process basics, measurement setup
- Algorithms

Part 3

Analysis Toolbox

Expert Training Day 2

- Visualizations
- Analysis parameters
- Indications
- 3D visualization
- Extra features

Information

Duration:	2–3 days
Training level:	advanced, EOS metal system installed, Parameter Editing Training completed
Seminar size:	maximum of 4 participants
Venue:	at EOS HQ or at your site



Manufacturing Facility Planning

Define a manufacturing facility customized to a specific process chain and production site.

Objectives

Define a facility by:

- 2D and 3D (VR) facility layout
- Project coordination by an Additive Minds expert
- Customized AM system-related production setup
- Facility layout of AM production and AM-related premises
- Health and safety risk assessment

Modules

Module 1

Factory Planning

- 2D, 3D (VR) layout planning
- Project coordination
- Argon, nitrogen setup
- Radiator setup
- Fire protection
- Transport
- Escape route

Module 2

Facility Planning

- Doors, room size, etc.
- Separation of polymer and metal area
- Contamination prevention
- Flooring
- Disposal and exhaust

Module 3

AM-related Facilities

- Microscopy
- Metallography
- Office space
- Powder warehouse
- Powder handling
- Heat treatment

Module 4

Auxiliary Services

- Air-conditioning
- Energy supply
- Compressed air
- Network technology

Module 5

Health and Safety

- Risk assessment
- Operating instructions
- Safety at work



EOSTATE Exposure OT and MeltPool Process Phenomena

Implementing process monitoring tools in existing QA/QC frameworks and providing a deep understanding of the DMLS process and its possible effects on defects.

Objectives

- Awareness of critical process variables and their influence on part quality
- Deep dive into process physics, measurement devices and analysis algorithms
- Insight into correlation methodologies and approaches for different industry demands
- Advanced DOE setups
- Alternative analysis and visualization strategies

Modules

Module 1

Revision of MPM/OT hardware/software setup

Module 2

Process Variables and their influences

Module 3

Correlation Methodologies

Module 4

Deep Dive Process Phenomena

Module 5

NDT/DT Method, Norms and Standards

Module 6

Application Specific Process Optimization



Process monitoring will change the game of quality assurance, reducing the overall cost and opening new potentials for challenging parts in highly regulated industries.



Reference Point Calibration

Enable customer to carry out absolute placement of parts, using the EOS reference point calibration functionality in PSW/EOSPRINT.

Objectives

- Introduction into reference point calibration functionality including practical exercises
- Overview of best practice cases
- Analysis of customer's production setup
 - + infrastructure (machine equipment, measurement devices)
 - + resources, workflows
 - + status of data preparation workflows (AM related + neighbour technologies used at customer)
- Analysis of concrete customer application case(s)
- Analysis of current know-how status in customer production organization
- Recommendation on how to integrate AM solution into existing production processes

We also offer machine trainings to all our metal and polymer systems.

EOS Technical Training

New machine operators receive intense training on the safe and efficient operation of EOS polymer or metal systems.

Objectives

- Work safety instructions
- Laser sintering process basics
- Data preparation
- Operation of machine and peripherals
- Daily system care
- Handling and refreshment of EOS laser sintering materials
- Check and adjustment of machine settings





Permedica Case Study

Founded in 1986 as a medical supplies distributor, today Permedica S.p.A. has become a leading provider of orthopaedic surgical products

Project

Fast-track development of a new hip cup system with a highly porous titanium structure to promote new bone formation and fast osseointegration. In this project, Additive Minds led the team from start to serial production with a special focus on quality as well as the production setup and the qualification process.

Starting Point

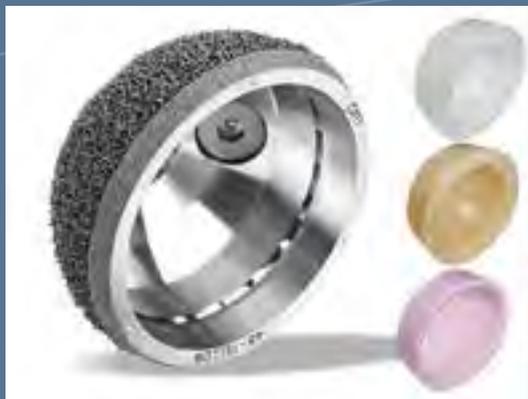
The Italian manufacturer of implantable medical devices wanted to enter additive manufacturing and build up know-how within the organization. The task was to develop a state of the art hip cup system and lead the company through validation of the equipment and the process. From start on, the project was intended in order to acquire know-how in industrial metal 3D printing.

Consulting Services by Additive Minds

- Business case development
- Design for AM
- Lattice structures consulting
- Applied process consulting
- 360° assessment
- Organizational qualification (OO)
- Performance qualification (PQ)

Results

- New technology know-how implemented in the company
- Fast validation of the equipment and the process
- Increased market share
- Successful transfer of knowledge to other implantable products (shoulder replacement and custom-made implants)



The Jump System Traser® cup with different inserts. The inner surface is post-processed by milling and polishing



Highly porous trabecular network characterized by fully interconnected irregular pores to promote fast bone ingrowth





Certify & Scale Your Production

Consulting

Operational Qualification Support (OQ)

Implementation and validation of robust processes according to legal requirements to ensure stable production.

