PRIMECH
Accelerate Report

About

This report includes the Accelerate projects supported by the PRIMECH Team from May 2023 to June 2024, along with the relevant results.

Goal

The aim was to provide support and resources to develop innovative teaching materials and activities.

Participants

The participants included TU Delft Mechanics teachers who have ideas to improve student learning but do not have sufficient time to implement them.

More information and resources about the project can be found on www.primech.nl

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COZ to ANS converter

Civil Engineering and Geosciences
February - September 2023

Contact person:
Tom van
Woudenberg

Goal

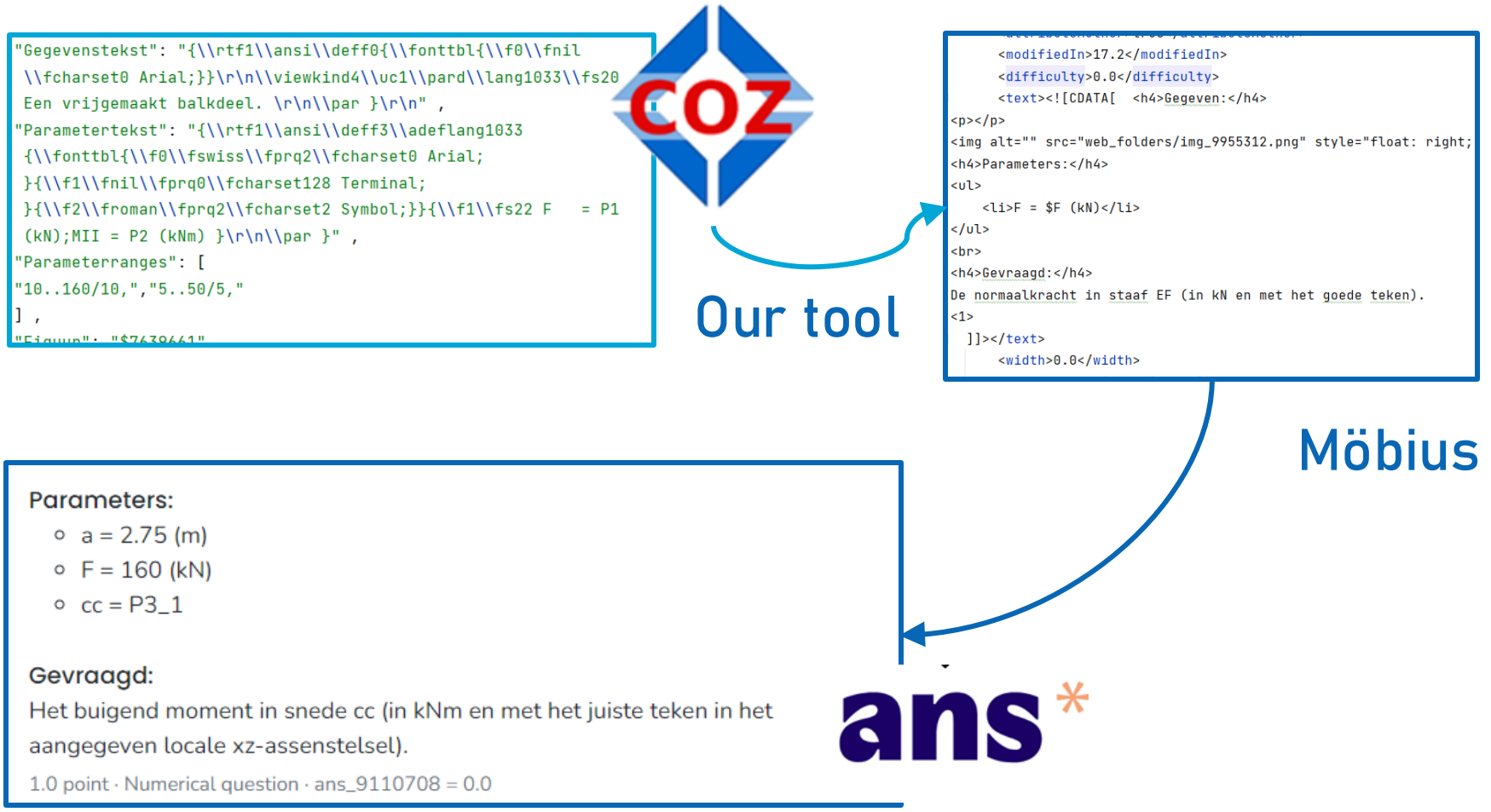
Develop a digital tool to facilitate the transfer of questions from the old assessment program COZ to the newly implemented program ANS.

