

CALCULATION OF DFMA CHARACTERISTICS AND RATIOS

GUIDELINES IN NUTSHELL



STARTING POINT



GOAL

DESIGN

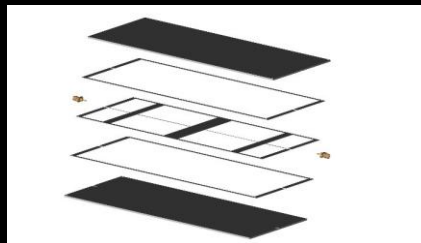
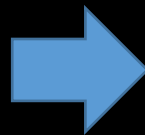
PERFORMANCE
OF THE DEVICE

Mechanical
requirements

Electrical
requirements

Other
functional
requirements

Directives and
laws to be
obeyed

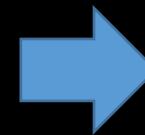


Product do be
analyzed

MANUFACTURING

MANUFACTURING
OF PARTS AND
COMPONENTS
(DFM)

ASSEMBLY STAGES
OF PARTS,
COMPONENTS
AND
SUB-ASSEMBLIES
(DFMA)

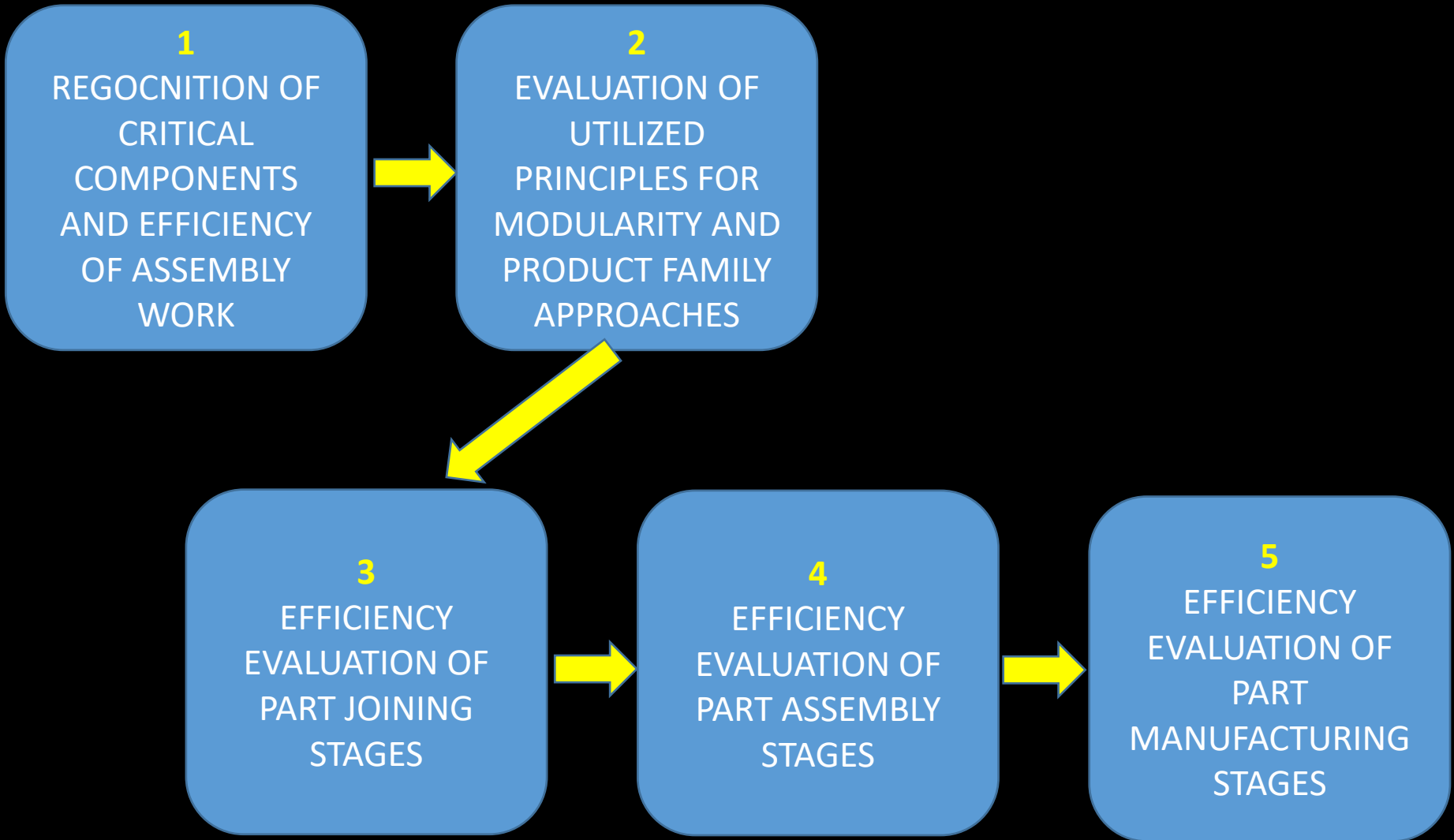


ANALYTICAL
COMPARISON OF
DFMA-ASPECTS
BETWEEN
DIFFERENT
PRODUCT VARIANTS
OR MEMBERS OF
PRODUCT FAMILIES
BASED ON THEIR
FUNCTIONAL AND
BUSINESS-ORIENTED
NUMERICAL
CHARACTERISTICS
AND RATIOS

How to find and define critical components?