Performance Qualification Support (PQ)

Detailed evidence that equipment and processes are working well within the defined ranges and specific parts under condition of serial production.

Additive Manufacturing Quality Program (AMQ)

The AMQ program prepares you to implement best-in-class practices for additive manufacturing on top of a previous installed quality management system to be prepared for high demand expectations.

Supplier Ramp-up

The Supplier Ramp-up Program offers a holistic approach for OEMs to select and ramp up their AM supplier using the extensive experience of Additive Minds.

Additive Minds Certified Trainer – Licensing Program

The Additive Minds Certified Trainer – Licensing Program allows you to offer best-in-class trainings in the field of additive manufacturing to your clients. Gain the necessary know-how within a short time period and get access to all needed material and our online platform.

360° Assessment

Analysis of the entire AM process chain from powder handling through part building, post-processing and quality testing. Not only does this 360° assessment optimize the elements of the process chain, but we also support benchmarking the entire chain with our best practice solutions.



Operational Qualification Support

Implementation and validation of robust processes according to legal requirements to ensure stable production.

Objectives

Giving the customer a shorter time to market in the qualification of the production through:

- Fixing the AM production process
- Preliminary PFMEA
- Preliminary work instructions and checklists
- Definition of critical process variables, including documentation and in-depth understanding of challenging strategies
- Comfort zone definition and quality control objectives

Modules

Module 1

Initial Assessment and Project Planning

- Analysis of situation at site
- Gap report
- Project definition and project planning

Module 2

Risk Management

- Validation master plan
- Risk evaluation
- Risk assessment and mitigations
- Creation of control plan

Module 3

Document Implementation

- Creation of documents
- Customizing of documents
- Implementation of mitigation actions

Module 4

Process Qualification

- Operational qualification (OQ) test
- Process capability analysis
- OQ test report

Module 5

Validation and Project Closure

- Validation master report
- Project closure



The profound level of the operational qualification consulting service is impressive and shows the advanced thinking of EOS. There is nothing comparable on the AM market.



Performance Qualification Support

Detailed evidence that equipment and processes are working well within the defined ranges and specific parts under condition of serial production.

Objectives

Giving the customer a shorter time to market in the qualification of his production through:

- Actual product and process parameters and procedures established in OQ
- Acceptability of the product
- Development of equivalent test coupons
- Assurance of process capability as established in OQ
- Process repeatability, long-term process stability

Modules

Module 1	Module 2	Module 3
Set up Production Run	Test Coupons, Strategy and SPC	Performance Qualification (PQ) Test
<ul style="list-style-type: none"> → Part orientation → Part location → Definition of minimum and maximum build jobs and production run 	<ul style="list-style-type: none"> → Development of test coupons → Development of test strategy → Development of SPC 	<ul style="list-style-type: none"> → PQ test plan → Execution of PQ test → PQ test report



EOS has met all my expectations. From installation to validation, EOS has held my hand every step of the way. I feel comfortable going to production with this equipment.



Additive Manufacturing Quality Program

The AMQ program prepares you to implement best-in-class practices for additive manufacturing on top of a previous installed quality management system to be prepared for high demand expectations.

Objectives

Supporting customers to certificate their additive manufacturing processes:

- Identify the matching norm
- Analyse the AM processes
- Identify gaps to the matching norm
- Compare to best practice solutions
- Create a plan of implementation



Modules

Possible types of certification

AMQ:	Industry norm ISO 9001 required
AMQ+ Aerospace:	ISO 9001 + industry norm ISO 9100 required
AMQ+ Medical:	ISO 9001 + industry norm SAE 13485 required
AMQ+ Automotive:	ISO 9001 + industry norm IATF 16949 required

Module 1

Planning of AMQ / AMQ+ Assessment

- Kick off meeting at customer site
- Decision on type of certification

Module 2

Execution AMQ / AMQ+ Assessment

- Assessment of customer's AM processes
- Evaluation of gaps between AM processes and norm

Module 3

Implementation of AMQ / AMQ+

- Identification of possibilities to close the gaps
- Creation of final report



The AMQ project helped us to set up a total quality management and business process system which contains the AMQ standards. My company will keep on moving to be an expert in industrial 3D printing.



Supplier Ramp-Up

The Supplier Ramp-up Program offers a holistic approach for OEMs to select and ramp up their AM supplier using the extensive experience of Additive Minds.