Impact

The developed script has successfully converted 1500 questions for mechanics courses, streamlining the process and saving significant manual effort.

Summary

PRIMECH collaborated with Tom van Woudenberg (CEG) to develop a tool that would help the CEG mechanics department transfer questions from their old system COZ to ANS. To enable ANS to import questions from COZ with one press of a button, PRIMECH developed a script that converted COZ exports to Möbius format, which is readable by ANS. This has saved a lot of manual work, as the tool has already converted 1500 questions for mechanics courses and supports figures, parametric questions and much more!



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CAD Masters

Aerospace Engineering
August 2023 - present

Contact person:
Eddy van den Bos

Goal

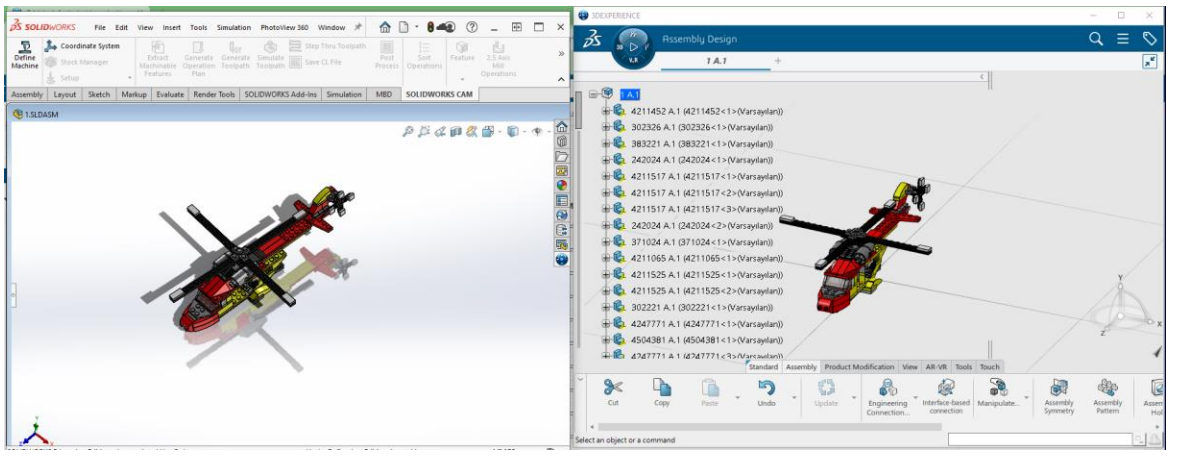
The goal of this Special Interest Group (SIG) is to create a collaborative platform for CAD and technical drawings teachers at TU Delft.

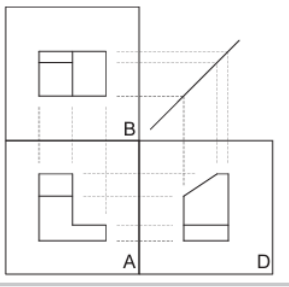
Impact

CAD teachers from various faculties are now in frequent contact, they have a dedicated MS Teams environment, and they meet regularly to address challenges, share best practices, and improve their teaching methodologies.

