

COURSE OVERVIEW - *Advanced CAD and AM Engineering*

OVERVIEW

Following the successful delivery of our first course we are now presenting the second instalment: *Advanced CAD and AM Engineering*. The first part of the course aims to complete and advance your knowledge of the Onshape platform by working on numerous complex designs using all the available tools. In the second part we focus on introducing you to basic engineering concepts both technical and professional. This is followed by an extensive run-through of your new working platform Optimatter™, designed to assist you in advanced technical (materials and processes) analysis of your 3D printed parts.

COURSE CODE

ACADAME01

COURSE BENEFITS

1. Our courses run entirely on cloud-based platforms requiring minimal local computing power thus offering greater flexibility.
2. All interfaces are designed to effortlessly adapt on mobile and tablet devices.
3. Our courses provide professional technical skill in CAD ([Onshape, Inc.](#)) and 3D printing ([3D matter](#)), which when mastered allow for a direct route to employment.
4. The training materials are developed to offer the maximum benefits of independent learning.
5. Our post-training commitment is offered through our blog, set up to tackle on-going questions, and informed the trainee about new technical breakthroughs, trends and course content updates. Importantly you can also [email us](#) for any question you might have.
6. Post-training, our trainees will have free access to all the technology platforms being taught, as well as our extensive eBook.
7. Our trainees will be invited to take part in 4Delta's skill competition initiatives.

COURSE AIM

- To build upon the knowledge of the [first course](#), familiarise the trainee with advanced concepts of Onshape CAD.
- Introduce the trainee to the basic engineering concepts and its application on Additive Manufacturing.
- Familiarise the trainee with technical standards and their importance.
- Introduce the topic of Computational Science and Engineering and discuss the progress of Computer Aided Engineering in 3D Printing.
- Familiarise with the Optimatter cloud based engineering platform.



- Make the trainee an advance user of the Optimatter platform.
- Present how FFF 3D Printing parameters affect the engineering properties of parts.

LEARNING OUTCOMES

By successfully completing this course the trainee should be able to:

- Use Onshape advanced commands and features to create complex parts, assemblies and mate connections.
- Create and edit assembly part animations.
- Create collaborative design environments using version control and branches.
- Understand and create engineering drawings.
- Understand and work with the concepts of Force, Stress, Strain, Impact Toughness and Hardness.
- Relate to the concept of Computer Aided Engineering and its impact to 3D printing.
- Acknowledge the importance of technical Standards.
- Comfortably use the Optimatter 3D printing engineering analysis cloud platform.
- Have a detail understanding on how FFF 3D Printing materials and processing parameters affect the engineering properties of your parts.

TRAINEE PREREQUISITES

Basic knowledge of any computer operating software (i.e. Windows, Mac OS, Linux) and the use of WebGL Internet web browsing (i.e. Firefox, Google Chrome, Opera and Safari) is necessary. Completion of the [Introduction to CAD and 3D Printing](#) is essential.

COURSE FORMAT

The course is a smart combination of Cloud-based tools. These include the CAD software Onshape™ and Optimatter™ online video training and self-assessment. All elements complement each other and are essential for the successful completion of the course. The trainee is invited to join our technical [Blog](#) for further advice and knowledge sharing.

- 30 days access to online content.
- 6+ hours of online self-paced video training.
- 15 e-Book homework.
- 60+ Self-assessment questions.
- At least 12 hours of independent work.

STUDY LITERATURE

- Course e-Book is provided with your course registration.
- Various complementary online and book literature resources for independent study are recommended in the e-Book's Reference Section.



COURSE CONTENT BREAKDOWN

Welcome Back	Onshape Design Elements; Engineering and Advanced AM Elements; How to Study; Onshape updates.
Section 1 - Wing Design	Airfoil Template (AT) - Plot; AT - Spars; AT - Lightening Holes; AT - LE Cavity; AT - TE Cavity; AT - Stringers; Root Rib; Mid Rib 1; Wing Tip Rib; Rib TE1; Rib TE Standard; Rib LE Standard; Truss Type Wing Rib; Aileron (A) - Tab; A - Structure L; A - Structure R; Rear Spar; Cover Panel; Wing Assembly; Cobb's Totem; Padlock - Shackle; Padlock - Main Body; Padlock Assembly; M5 Hex Bolt; M5 Hex Nut; M5 Bolt & Nut Assembly.
Section 2 - Rocket Design	Profile Plot; Engines; Supply Line; Landing Legs; Markings; Grid Fin (GF) 1/2; GF 2/2; GF, Main Body; GF, Pad 1/2; GF, Pad 2/2; Rocket Assembly; Version Control & Branching; Comparing; Drawings.
Homework	Homework 1 (HW1)- Rear Spar; HW2 - Fwd Upper Stringer; Rib; HW3 - Mid Rib 1; HW4 - Mid Rib Standard; HW5 - Rib TE1; HW6 - Truss Type Wing Rib Foundation; HW7 - Front Spar; HW8 - Cover Panels; HW9 - Stringers; HW10 - Cobb's Totem; HW11 - Rocket Segments; HW12 - Engines Numbering; HW13 - Markings; HW14 - Creating the Grid Fin Template; HW15 - Working with Stress.
Section 3 - Introduction to Engineering	Why Engineering; Engineering in a Nutshell; Basic Engineering Concepts (Force, Stress, Strain, Impact, Hardness).
Section 4 - Standardisation	Technical Standards and their need.
Section 5 - Computer Aided Engineering & 3DP	Computational Science and Engineering; Simulation in Engineering; Computer Aided Engineering and 3D Printing.
Section 6 - Optimatter	Introduction to Optimatter & Interface Controls; Analysis of the Forecast and the Optimize tools the Working with Stress.
Section 7 - Advanced FFF Observations	Detail discussion of laboratory studies conducted on the mechanical and material integrity of FFF 3D printed parts.
Section 8 - Closing Remarks	Closing remarks from the whole course

The *COURSE CONTENT BREAKDOWN* refers only to the main chapters covered in the course and not the full content of those chapters. For a detailed outline of the course please refer to the e-Book contents page available online.



FURTHER INFORMATION

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ABOUT US

Established by experienced scientists and engineers in London, 2015, 4Delta is a venture technology company. We embrace revolutionary ideas from the science, technology, art and socioeconomic world to research, educate and develop future disruptive technologies.

As part of our vision for a sustainable, secure and fairer world, we have created 4Delta Education. Here you will find a series of carefully formulated training courses designed to bring technology, science and the arts closer to you. We have gathered the right knowledge and adapted it for you, aiming to stimulate questions, creativity and innovation. Using online tools and community driven initiatives we strive to seed the next generations of innovators.

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