Objectives

- Get your individual "cookbook" to easily source for multiple suppliers and ensure a comparable level of quality and deliverables according to your functional specification and URS
- Get a head start once you decide to in-source your production, thanks to your holistic enablement
- Make use of EOS know-how in product development, process development and qualification / validation
- Increase your and your service providers success

Modules

Module 1	Module 2	Module 3
Initial Assessment <ul style="list-style-type: none"> → Identify the customer needs and know-how gaps through an thorough assessment → Initiate supplier URS document making use of AM specific knowledge 	Project Execution <ul style="list-style-type: none"> → Application development through re-design and process development → Generate the supplier cookbook which the supplier needs to fulfill 	Supplier Cookbook <ul style="list-style-type: none"> → Generate an AM application specification to minimize ambiguity → Generate quality control requirements → Generate a suggested process flow



Additive Minds Certified Trainer – Licensing Program

The Additive Minds Certified Trainer – Licensing Program, allows you to offer best-in-class trainings in the field of additive manufacturing to your clients. Gain the necessary know-how within a short time period and get access to all needed material and our online platform.

Objectives

- Offer best-in-class AM trainings from the market leader to your clients
- Become a certified "Additive Minds Certified Trainer"
- Ramp up your AM know-how with a defined and proven Train-the-Trainer process
- Gain access to state-of-the-art training material and get constant updates
- Use the Additive Minds visuals for marketing purposes

Modules

Module 1 Intro Into AM (Innovation With 3D Printing)

- Key benefit of AM
- Become a AM thought leader
- Optimize for AM production
- Unleash your creativity

Module 2 Design for AM (Metal/Polymer)

- Understanding the design workflow
- Learn technical and design guidelines
- Learn innovative designs like bionics and lightweight
- Using AM design on practical exercises

Module 3 Application Sprint

- Design thinking for AM
- Deep understanding for an AM design concept for the part
- Develop ideas for AM transformation
- Holistic design evaluation
- Specifications for future design

Module 4 Orientation and Support Structures

- Advanced lessons in generating and manipulating supports
- Understanding and editing support parameters
- Best practices for orienting a part

Module 5 Exposure Strategy

- Basic understanding exposure strategy principles
- Overview about the different exposure strategies and parameters
- Best practices to calculate energy input



360° Assessment

Analysis of the entire AM process chain from powder handling through part building, post-processing and quality testing. Not only does this 360° assessment optimize the elements of the process chain, but also we support benchmarking the entire chain with our best practice solutions.

Objectives

Helping customers to optimize their production

- Identify the production targets
- Understand the entire value stream
- Define KPIs
- Compare to best-practice solutions
- Identify potential for improvement
- Create a plan of implementation

Modules

Modules		
<p>Module 1 360° Assessment of the Entire Process Chain</p> <ul style="list-style-type: none"> → Kick off meeting at customer site including target definition → Definition of target-relevant key performance indicators (KPI) → Assessment of the customer's entire process chain 	<p>Module 2 Analysis of Strength and Weakness in Customer's Process Chain and Compare With Best Practice</p> <ul style="list-style-type: none"> → Evaluation of customer's defined KPIs → Comparison of entire process chain and KPIs → Identification of possibilities for improvement 	<p>Module 3 Define Key Improvement Actions and Decide With Team on Prioritization and Responsibilities</p> <ul style="list-style-type: none"> → Finalization of implementation plan, including timeline, prioritization and responsibilities with team → Initiation of quick wins together with team → Presentation of final report to management



The 360° improvement program increased my overall productivity and part quality, which results in customer enthusiasm and production cost reduction.





NextGenAM Case Study

NextGenAM is a project involving the partner Premium AEROTEC, Daimler, and EOS for developing series additive manufacturing. A pilot plant has been put into operation at Premium AEROTEC in Varel/Germany.

Project

Optimize layout planning of EOS machines in a green field with the aim to maximize number of parts per m² of the available floor space.

Starting Point

To satisfy its production demands Premium AEROTEC decided for 21 EOS M 400-4 machines and the EOS Shared Modules concept for higher utilization. The concept contributes to an automation of the whole process chain because work steps happen in parallel and ensure highest uptime of AM machines. The challenge is to organize as many machines in a way that the costs related to installations, daily operations, service and maintenance are minimal and operations can be conducted as efficient and

smoothly as possible. Keeping in mind the overall goal to reduce nonproductive time and as a consequence archive lowest cost-per-part. Apart from these, criteria like material flow, part flow, operator's movements, local health and safety requirements, other customer specific needs, etc. are also taken care of.

Consulting Services by Additive Minds

AM Layout Planning

- Value-stream mapping and analysis
- Area feasibility calculations
- Scenario assessment and decision
- Detailed 2D layout and 3D environment of the factory

Results

- Optimum output of EOS machines
- Quicker production ramp-up
- Best conditions for installations, service, maintenance and daily operations
- Maximum area utilization
- Reduced production cost and non-productive times

Optimal facility layout maximizes number of parts per m²



Establish Your Digital Manufacturing Facility NextGenAM

Establish Your Digital Manufacturing Facility

Training

EOSCONNECT Training

Learn how to use EOS IIoT dashboards for each persona for AM production optimization in terms of efficiency, cost and quality.

AM IIoT Training

Learn how to use EOS IIoT dashboards for each persona for AM production optimization in terms of efficiency, cost and quality.

AM Analytics Training

Learn how to use EOS analytics apps for AM production optimization in terms of efficiency, cost and quality. This is a deeper dive into the data and algorithms behind the IIoT dashboards.