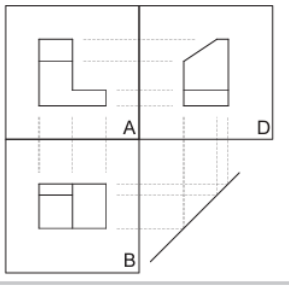
Summary

PRIMECH supported Eddy van den Bos in initiating the CAD Masters SIG. We identified CAD and technical drawing instructors (around 15 people) by reviewing the study guide and contacting faculty. We then organized meetings, handling invitations, location, catering, and speaker coordination. In the 2023/2024 academic year, the SIG held four lunch meetings: one introductory meeting and three meetings focusing on CAD education in the faculties of AE, ME, and CEG, respectively. These gatherings fostered collaboration and discussion among passionate teachers, addressing challenges and sharing solutions to enhance CAD education at TU Delft. The SIG and its MS Teams environment are set to continue promoting communication and material sharing in the coming years.





Figuur 2.10: Bovenaanzicht, vooraanzicht en rechter zijaanzicht



Figuur 2.11: Verplaats het bovenaanzicht naar beneden

Math + Mech in AE

Aerospace Engineering & PRIME
November 2023 - present

Contact person:
Daniela Petrova

Goal

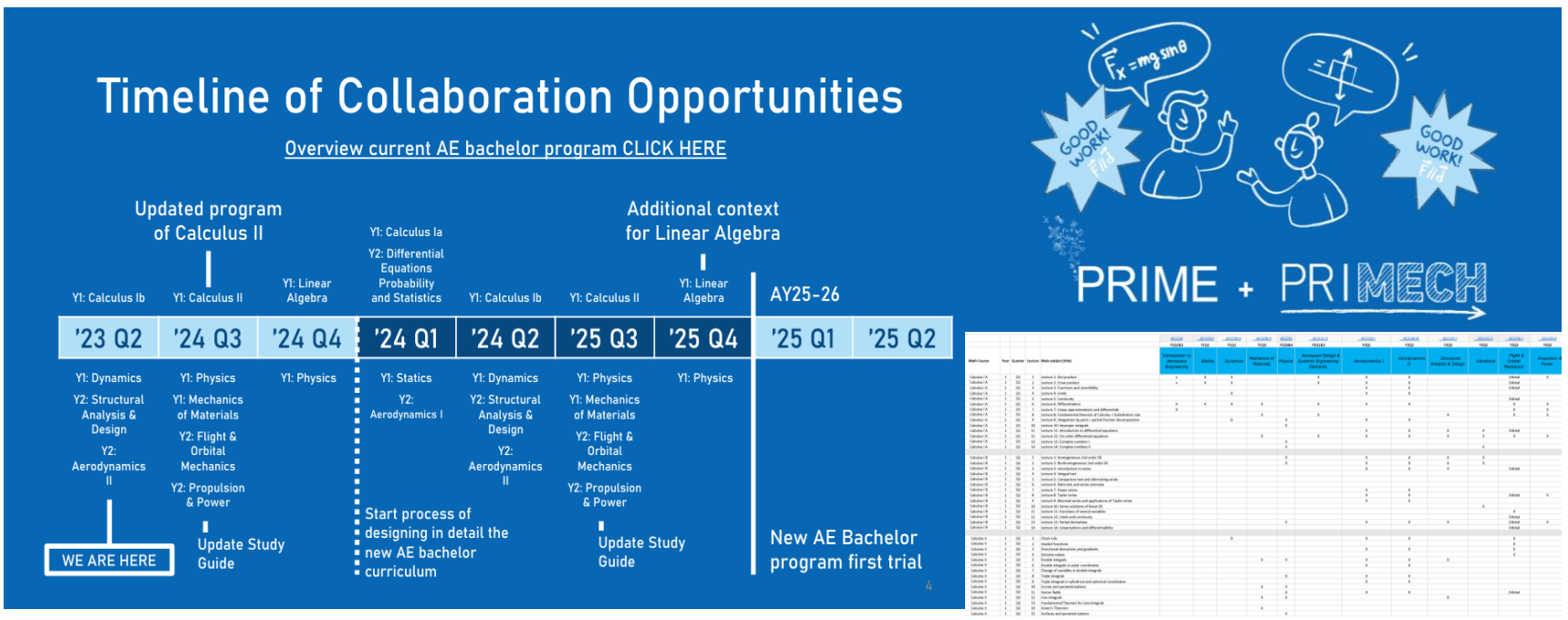
Better align the math and mechanics courses content in the bachelor program of Aerospace Engineering:
- by introducing concepts at the right time and in the right sequence
-by using each other's examples and materials for reinforcement and efficiency.

