PRODUCT ATTACHMENT & TRUST

Goal: to (re)design the product as such that the user of this product will feel personally attached to it, encouraging him or her to be careful with it and postpone replacement of this product. In this way, the product's lifetime will be extended.

PRODUCT ATTACHMENT & TRUST

User is personally attached to product

- Emotional product value
- Narrative
- Social product value
- Product personalization

PRODUCT ATTACHMENT & TRUST

User trusts product

- Product quality
- Product safety

PRODUCT ATTACHMENT & TRUST

User is personally detached from product

- Lack of emotional product demand
- Lack of product expectation

PRODUCT ATTACHMENT & TRUST

Product's design is attractive to user

- Attractive, fashionable, personalized
- Well-aging materials and surface

PRODUCT ATTACHMENT & TRUST

Product triggers curiosity

- Product innovativeness
- Product upgradability and adaptability

PRODUCT ATTACHMENT & TRUST

Product is ‘conscious’

- Product-user interaction
- Comfort of product use

PRODUCT ATTACHMENT & TRUST

Product has favorable economy of use

- Product profitability

PRODUCT DURABILITY

Goal: to (re)design the product as such that this product will last as long as possible. Key in this is to guarantee and improve the product's reliability of use.

PRODUCT DURABILITY

Enhanced product durability

- Degradation-resistant materials
- Ruggedization of product

PRODUCT DURABILITY

Pre-use processes optimized

- Manufacture process optimized
- Assembly process optimized
- Installation process optimized

PRODUCT DURABILITY

Simplified product

- Less complex product use
- Less complex product components

PRODUCT DURABILITY

Specified product

- Product use mechanisms improved
- Product components improved

PRODUCT DURABILITY

Product replacement potential

- Easily accessible product components
- Easy-to-replace materials

PRODUCT DURABILITY

Reduced product variability

- Limited material variability
- Standardized product components

PRODUCT DURABILITY

Under-stressed product use

- Product components designed for understressed use

PRODUCT DURABILITY

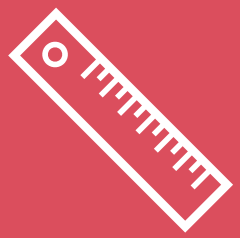
Product redundancy

- Crucial product components duplicated
- Product components and subsystems used in parallel

PRODUCT DURABILITY

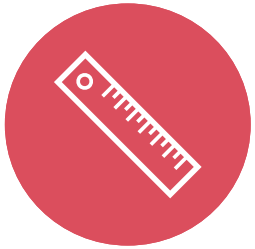
Post-purchase services professionalized

- Maintenance services
- Ease of inspection



PRODUCT STANDARDIZATION & COMPATIBILITY

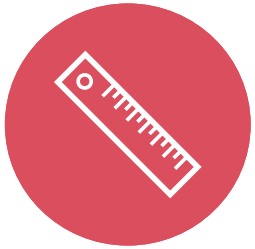
Goal: to (re)design the product as such that this product will be capable of “performing in harmonious or congenial combination with different parts” (Succi et al., 1998, p. 140) or different products.



PRODUCT STANDARDIZATION & COMPATIBILITY

Introduction

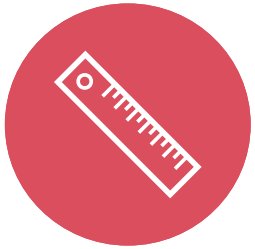
Product compatibility may be achieved through 3 steps of standardization, meaning that products or product components are designed and produced in a defined and uniform way (i.e. according to standards), or through developing adapters between incompatible parts of this product.



PRODUCT STANDARDIZATION & COMPATIBILITY

1. Determining whether product compatibility is desirable

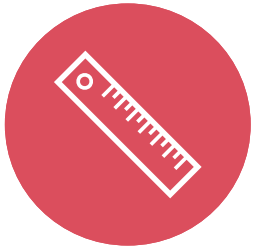
- Is interchangeability of product components or systems favorable?
- Is there a sufficiently interesting opportunity to become a ‘leader’ within the market by introducing a compatible product?
- How innovative is the new technology that will be introduced?
- Is mass production and mass customization desirable for this product from financial and/or market share perspective?



PRODUCT STANDARDIZATION & COMPATIBILITY

1. Determining whether product compatibility is desirable

- Is ease of communication among users in the same product network or system favorable?
- How large and promising is the current installed base of the product for which a compatible product or component would be designed?

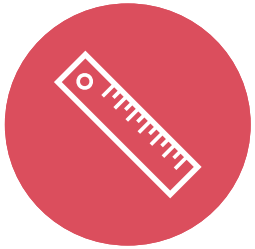


PRODUCT STANDARDIZATION & COMPATIBILITY

2. Determining the type of product compatibility

- What kind of compatible product or product component is most favorable?