Consulting

Digital AM Factory Transformation

AM Production Process Optimization

AM Production Layout Optimization

Factory Integrated AM Workflow

EOS Software Integration Consulting

IT & Software Integration Consulting

AM Digital Factory Optimization Consulting

IIoT Dashboard Optimization

Analytics Development Sprint

Smart Part Sprint



EOSCONNECT Training

Learn how to use EOSCONNECT and its interfaces to enable integration of EOS systems into your factory.

Objectives

- Train EOSCONNECT installers and users
- Understand how to use EOSCONNECT interfaces
- Understand how to integrate EOSCONNECT into your own IT and software infrastructure

Content

Part 1

EOSCONNECT Functionality

- Hardware and software architecture
- User interface
- EOSCONNECT Core
- EOSCONNECT Server
- Legacy systems

Part 2

EOSCONNECT Interfaces

- OPC UA
- Web API
- Machine park monitor

Part 3

Implementing EOSCONNECT in own IT and Software Infrastructure

- Trainee performs task to scope EOSCONNECT execution in own company
- Review execution plan

Duration: 2 days



AM IIoT Training

Learn how to use EOS IIoT dashboards for each persona for AM production optimization in terms of efficiency, cost and quality.

Objectives

- Use an IIoT platform to optimize AM based production
- Train IIoT installers, users and maintainers
- Understand how to integrate EOS IIoT into own hardware and software infrastructure

Content

Part 1

EOS IIoT Introduction

- Introduction to IIoT platform
- IIoT hardware and software architecture

Part 2

EOS IIoT Personas and Dashboards

- Study each persona
- Study dashboards per persona
- Study functionality per dashboard

Part 3

Implementing IIoT on own Infrastructure

- Trainee performs task to scope EOS IIoT execution in own company
- Review execution plan

Duration: 3 days



AM Analytics Training

Learn how to use EOS analytics apps for AM production optimization in terms of efficiency, cost and quality. This is a deeper dive into the data and algorithms behind the IIoT dashboards.

Objectives

- Use IIoT analytics apps to optimize AM based production
- Train analytics app installers, users and maintainers
- Understand how to integrate EOS analytics apps into own hardware and software infrastructure

Content

Part 1

EOS Analytics Apps

Introduction

- Introduction to analytics apps
- Analytics data sources, algorithms and outcomes

Part 2

EOS Analytics Apps

- Overall equipment effectiveness apps
- Condition based maintenance apps
- Cost optimization apps
- Quality optimization apps

Part 3

Implementing Own Analytics

- Trainee performs task to define problems to be solved or opportunities for improvement
- Trainee defines likely root causes and the sensors required to monitor symptoms of root cause
- Trainee determines the analytics tools required for algorithm development
- Trainee scopes new analytics execution in own company
- Review execution plan

Duration: 3 days



Digital AM Factory Transformation

Complete a full transformation package starting with a current status assessment followed by the development of a physical, digital and process plan for digital transformation.

Objectives

- Seek to define a digital AM manufacturing strategy and execution plan
- Need expertise and advice in AM, IIoT, and Industry 4.0

Modules

Module 1

Digital AM Factory Assessment

- Assess a factory in terms of digital readiness from a physical, digital and process point of view. Combine this with a targeted end state to define the gaps to be filled

Module 2

Physical AM Transformation

- Based on the current status and the desired end state, detail the changes that are required in equipment, sensors, control and other hardware

Module 3

Digital AM Transformation

- Based on the current status and the desired end state, detail the changes that are required in the IT, software, and platforms

Module 4

AM Process Transformation

- Based on the current status and the desired end state, detail the changes that are required in the workflows, maintenance, supply chain, and quality

Module 5

AM Change Plan

- Consolidate all findings into a single digital AM transformation plan

Duration: 6 days



AM Production Process Optimization

Analyze the production requirements and KPIs, create process concepts to execute these requirements, assess these concepts in terms of the KPIs to select the preferred process and optimize the preferred process.

Objectives

- Establish an AM production capability, beyond rapid prototyping
- Improve the economics or efficiency of an AM production facility
- Grow the AM production capacity (brown or green field)

Modules

Module 1

Production Requirements and KPIs

- Determine AM production requirements
- Capture factory KPIs
- Develop value stream mapping
- Perform production scenario analysis

Module 2

Develop Production Process Concepts

- Review production cost scenario comparisons as input to concept development
- Develop production process concepts
- Assess process flow feasibility per concept using process simulation tools

Module 3

Assess Production Process Concepts

- Assess production process concepts against KPIs

Module 4

Optimize Preferred Process Concept

- Decide on preferred production process concept
- Optimize preferred concept using process simulation tools

Duration: 3 days



AM Production Layout Optimization

Analyse the production requirements and KPIs, create layout concepts to execute these requirements, assess these concepts in terms of the KPIs to select the preferred layout and optimize the best layout.