Impact

Calculus 1 and Statics aligned on vectors and double integrals. New examples for math courses taken from mechanics. Complete map of math topics used in mechanics courses. List of notations from mathematics courses that mechanics teachers should be aware of. MS Teams channel for interested parties to communicate and share materials.
This project was presented at the “From math to mechanics 2” PRIMECH event, on February 28th, 2024. PRIME is doing a follow up project regarding case studies for applications of Linear Algebra to AE

Summary

This collaboration project followed up on the 'From Maths to Mechanics' PRIMECH event in May ‘23, which aimed to identify challenges students encounter by bachelor students in applying math to mechanics. The event effectively highlighted several challenges which called for faculty-specific discussions. Therefore, PRIMECH and PRIME involved mechanics and math instructors from the AE Bachelor program, who started analyzing their respective course content and working to align their courses. The collaboration workflow we followed has been proven successful and it holds potential for aligning math and mech courses content in other faculties as well.



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Dynamics Escape Room

Civil Engineering and Geosciences
Q2 AY '23-'24

Contact person:
Alexandra Gavriilidou

Goal

Develop a virtual reality escape room for formative assessment in the Y1Q2 Dynamics course of the CEG faculty.

Impact

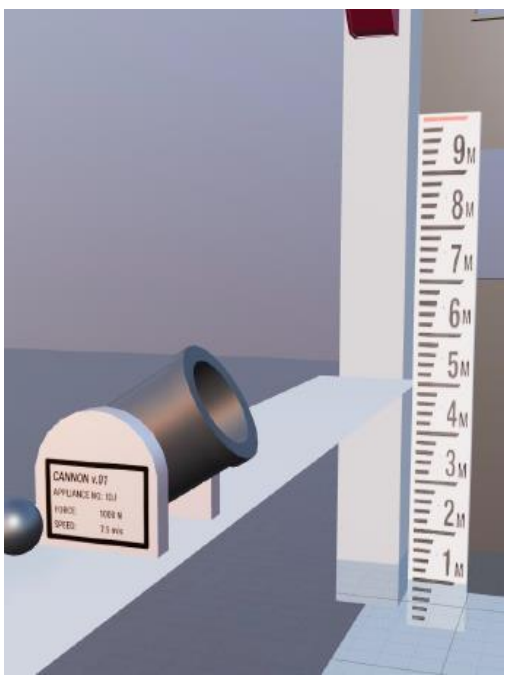
Successfully piloted the escape room with over 20 student teams.

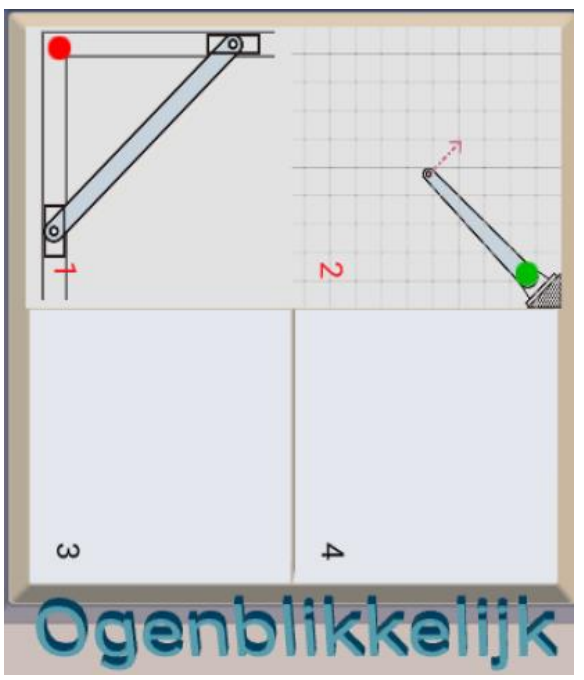
This project was presented at the "VR, Floods & Rovers" PRIMECH event, on April 17th, 2024.

