



# COLLABORATIVE ROBOTICS FOR CIRCULAR ECONOMY IN MANUFACTURING SECTORS

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Mini Project



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## Introduction

This assignment is part of the CROCEMS project, which aims to provide learning materials on collaborative robotics, which are used to improve the Circular Economy. Participants of the mini project will be challenged with their knowledge of the learning materials provided. The collected results will help the project consortium to verify if the provided learning materials help to understand the connection of circular economy and collaborative robotics.

The "Product as a Service" (PaaS) business model is based on the idea that customers no longer buy a product but use it as a service. Instead of a one-time purchase, payment is made based on the duration and intensity of use. The provider retains ownership of the product and is responsible for maintenance, repair, and occasional upgrades. This means that the longer a product lasts, the longer it can, for example, be rented, generating more income. The provider will therefore be interested in durable and repair-friendly products. This model promotes the circular economy by creating incentives for longevity, reusability, and recycling.

## Assignment

### 1. Product Selection

Choose any product that is suitable for the "Product as a Service" business model. The product should be capable of regular maintenance and, after its life cycle, be refurbished or recycled. Describe the service offered for the product.

### 2. Design Criteria

Determine the essential design criteria necessary for the selected product to meet the requirements of the "Product as a Service" business model. Apply these to your product and develop ideas or a product concept for this PaaS business model.

Consider:

- Durability and maintenance friendliness (connection techniques)
- Modularity for easy repairs and upgrades
- Environmentally friendly materials
- Optimization of usage for various users (ergonomics and adaptability)
- Opportunities for reuse or recycling of parts

### 3. Disassembly Line

Plan the disassembly of the product using collaborative robots. Define where and how the product should be disassembled to enable efficient refurbishment or recycling of the components. Consider how collaborative robots could perform the disassembly to improve efficiency and accuracy.

Consider:

- Gripping technology
- Disassembly sequence
- Where does the use of collaborative robotics make sense?



## 4. Presentation

Summarize your results in a PowerPoint presentation with 5-10 slides (PowerPoint template download link below). Your presentation should cover the following points:

- A brief introduction to the selected product and its suitability for the "Product as a Service" business model, as well as the specific benefits for the user.
- The selected design criteria, their relevance to the business model, and ideas for implementing them in the product/new product concept.
- A rough outline of the disassembly line and the role of collaborative robots.
- Diagrams to illustrate the design criteria and the disassembly line.

## Evaluation Criteria

### 1. Product Selection and Relevance (20%)

- Is the selected product appropriate for the "Product as a Service" business model?
- Are the benefits of the model clearly presented?

### 2. Design Criteria (30%)

- Were relevant design criteria identified and explained?
- Is it clearly explained how these criteria support the circular economy?

### 3. Disassembly Line and Collaborative Robots (30%)

- Is the planned disassembly line sensible and practical?
- How well is the integration of collaborative robots into the disassembly process explained?

### 4. Presentation and Clarity (20%)

- Is the PowerPoint presentation clear and well-structured?
- Were all necessary details conveyed clearly and engagingly?



## General Information

**Submission Deadline:** December 21, 2024, 12:00 AM.

Please use the following forms sheet to upload your document. In case you have troubles to upload your document, get in contact with [a.munoz@cetem.es](mailto:a.munoz@cetem.es).



<https://forms.gle/uEZMSFuXR7dTajNu7>

**Template:** Please use the CROCEMS PowerPoint template for preparing the presentation. You can download the template here:



[https://cetem365-my.sharepoint.com/:p/g/personal/a\\_munoz\\_cetem\\_es/ESlj7LQjppLu1XhHUFpglEB5isJ-STMz-XZLxUlc5xfKQ?e=zSz7ec](https://cetem365-my.sharepoint.com/:p/g/personal/a_munoz_cetem_es/ESlj7LQjppLu1XhHUFpglEB5isJ-STMz-XZLxUlc5xfKQ?e=zSz7ec)

**Prize:** The best submissions will receive a surprise prize. All participants will receive a participation certificate.

**Note:** Even if you do not have detailed prior knowledge of design criteria or collaborative robots, your ability to develop a well-thought-out concept and communicate your ideas clearly will be evaluated. Your creativity and understanding of the circular economy are key.