Objectives

- Establish an AM production capability
- Improve the economics or efficiency of an AM production facility
- Grow the AM production capacity

Modules

Module 1

Production Requirements and KPIs

- Determine AM production requirements
- Capture factory KPIs
- Develop value stream mapping
- Perform production scenario analysis

Duration: 3 days

Module 2

Develop Layout Concepts

- Review production cost scenario comparisons as input to concept development
- Develop factory layout concepts
- Assess floor space feasibility per concept
- Develop 2D and 3D layouts per concept

Module 3

Assess Layout Concepts

- Assess concepts against KPIs

Module 4

Optimize Preferred Layout Concept

- Decide on preferred concept
- Optimize preferred concept and produce 2D and 3D layout views



Factory Integrated AM Workflow

Factory operators seek effectiveness and efficiency through operational integration. This can be achieved in three steps: EOS Software training, consulting to integrate EOS Software into the factory and consulting to optimize the integrated ecosystem.

Objectives

- The factory processes and interaction between them are complex, requiring tight integration
- Factory operators seek effectiveness and efficiency through operational integration
- Current management systems must be used to their full potential and automated as much as possible

Modules

Module 1

EOS Software Training

→ See separate package

Module 2

EOS Software Integration Consulting

→ See separate package

Module 3

IT & S/W Integration Consulting

→ See separate package

Module 4

AM Change Plan

→ Consolidate all findings into a single integrated factory AM workflow plan

Duration: 2-10 days



EOS Software Integration Consulting

After EOS Software training, consulting can be provided to enable efficient integration of EOS Software into the existing factory ecosystem.

Objectives

- EOS customers would like to connect EOS Software to their software, particularly EOSCONNECT which is used to interface to the customer software

Modules

Module 1

EOS Software Integration Planning

- Capture the customer software and IT ecosystem
- Develop an EOS Software integration plan

Module 2

EOS Software Integration Execution Consulting

- Support the customer to execute the EOS Software integration plan either using customer experts or contracted vendors, with EOS only providing consulting support

Duration: 3 days



IT & Software Integration Consulting

After EOS Software training and integration of EOS Software into the customer factory, consulting can be provided to determine an improved factory ecosystem using the ISO95 pyramid to include additional functionalities, optimization and 3rd party solutions.

Objectives

- EOS customers would like to optimize their IT and software ecosystem to increase efficiency and reduce cost by optimizing the AM factory

Modules

Module 1

IT and Software Optimization Planning

- Capture the customer software and IT ecosystem around the AM factory
- Develop an IT and software optimization plan based on AM factory using the ISO95 pyramid
- Capture the additional functionalities, optimization opportunities and use of 3rd party solutions

Module 2

IT and Software Optimization Execution Consulting

- Support the customer to execute the IT and software optimization plan either using customer experts or contracted vendors, with EOS only providing consulting support

Duration: 3 days



AM Digital Factory Optimization Consulting

Manufacturers seek optimized factory operation. This can be achieved in the following steps: training on EOS IIoT and analytics software, IIoT dashboard optimization for specific operation, using factory data to develop new analytics and co-development of smart AM parts with integrated sensors and links to apps.

Objectives

- Manufacturers seek optimized factory operation
- Manufacturers seek competitive advantage through innovative and smart products

Modules

Module 1 AM IIoT Training

→ See separate package

Module 2 AM Analytics Training

→ See separate package

Module 3 AM IIoT Dashboard Optimization

→ See separate package

Module 4 AM Analytics Development Sprint

→ See separate package

Module 5 Smart Part Sprint

→ See separate package

Module 6 AM Digital Factory Optimization

→ Consolidate all findings into a single digital factory optimization plan for future execution

Duration: 3-21 days



IloT Dashboard Optimization

The AM IloT dashboards can be improved in terms of dashboards, personas and embedded analytics to optimize a specific factory's operation.

Objectives

- Manufacturers seek optimized factory operation
- Management seek solutions tailored to their specific application and situation rather than generic solutions

Modules

Module 1

Customer AM Production Requirements

- Capture the strengths and weakness of the AM IloT system in the customer operation
- Capture the customer KPIs
- Develop plan to fill the gaps and prioritize improvements according to KPIs

Module 2

IloT Improvements

- Support the customer in the execution of the IloT improvement plan either using customer experts or contracted vendors, with EOS only providing consulting support

Duration: 5 days



Analytics Development Sprint

Use a factory's own data to solve a unique or specific optimization problem that is not possible with currently available analytics.

Objectives

- Manufacturers seek optimized factory operation
- Management seek solutions tailored to their specific application and situation rather than generic solutions

Modules

Module 1

Opportunity or Problem Definition

- Capture customer opportunity or problem
- Determine root cause
- Determine symptoms of root cause and suitable sensors
- Develop analytic development plan

Module 2

Analytic Solution Execution

- Support the customer in the execution of the new analytic using customer experts or contracted vendors, with EOS only providing consulting support, including:
 - * Sensor execution
 - * Data gathering and processing
 - * Analytic development
 - * Analytic deployment

Duration: 5 days



Smart Part Sprint

Co-develop a smart AM part that includes integrated sensors and links to apps. The smart part must unlock a unique and significant economic advantage by combining the benefits of AM, digital enabled products, the digital consumer world and digital manufacture.

