

MFG322477

Innovation journey from Shape Optimization to Generative Design

Angel Jover
Veolia Water Tech Europe & Africa

Hervé Morellon
Autodesk Global Consulting Delivery Consulting

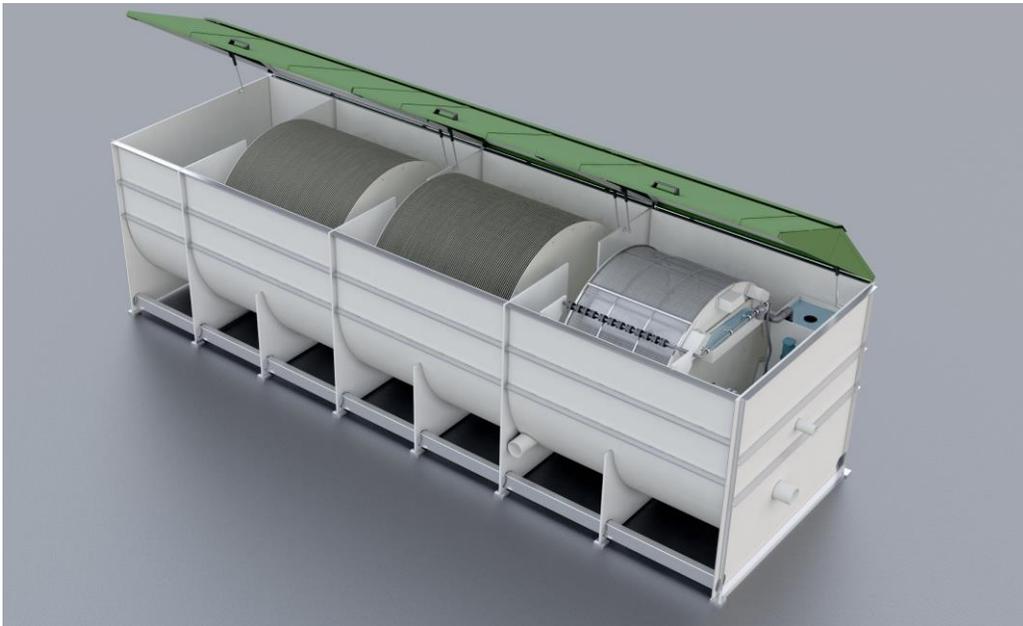
Goulven Inial
Veolia Water Tech

Learning Objectives

- How shape Optimization and Generative design are used for sustainability
- Learn how Generative design in Fusion 360 can be used in the Water treatment Industry
- Learn how to redesign manufacturing parts
- Learn how to control the production costs

Description

This class will focus on how Plastique Metal Technologie (PMT), part of Veolia Water Technologies (VWT), has used Fusion 360 features in order to optimize the shape of some parts of their ecological wastewater treatment plants. Veolia will explain how their engineering teams have worked on a few use cases like optimizing separation plates or exploring new shapes for the bucket wheels through Generative Design capabilities. With Fusion 360 Veolia can redesign key manufacturing parts of their equipment and reduce material used. It participates, in a context of sustainable development to reduce waste, and costs (like transportation and manufacturing costs) and improve the security during maintenance operation for Veolia customers and employees.



Ecodisk™ packaged biological waste water treatment unit

Speaker(s)

Angel Jover

Naval Officer by education, over 20 years of worldwide experience in AEC within shipbuilding, power generation, water and circular economy. Currently based in Tokyo (Japan)

Hervé Morellon

Project Manager at Autodesk Global Consulting Delivery in EMEA, based in Paris, France

> 4 years at Autodesk

> 13 years in Project Management

Focused in driving value for Autodesk customers in Architecture Engineering Construction (AEC), and Manufacturing (MFG)

Goulven Inial

After a few years in Asia working for the water and environment business in operation and R&D, Goulven is now the manager of PMT, the Veolia subsidiary dedicated to the production of small packaged biological plants, called Ecodisk.