Summary

Alexandra Gavriilidou's developed this activity as formative assessment for a first-year bachelor Dynamics course. In the virtual escape room, students are tasked with the mission to prevent the flooding of the CEG building, employing their dynamics knowledge to do so. The CEG faculty provided the funding for the development of the activity, PRIMECH provided advice and support in the development of the puzzles; while the VR zone developed the VR interface.

The VR escape room was successfully piloted in December 2023, just before the winter holidays, and more than 20 student teams voluntarily took part in the activity. Alexandra collected students' feedback to refine the activity for the second implementation during upcoming academic year.





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Column buckling conceptual hands-on activity

Mechanical Engineering
Q2 AY '23-'24

Contact person:
Giuseppe Radaelli

Goal

Develop a lecture activity to guide students in experimenting with the hands-on column buckling demonstrator and measure its effectiveness on students understanding of the phenomenon.

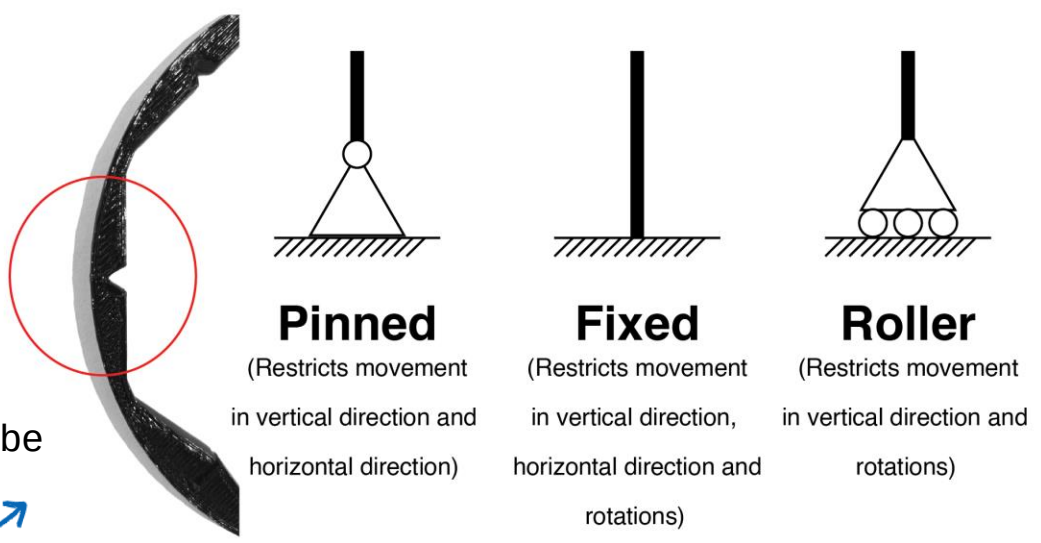
Impact

The activity was successfully implemented in January '24. 105 students attended the lesson. The main results showed that the activity engaged the students and helped them understand the column buckling phenomenon.

Summary

In the second quarter of the first year, mechanical engineering students take the 'Mechanical Design' course, which applies mechanics of materials to designing mechanical systems. However, the course includes only one lesson on stability and column buckling, making it challenging for students to grasp these concepts. To address this, Giuseppe Radaelli, the lecture teacher, developed a hands-on column buckling demonstrator, while PRIMECH created the learning activity, incorporating a Vevox poll, quiz, and survey. The activity followed the Interactive Lecture Demonstration approach, aiming to help students describe the relationship between support conditions, buckling load, and deformed shape, and to relate their experience to formulas, symbols, and diagrams. This project will provide a template for developing similar lectures with other demonstrators as part of Giuseppe Radaelli's Education Fellowship.