Objectives

- Smart AM parts that unlock a unique and significant economic advantage

Modules

Module 1

Define Customer Problem

- Capture customer (end users) problem statement (using design thinking)
- Define leaps of faith to achieve success (using lean start-up) method

Module 2

Concept Development

- Develop minimum viable product concepts (using agile methods)
- Test minimum viable product (this could be paper study or actual hardware)

Module 3

Smart Part Development

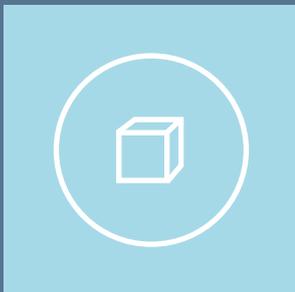
- Develop successful minimum viable products into final products (AM specific consulting provided to customer driven process)

Duration: 5-15 days



Consulting Packages

Choose one of our packages to start your AM journey more quickly and use our expertise instead of developing by conventional "trial & error" system (with a mix of training and consulting offerings):



AM Starter Package

AM Sprinter Package

AM Runner Package

AM Flyer Package

AM Starter

Package for a Quick Proof of Concept

Your Requirements

- Check the potential of AM for your organization
- Support developing your first AM application concept
- Low investment risk prior to purchase of a system

Our Offering

- Transfer of AM know-how
- Part selection: identification of a suitable application
- Development of an application concept
- Design support
- Preparation of your business case, incl. calculation of costs & evaluation of value added

-
- + Your first application built on an EOS system at the EOS Technology Center

Benefits

- You are "ready-to-develop"
- Effective risk reduction thanks to technical & economic proof of concept
- Special discounted package price

Time saving: 3 months*



*compared to conventional „trial & error“ development

AM Sprinter

Package for Building an Application
on Your Own System

Your Requirements

- Speed up your AM journey with first system purchase
- Development of AM expertise
- Accelerated production of first application on own system

Our Offering

- Transfer of AM know-how
 - Part selection: identification of a suitable application
 - Development of an application concept
 - Design support
 - Preparation of your business case, incl. calculation of costs & evaluation of value added
-
- + EOS support building application
-
- + Your first application built on your own EOS system

Benefits

- You are "ready-to-print"
- Accelerated AM entry
- Special conditions with purchase of EOS system

Time saving: 6 months*



*compared to conventional „trial & error“ development

AM Runner

Package for Complete Support Until Final Part Production

Your Requirements

- Quick realization of identified application
- Get ahead of the competition
- Qualify & ramp up your AM production

Our Offering

- Transfer of AM know-how
- Part selection: identification of a suitable application
- Development of an application concept
- Design support
- Preparation of your business case, incl. calculation of costs & evaluation of value added

+ Full support building and developing an application on your own system

+ Optimization of build job & parameters

+ Industry-specific qualification support: setup and qualification of process chain for part delivery & reduction of production risks

Benefits

- You are "ready-to-produce"
- Optimized final application
- Comprehensive support until final part delivery
- Special conditions with purchase of EOS system

Time saving: 10 months*



**compared to conventional „trial & error“ development*

AM Flyer

Package for Complete Support
Until Digital Factory is Operational

Your Requirements

- Optimized serial production
- AM cells optimized and integrated into factories
- Minimum cost-per-part and cost of operation
- Maximum production throughput of parts achieving required quality

Our Offering

- Digital factory planned, implemented and optimized
- Enabling best AM integration into your factory
- Enabling digital twin, digital thread, digital market places and other future oriented digital concepts

- + Full support in planning, implementing and optimizing your AM cell and factory
- + Optimizing physical, digital and management systems
- + Tools to plan, optimize and track AM performance, cost and quality

Benefits

- You are "ready-to-digitally-optimize"
- Integrated digital AM factory
- Comprehensive support until digital factory operational

Time saving: 12 months*



**compared to non-integrated and non-optimized digital factory*

A Rapid Approach AM Academy

Before the introduction of our Additive Minds Academy most engineers learned AM the old fashioned way, through trial and error. This method is expensive, time consuming, and no longer necessary.

Our three programs – AM Engineer, AM Development Expert and AM Manager – build specific technological and economical skills in a structured, time-efficient manner. They can also be combined to match individual profiles and roles of employees.



EOS Headquarter Krailing near Munich

- More than 200 specialists for industrial 3D printing on site
- Courses are run by experienced application specialists and consultants
- Dedicated pool of systems to guarantee a lot of hands-on training
- AM Design and Technology Enabler



SRH Hochschule Berlin

- Location in Berlin with students from 60 nations
- Focus on international business administration & international management
- Top ranking for international orientation
- More than 60 partner universities worldwide
- AM Implementation Enabler



University of Wolverhampton

- Offers over 500 courses through its 18 schools and institutes
- EOS partner for over 14 years with deep know-how in AM technology & research
- Focus on industrial applied research for broad customer base (e.g. Formula 1 teams)
- Graduate employment rate of over 95 %
- AM Technology Enabler



