Designing and defining the technical plastic revaluation process

This module identify theoretical information on steps to follow when designing and defining the technical plastic revaluation process. Get inspired and get things done after. Good luck!

Designing and defining the technical plastic revaluation process might be a stressful yet enlightening experience. Upcoming strict regulatory framework does not leave anyone behind. Those, who grasp the basic idea of Circular economy and harness it´s added value for their benefit, will get a huge lead.

Description

By following these steps, SMEs can design and define a technical plastic revaluation process, leading to improved product performance, cost-efficiency, and competitiveness in the market. It's important to consult with experts in the field and conduct a thorough analysis to determine the most cost-effective approach and successful revaluation process.

Guide to Designing and Defining the Technical Plastic Revaluation Process in SMEs:

1. **Assess Project Requirements:**

- Clearly define the objectives and requirements of the plastic revaluation project.
- Identify the specific plastic part to be revaluated and its intended application.

2. **Conduct Feasibility Study:**

- Evaluate the feasibility of revaluing the plastic part in terms of cost, time, and resources.
- Analyze potential benefits and risks associated with the revaluation process.

3. **Select a Competent Team:**

- Assemble a cross-functional team with expertise in plastics engineering, design, manufacturing, and quality control.
- Ensure effective communication and collaboration among team members.

4. **Material Selection:**

- Determine the ideal material for the revaluation based on the application requirements and performance criteria.
- Consider factors such as mechanical properties, chemical resistance, and environmental impact.

5. **Design and Prototyping:**

- Utilize CAD (Computer-Aided Design) software to create a detailed design of the revaluated plastic part [8].
- Build prototypes to test and validate the design before full-scale production.

6. **Process Selection:**

- Identify the most suitable plastic forming process (injection molding, extrusion, blow molding, etc.) based on the part's complexity and volume requirements [1].

7. **Performance Testing:**

- Conduct thorough testing to ensure the revaluated plastic part meets all necessary performance standards.
- Consider factors like strength, durability, and dimensional accuracy [2].

8. **Cost Analysis:**

- Estimate the overall cost of the revaluation process, including material, equipment, and labor costs.
- Compare the cost with potential benefits and determine the return on investment (ROI) [3].

9. **Regulatory Compliance:**

- Ensure that the revaluated plastic part complies with relevant industry standards and regulations.
- Obtain any necessary certifications or approvals.

10. **Production Planning:**

- Plan the production process, considering the required quantity and lead times.
- Develop a timeline for implementation and monitor progress regularly.

11. **Supplier Selection (if outsourcing):**

- If outsourcing the revaluation process, carefully select a reputable and experienced plastics manufacturer.
- Request quotes, evaluate capabilities, and review past performance.

12. **Continuous Improvement:**

- Encourage a culture of continuous improvement within the organization to refine the plastic revaluation process.
- Solicit feedback from stakeholders and implement lessons learned for future projects.

13. **Monitor and Optimize:**

- Regularly monitor the performance of the revaluated plastic part in real-world applications.
- Address any issues and make necessary improvements for optimal results.

Improving design for recycling would make it easier to meet the proposed target specifications, leading to higher yields, lower costs, and increased incorporation of higher recycled content in packaging in the future. Currently, producers have high aesthetic demands for products containing recycled content. Converters and producers working with post-consumer plastic face challenges in controlling visual imperfections and color inconsistencies due to varying incoming material. To address this, brands and retailers can promote consumer acceptance of products with recycled content by raising awareness about aesthetic differences linked to recycled materials [7].

Simplifying the design of specific packaging colors would encourage the creation of dedicated waste streams for particular applications. Additionally, innovative packaging design that reduces sensitivity

to minor color variations, such as using shrink sleeves over non-pigmented items, can enhance the availability of improved secondary raw material streams. Establishing quality specifications for recyclates is crucial as it will enhance their value, encourage tailored investments in sorting and recycling operations, and promote better collection and sorting technologies. These investments will maximize the benefits of recycling and facilitate the transition towards a circular economy [7].

Case studies & Examples

The given example discusses the state of the art in PVC recycling in the manufacturing industry for MEGABOARD company. MEGABOARD is Austria's specialist for large-scale outdoor advertising and out-of-home campaigns where the topic of sustainability has a special significance. Let's find out about the challenge and opportunities the company faces (text prepared by Cyrkl):

PVC is a plastic that is known primarily for its durability and longevity. Usually, PVC is found in the construction industry, for example for window profiles, pipes, or flooring. However, the material is also used in the advertising industry, such as MEGABOARD, in the form of tarpaulins. The composite material is made up of PVC and a polyester mesh material. A robust infrastructure already exists for sorted PVC waste, but it is unclear whether and which recycler can process this composite material and return it to the cycle. MEGABOARD and Cyrkl collaborated to survey the state of the art and research a portfolio of options and recycling partners.

PVC in composite materials presents some challenges that have led companies like MEGABOARD to research equivalent PVC-free materials. The main material used in outdoor advertising is relatively heavy (causing higher transportation emissions), often contains additives or plasticizers, and contains a chloride component that turns into hydrochloric acid when burned. Although PVC in composite materials presents some challenges, it also offers many unique applications. That's why research is being done assiduously into recycling technologies and processes for reprocessing the material.

A similar composite material is used in truck tarpaulins, which currently have two potential material recycling routes: The material can be mechanically processed into a mixture of polyester (PES for short) and PVC, which is reused in the production of flooring or mats. In chemical recycling, the polyester can even be completely separated from the PVC and both raw materials can be reused separately. Looking into the future, research is currently being conducted on a solvent-based process that allows the PVC to swell, as well as on the physical separation of PVC & polyester, completely without chemicals.

After intensive research throughout German-speaking countries, potential recycling partners for MEGABOARD's PVC/PES tarpaulins could be found. Two of these companies have production capacities available and could recycle the material. Thus, the foundation has been laid to be able to enter into closer talks with the partners in the future.

In addition to researching the market and contacting recycling partners, MEGABOARD was also given some recommendations that think beyond traditional waste management. There is further potential in re-use beyond processing into bags and a new project was initiated to keep the material in circulation [4].

Another source of inspiration is Precious Plastic community formed by thousands of people passionate about plastic recycling, which shares ideas, practices, suggestions and everything related to plastic reuse. The founder is the Dutch designer Dave Hakkenson [5].

You can get inspired by the complete instructions for recycling, detailed instructions with videos on how to construct the necessary equipment, or contacts or even join the community at www.preciousplastic.com [6].

Resources

Links:

[1] https://formlabs.com/eu/blog/guide-to-manufacturing-processes-for-plastics/
[2] https://measurlabs.com/blog/mechanical-testing-of-plastic-materials/
[3] https://www.techtarget.com/searchcio/definition/ROI
[4] https://cyrkl.com/en/case-studies/290
[5] https://www.odpady-portal.sk/Dokument/103839/ako-recyklovat-plastovy-odpad-a-vyrabat-z-neho-produkty-doma-tu-je-navod.aspx
[6] https://preciousplastic.com/index.html
[7] https://endplasticwaste.org/en/our-stories/improve-plastic-packaging-circularity

Social media posts:

[8] https://www.linkedin.com/advice/1/how-can-you-use-cad-software-optimize