What type of support does best describe the support this slit provide?



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Sustainability & Modelling in Mechanics of Materials

Aerospace Engineering
Q3 AY '23-'24

Contact person:
Daniël Peeters

Goal

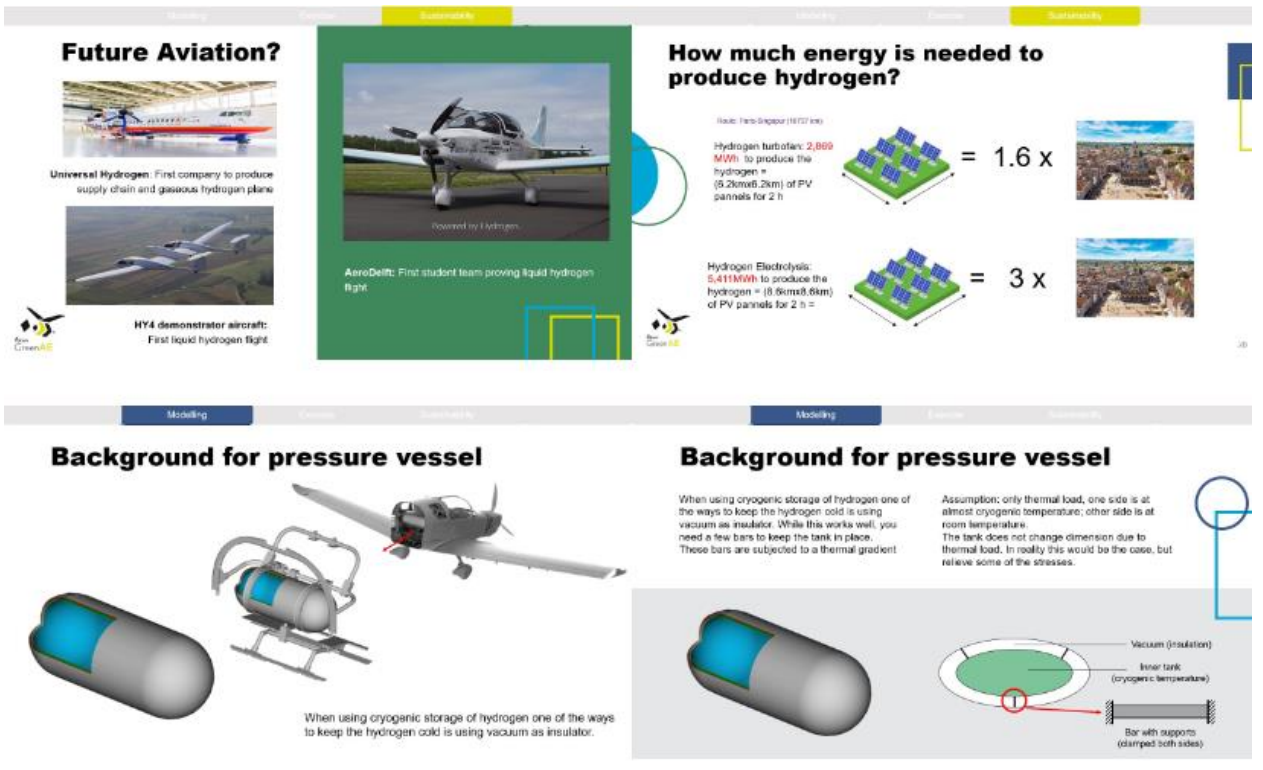
Review of the Mechanics of Materials (MoM) course material to integrate sustainability topics and increase the focus on modelling real world structures.

Impact

The new material was successfully implemented in the MoM course, in Q3 AY '23-'24. Students positively reacted to the modelling and sustainability modules. This project was presented at the "Sustainability in Mechanics" PRIMECH event, on May 16th, 2024.