Engineers,
Quality/ Measurement
Engineers



Teammanager,
Change Agents,
Sales

2 weeks
at Wolverhampton

AM Development Expert

Main learning steps

- + Metallurgy
- + Parameters
- + Material properties
- + House of quality
- + Advanced AM design
- + Post-processing

2 weeks
at SRH Berlin

AM Manager

Main learning steps

- + Cross functional implementation
- + Business cases & models
- + Internal value chain

2 weeks
at EOS

AM Engineer

Main learning steps

- + AM process
- + Additive thinking
- + AM benefits & opportunities
- + Design for AM
- + Support and orientation
- + DMLS laser scan strategies
- + Part screening and selection

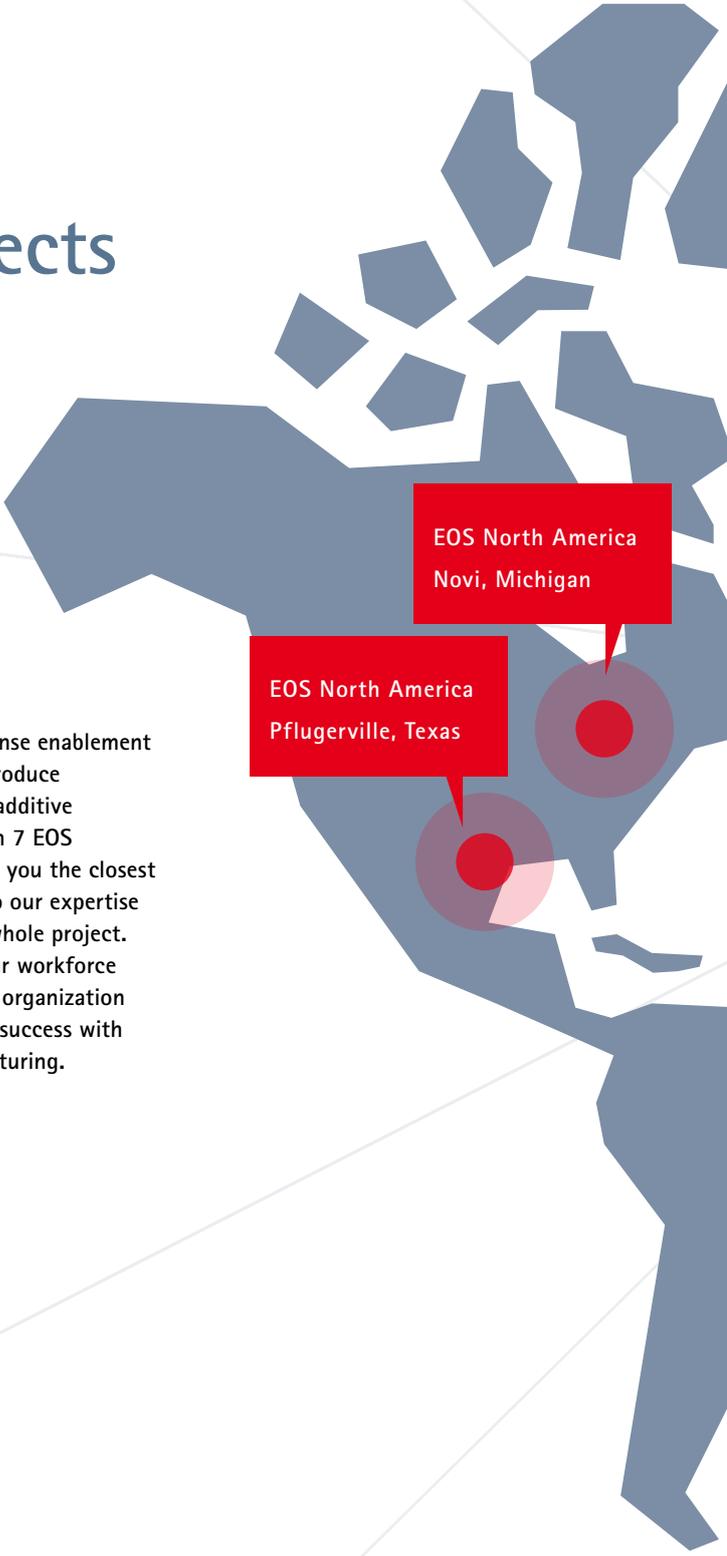


Engineers, Technicians,
Sales, Teammanager,
Quality Engineers

Concentrate All Your AM Projects in One Place

With 7 global EOS Innovation Centers, we support you wherever you are, whenever you need it

Benefit from intense enablement to develop and produce serial parts with additive manufacturing. In 7 EOS facilities we offer you the closest possible access to our expertise throughout the whole project. You can train your workforce and prepare your organization to achieve faster success with additive manufacturing.