- There are several optional viewpoints: a component could be regarded as a critical one if...
- ***...it is needed to ensure the main function or the performance of the device (e.g. a heating element in a hair dryer)***
- ...it is the most expensive component in the construction
- ...it should be ordered from a sub-contractor (there might be some risks e.g. in delivery)
- ...it should be changed relatively often (e.g. service and maintenance activities)
- ...it is somehow challenging for assembly or manufacturing (e.g. most time consuming manufacturing or assembly stage)
- ...it is made of material which is difficult for recycling or other environmental reasons
- ...there are several EU directives or laws to be obeyed dealing with the component (e.g. electric devices)
- ... the total number of same kinds of components is relatively high (e.g. tens or hundreds of similar mounting screws or rivets)
- ...etc.

CALCULATION OF DFMA CHARACTERISTICS AND RATIOS



APPLIED DFMA VIEWPOINT (1...5)	DESIGN CONDITIONS	FUNCTIONAL AND BUSINESS-ORIENTED NUMERICAL CHARACTERISTICS AND RATIOS FOR ANALYTICAL COMPARISON
<p>1 RECOGNITION OF CRITICAL COMPONENTS AND EFFICIENCY OF ASSEMBLY WORK</p>	<p>How much time is needed for assembly work? How many critical components are there in the construction? How many functions does each component have?</p>	<ul style="list-style-type: none"> -Number of critical components / total number of components -Total assembly time / number of components -Total assembly time / number of critical components -Number of different functions for each component in average → Numerical ratios to describe the efficiency of assembly work of critical and secondary components and the cost-effectiveness of assembly work
<p>2 EVALUATION OF UTILIZED PRINCIPLES FOR MODULARITY AND PRODUCT FAMILY APPROACHES</p>	<p>How many modular geometries or other modular solutions are there in the construction? How many members of product families can be formed from modular solutions? How many modular manufacturing stages are included to the production?</p>	<ul style="list-style-type: none"> -Number of modular components/ total number of components -Total number of components/ number of product families → Numerical ratios to describe the efficiency of utilizing modularity and the cost-effectiveness of modularity

APPLIED DFMA VIEWPOINT (1...5)	DESIGN CONDITIONS	FUNCTIONAL AND BUSINESS-ORIENTED NUMERICAL CHARACTERISTICS AND RATIOS FOR ANALYTICAL COMPARISON
<p>3 EFFICIENCY EVALUATION OF PART JOINING STAGES</p>	<p>How many separate joining components are there in the construction? How many different joining components or joining types are there in the construction? How many different joining technologies or methods are needed to make these joints? How many different types or special tools are needed for joining stages?</p>	<ul style="list-style-type: none"> -Number of different kinds of joining components/ total number of components -Number of different kinds of joining components/ number of different joining technologies or methods -Number of special tools / total number of components -Assembly time of each different type of joint / total assembly time → Numerical ratios to describe the efficiency of joining stages and the cost-effectiveness of joining

APPLIED DFMA VIEWPOINT (1...5)	DESIGN CONDITIONS	FUNCTIONAL AND BUSINESS-ORIENTED NUMERICAL CHARACTERISTICS AND RATIOS FOR ANALYTICAL COMPARISON
<p>4 EFFICIENCY EVALUATION OF PART ASSEMBLY STAGES</p>	<p>How many assembly directions are required? How many different assembly directions or positions are accepted for each component or sub-assembly?</p>	<p>-Number of acceptable assembly directions / required assembly directions → Numerical ratio to describe the efficiency and the cost-effectiveness of assembly work</p>
<p>5 EFFICIENCY EVALUATION OF PART MANUFACTURING STAGES</p>	<p>How many different manufacturing technologies are needed to produce one device?</p>	<p>-Total number of components / number of required manufacturing technologies and methods → Numerical ratio to describe the efficiency and the cost-effectiveness of component manufacturing and production chain</p>

SUMMARY OF DFMA CHARACTERISTICS AND RATIOS

APPLIED DFMA VIEWPOINT (1...5)	DESIGN CONDITIONS	FUNCTIONAL AND BUSINESS-ORIENTED NUMERICAL CHARACTERISTICS AND RATIOS FOR ANALYTICAL COMPARISON
1 REGOCNITION OF CRITICAL COMPONENTS AND EFFICIENCY OF ASSEMBLY WORK	How much time is needed for assembly work? How many critical components are there is the construction? How many functions does each component have?	-Number of critical components / total number of components -Total assembly time / number of components -Total assembly time / number of critical components -Number of different functions for each component in average → Numerical ratios to describe the efficiency of assembly work of critical and secondary components and the cost-effectiveness of assembly work
2 EVALUATION OF UTILIZED PRINCIPLES FOR MODULARITY AND PRODUCT FAMILY APPROACHES	How many modular geometries or other modular solutions are there in the construction? How many members of product families can be formed from modular solutions? How many modular manufacturing stages are included to the production?	-Number of modular components/ total number of components -Total number of components/ number of product families → Numerical ratios to describe the efficiency of utilizing modularity and the cost-effectiveness of modularity
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