Summary

Daniël Peeters, teacher of Mechanics of Materials in the AE bachelor programme, revised the course assignments to provide students with a deeper understanding of the role of sustainability in aerospace engineering. This initiative also aimed to help students apply the course theory (e.g., free body diagrams, math formulas) to model real-world structures. To achieve this, he collaborated with the dream team Aerodelft, using their hydrogen plane as a case study, and worked with the AE Green Team, who developed additional sustainability content modules. PRIMECH developed interactive visuals from the 3D drawings of the Aerodelft plane, visuals for the slides about modeling, and the overall slide templates to provide a coherent look to the material developed by all the parties involved.



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Mission M.A.R.I.J.N.

Aerospace Engineering
Q3 AY '23-'24

Contact person:
Ines Uriol Balbin

Goal

Develop a voluntary instructional activity, Mission M.A.R.I.J.N., for first-year aerospace engineering students, immersing them in Martian exploration while explaining the concept of "design requirements".

Impact

Activity successfully piloted with 70 bachelor students from the course "design and construction", demonstrating innovative teaching methods and fostering enthusiasm for the topic.

Summary

Ines Uriol Balbin, lecturer in Aerospace Engineering, conceived Mission M.A.R.I.J.N.(Mars Adventures: Research Initiative for Journey & Navigation), as a voluntary activity to introduce the students of design and construction to the topics of their design project. The M.A.R.I.J.N. mission consists of 3 adventures: The VR Mars Fleet, where students get to know more about past Mars missions in a VR environment; Let's Rock, Let's Bo(o)gie, where students gain insights into the functioning of rovers' rocker-bogie mechanism by driving M.A.R.C.O. (a 1:4 scale replica of the Perseverance rover); and Mars Geologists on Wheels, where students discover how the Martian terrain influences rover design. PRIMECH contributed to the development of the instructional activity, by helping defining learning objectives and activities specifications, a beautiful activity sheet and mission badge, while the physical learning materials and tools had been previously developed or collected and generously made available by several AE staff members.

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DiDATA: learning analytics

Civil Engineering and Geosciences
March – June 2024

Contact person:
Tom van Woudenberg

Goal

Develop a web system for TU Delft teachers to view detailed cohort performance on weekly ANS assignments and provide a data visualization that can be used to provide feedback to students in class.

Impact

Enhanced the ability of teachers to assess and respond to student performance comprehensively.
Laid the groundwork for expanding the system to include additional learning analytics from various digital educational systems, in collaboration with TLS.

Summary

The current assignment overviews in ANS present challenges in providing a clear understanding of the general student cohort performance, particularly for homework assignments with numerous questions, an issue prevalent among bachelor-level mechanics teachers. To address this, Tom van Woudenberg, teacher of Statics in CEG, and PRIMECH are developing a simple web system leveraging the ANS API. This system allows teachers to log in using their NetID, select one of their ANS assignments, and obtain a detailed results overview. This functionality is just the beginning; the system is expandable. TUDelft Teaching and Learning Services (TLS) is considering using it as a dashboard to showcase more learning analytics from other digital educational systems.

diDATA

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Experimenteer Doos

Mechanical Engineering
May 2024 - present

Contact person:
Suzanne
Rademaker

Goal

Refresh the content and the learning activities of the 'Experimenteer Doos': a portable box containing materials and tools to perform a set of three experiments for the course 'mechanical design'.

Impact

The project will be carried out during the summer of 2024, with the updated boxes to be used by students during Q2 of AY 2024-2025. A total of 100 boxes will be updated, serving a cohort of approximately 800 students.

Summary

For the project-based course "Mechanical Design“, a first year second quarter course, students are given an experimentation box. The learning objective of the kit are to gain a better understanding of the relationship between the mechanical properties of materials and the stiffness and strength of components and for the student to independently set up and conduct experiments. In this process, the student also learns to apply a theoretical model in practice. The box contains material and includes instructions for three experiments: flexural strength; bending stiffness; torsional stiffness. PRIMECH will provide advice to the junior lecturers Suzanne Rademaker and Renee Dooren in developing new learning objectives and different experimental activities.