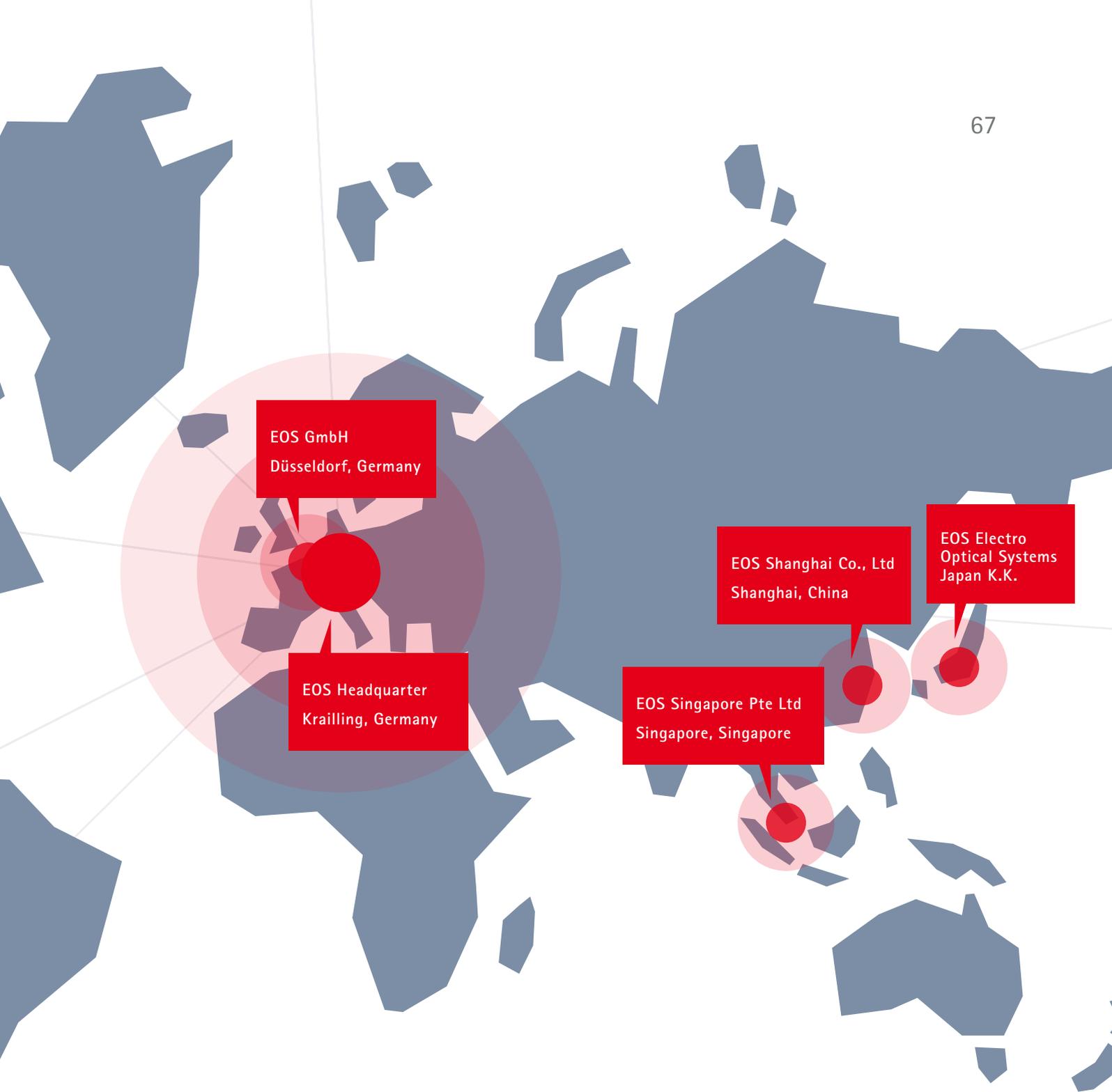


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Novi, Michigan

EOS North America
Pflugerville, Texas

At EOS Innovation Centers, we address the challenges of your company

- Your workforce has difficulties in understanding additive manufacturing technology, processes, limitations, and possibilities
- Your existing know-how in AM is limited and the learning curves of application engineers are difficult to predict
- You perceive a possible investment risk due to an unknown productivity curve in the first years with new applications
- You are missing knowledge and methodologies in developing AM applications and optimizing the entire AM process chain
- Your AM resources were merely used in R&D, which is not fully production- and supply-chain orientated



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Krailling, Germany

EOS Singapore Pte Ltd
Singapore, Singapore

EOS Shanghai Co., Ltd
Shanghai, China

EOS Electro
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Japan K.K.

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EOS Innovation Center Düsseldorf
offers dedicated customer areas
and shared spaces

- EOS showroom M
(with EOS M 290)
- EOS showroom P
(with EOS P 396)
- Specific customer areas with
room for your own system
- Specific powder handling areas
- Machine shop and quality lab
- Training room and office

Would you like to establish your own innovation lab?

We support you in

- Developing the business case for your innovation lab
- Planning the lab configuration out of a set of pre-defined modules
- Adapting the necessary auxiliary installations and equipment, and optimizing the facility layout
- Identifying customer's most promising applications
- Developing innovative products and application improvements
- Designing customer specific processes, driving optimization along the entire process chain
- Transferring know-how to your own and your customer's engineers in customized courses and workshops
- Enabling your trainers to carry out Additive Minds certified training courses

Take the shortcut to your own AM innovation center:

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