Learning Objective 1: How shape Optimization and Generative design are used for sustainability

- Veolia, a French company with 25b€ annual turnover and 160,000 employees worldwide, has made a commitment to achieve United Nations Sustainable Development Goals (SDG) by 2030.
- As such, at Veolia Water Technologies - a division of Veolia, we focus on the SDGs every time we launch a project or an initiative. In the case of PMT's Ecodisks shape optimization and generative design we will positively impact three SDGs:
 - #6 Clean Water and Sanitation - Ecodisks are ecological wastewater treatment plants for small communities. Water is treated before returning, clean, to nature
 - #9 Industry Innovation and Infrastructure - Compact and easy to install Ecodisks have been continuously improved since 1960 - the use of GD represents a major leap forward
 - #12 Responsible Consumption and Production - with GD we will use less plastic, less steel and less energy to produce and operate the Ecodisk
- Our strategy is to progressively apply Generative Design to all our products and technologies to make them more sustainable and thus contribute to achieving SDGs

Learning Objective 2: Learn how Generative design in Fusion 360 can be used in the Water treatment Industry

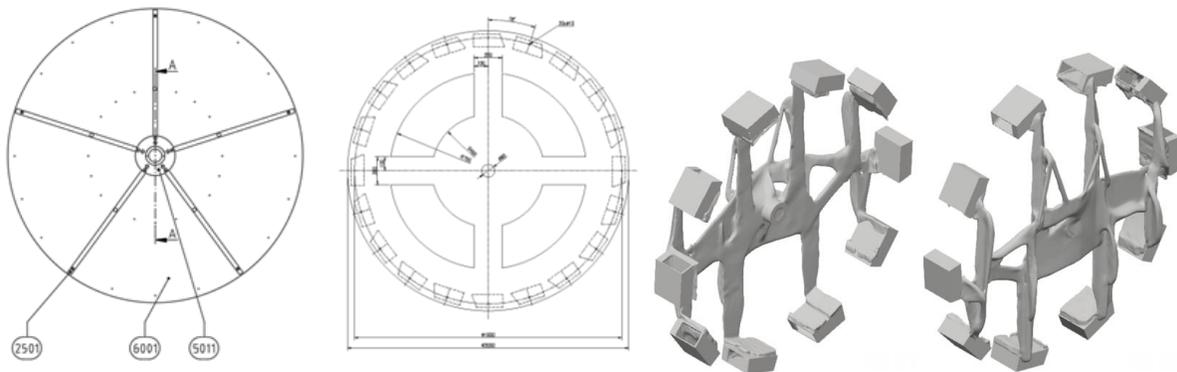
- How Autodesk partners with Veolia through the 3 years program (EBA: Enterprise Business Agreement) in order to meet Veolia business goals
- Introduction to Generative Design and the distinction with Shape Optimization
- How Veolia and Autodesk have collaborated on the Generative Design POC with the use of Fusion 360 for Generative Design
 - Project Organization
 - Delivery approach & Planning
 - Project outcomes
- Illustration in video of Shape Optimization and Generative design applied to Veolia use case using Fusion 360

Learning Objective 3: Learn how to redesign manufacturing parts



PMT manufacturing workshop

- Assembling the team with a focus on product knowledge rather than modeling know-how
- Writing the specifications with inputs from the end user
- Keeping objectives of the design update simple
- Matter reduction
- Easier assembly
- With the constraint of keeping the production capacities unchanged.
- Introducing shape optimization and generative design methodologies during the 6 days training



Sub assembly transformation after Shape Optimization and Generative Design

- Training exercises where based directly on parts and sub-assembly defined during a kick-off session in the workshop with the designers prior to the software training.
- Expert validation of the design hypothesis has proven necessary

Learning Objective 4: Learn how to control the production costs

- Delivery by the design team of drawings for ready-to-be-manufactured components facilitated the acceptance of the new parts by the production team
- Obtained results demonstrated that shape optimization can help reduce matter in structural parts by 20%. While these parts amount to about 15% of the cost of the unit, a total reduction of the construction costs by 3% is expected.
- Generative design also demonstrated a matter reduction by 20%. In addition, the manufacturing and assembly of several parts were integrated in a singly newly designed part leading to an expected total cost reduction of 40% on the selected sub-assembly.
- The parts have been redesigned to maximize the individual surface of the parts to be removed during the numerical cutting to allow the manufacturing of smaller parts within the empty spaces of the redesigned parts.
- Weight reduction on the new parts (minus 10 to 15 kilograms / part) will support the effort done to reduce the health and safety risks associated with the handling of heavy parts during production.

Conclusion

Through this relatively short and light project, it has been possible to assess both the readiness of VWT's engineering community to adopt the new Generative Design tool and the potential gains on our manufacturing activity.

In short, a team specialized in civil and piping drawings but with a good understanding of the product was capable of delivering quantitative results after 2 months of work and 2 x 3 days training sessions.

Best results seem to be achieved when both engineering and manufacturing have let-go their professional safeguards and allowed respectively the software to drive the design and the design team to reshape the product.