1. New product as a whole
2. New product component as a whole
3. Product component that can be added to an already existing product system of the producer
4. Product component that can be purchased and combined so as to form a product system; this involves components of more than one producer



PRODUCT STANDARDIZATION & COMPATIBILITY

3. Determining the most optimal way to obtain product compatibility

- How can this compatible product or product component best be obtained?
- Designing product or product component in such way that it is compatible with existing production standards
- Designing product or product component in such way that it is directly compatible with other products or product components
- Use of product modularity

EASE OF PRODUCT MAINTENANCE & REPAIR

Goal: to (re)design the product as such that it is easy to maintain and repair by its user. This prolongs product quality and will postpone the need for product replacement, thereby allowing for a longer lifetime of this product.

EASE OF PRODUCT MAINTENANCE & REPAIR

General design guidelines

- Unambiguity with regard to product use, maintenance and repair activities
- Predictability of product performance and maintenance
- Safety of product
- Testability of product performance
- Monitoring ability inherent to product
- Standard interface of product

EASE OF PRODUCT MAINTENANCE & REPAIR

Product handling & access

- Maintenance points appropriately located and designed
- Access points appropriately located and designed
- Maintenance activities understandable and easy to perform

EASE OF PRODUCT MAINTENANCE & REPAIRModules & joining mechanisms

- Modularized components and systems
- Fasteners practical and compatible with regard to maintenance and repair acitivities

EASE OF PRODUCT MAINTENANCE & REPAIR

Components & materials

- Standardized, universal components
- Modularized components
- Ease of component and material handling
- Practical location of components
- Component usability and tolerance range

PRODUCT UPGRADABILITY & ADAPTABILITY

Goal: to (re)design the product as such that it can be upgraded to perform different functions and satisfy different user needs in future product generations (i.e. upgradability) and/or that the product in its current form can be adjusted to improve its current functions and to satisfy user needs more appropriately (i.e. adaptability).

PRODUCT UPGRADABILITY & ADAPTABILITY

Introduction

Product upgradability and adaptabilty may be achieved through 3 steps. This will foster product flexibility and eliminate the need for purchasing a new product when new technologies are available or advances are made, thereby lengthening the product's lifetime.

PRODUCT UPGRADABILITY & ADAPTABILITY

1. Defining long-term upgrade-and-adapt plan for various product generations

- Determining product functions of current product
- Determining scenarios of future product change
- Determining product functions that are to be upgraded or adapted per product generation

PRODUCT UPGRADABILITY & ADAPTABILITY

2. Determining upgrading and adaptation operations for each product generation

- Functional upgrading: determining how the product can be upgraded through altering its functions
- Parametric upgrading: determining how the product can be upgraded thorugh altering its performance
- Functional adaptability: enhancing the extendibility of product fucntions
- Customized and operational adaptability: determining the ease of adaptability

PRODUCT UPGRADABILITY & ADAPTABILITY

3. Determining the product platform and upgrade-and-adapt modules of product

- Distinguishing between the product platform and the upgrade-and-adapt modules of the product
- Delayed selection of components
- Standardization and modularization of prodcut compoentns and upgrade-and-adapt modulesn

PRODUCT DIS- & REASSEMBLY

Goal: to (re)design the product as such that it can be easily disassembled and reassembled without its various components losing their initial function due to damage or deformation.

PRODUCT DIS- & REASSEMBLY

Introduction

As the original product components can be reassembled after disassembly, there is no need for replacing the current product with a new one. In this way, the product's lifetime is extended.

PRODUCT DIS- & REASSEMBLY

Less disassembly work

- Minimize material and component variability
- Combine elements of same material
- Use standardized and compatible components and materials
- Modularize related components
- Provide easy access for harmful, valuable, reusable components
- Provide easy access to joining points

PRODUCT DIS- & REASSEMBLY

Predictable product configuration

- Avoid ageing and corrosive material combination
- Protect subassemblies against soiling and corrosion

PRODUCT DIS- & REASSEMBLY

Easy disassembly

- Use standardized and modularized components
- Accessibility of key components
- Simplicity of joining mechanisms
- Uniformity of fasteners
- Linear and unified disassembly direction
- Avoid turning operations
- Enable simultaneous separation and disassembly
- Base-part product structure with key elements
- Avoid metal inserts in plastic parts

PRODUCT DIS- & REASSEMBLY

Easy handling

- Surface available for grasping
- Avoid non-rigid parts
- Seal and modularize harmful substances
- Parts easy to store and transport

PRODUCT DIS- & REASSEMBLY

Easy separation

- Use standardized and modularized components
- Avoid secondary finishing
- Labelling of different materials

PRODUCT DIS- & REASSEMBLY

Variability reduction

- Use standardized and modularized components
- Limit number of materials and fasteners