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Statics in Space

Aerospace Engineering
May 2024 - present

Contact person:
Calvin Rans

Goal

The goal is to link all the instruction session exercises of first year Statics course with a common storyline: engineers preparing a mission to Mars.

Impact

The expected impact is help engage students more with the content, make the content more memorable, and provide context for discussing design implications..

Summary

This project involves creating instructional content for a first-year Statics course, consisting of seven sessions. Currently, two videos have been produced by the teacher, and our focus is on developing a third one. Each video aims to provide context for the exercises through the storyline of an astronaut journeying to Mars. In each video, the astronaut encounters a problem that can be solved using statics concepts, with the assistance of role model engineers. The exercise accompanying the video is divided into different parts, allowing each student team in the session to work on a specific section. Subsequently, all parts will be combined to form a complete solution. This collaborative approach not only engages students but also provides a platform for discussing design implications, emphasizing the importance of design choices in engineering rather than focusing solely on problem-solving..

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Promotional Videos

Design and Media
August 2023

Contact person:
Veronica Comin

Goal

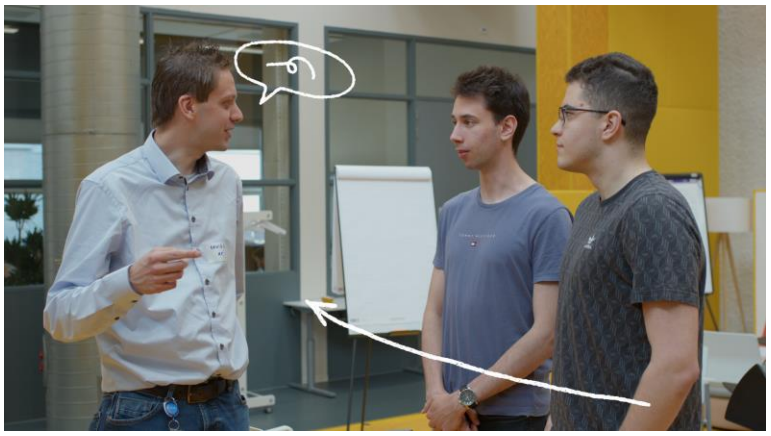
The videos aim to promote the PRIMECH social club and the events to reach more interested support staff in mechanics.

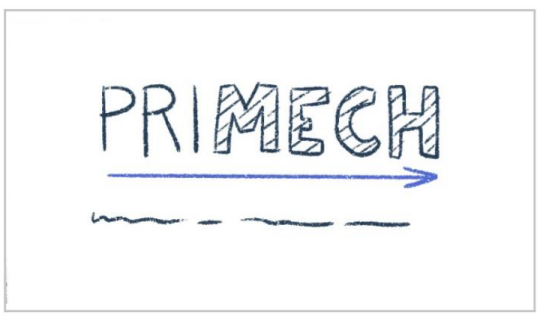
Impact

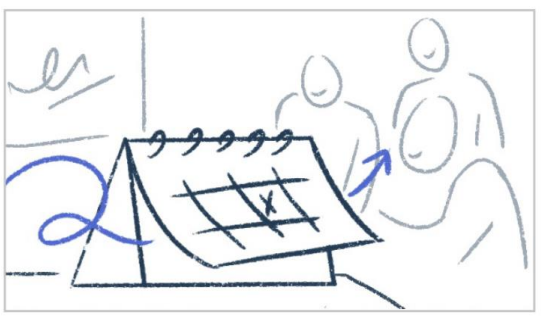
The expected impact is to reach people who could benefit from the community of practice to join PRIMECH.

Summary

This project involved creating two promotional videos about the community of practice. The first step was writing a script and voice-over text, followed by a storyboard that puts into images the text. The storyboard was presented to the staff of the New Media Center to coordinate with recording the videos. Additional design elements were added on top of the live-action recordings to integrate PRIMECH's branding elements and have a consistent communication style.







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