# Appendix Writing in a Report

## Appendix 1 – Figures and Tables

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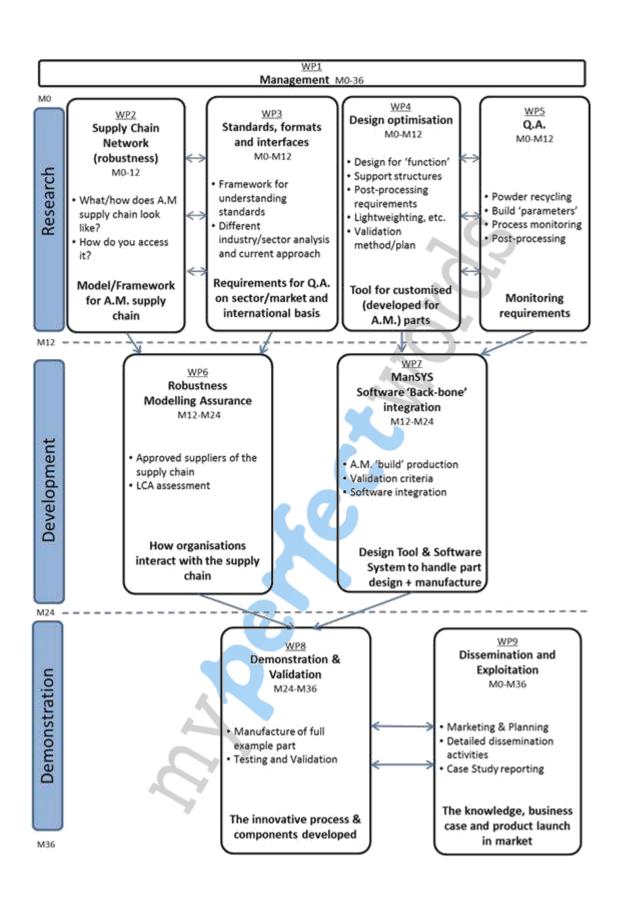


Figure 1 Timing of Work Packages and their components

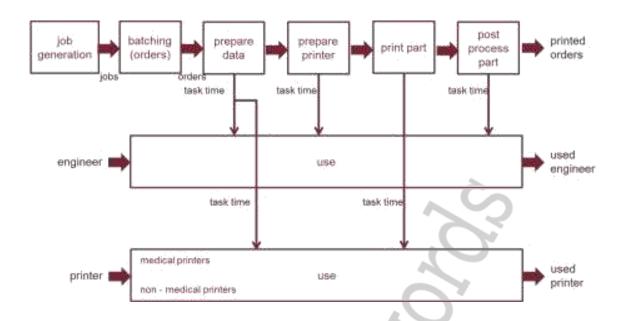


Figure 2: Overview of discrete event simulation process.

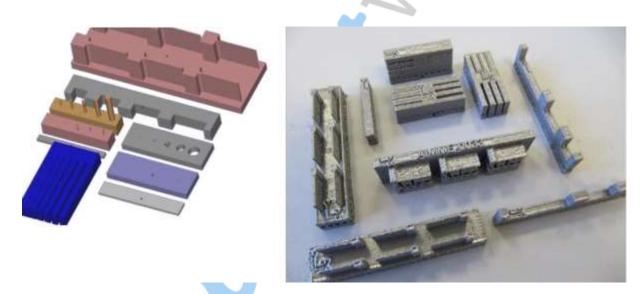


Figure 3: Design file of test artefact (left). Actual manufactured test artefact (right).

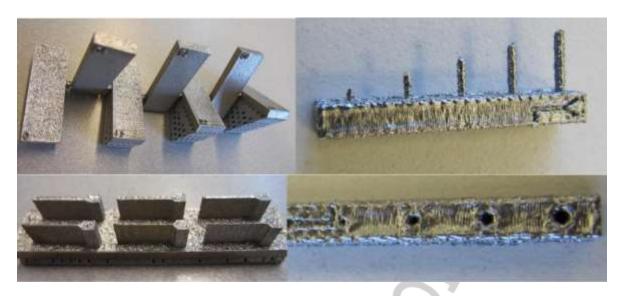


Figure 4: Surface finish, pins, thin walls and holes assessed.

## **Original part**

- Definition of geometry (CAD)
- Definition of load cases and constraints
- Part requirements (fatigue, material behaviour and strength)
- Analysis of original component

#### Topology Optimisation

- Definition and refinement of optimisation parameters: number of iterations, member size constraints, etc.
- Assessment of results and mesh sensitivity study

# Part "Re-design"

- Based on original part and STL from topology optimisation
- Use Materialise
   3-Matic software
- Regularise, smooth, and replace unwanted aspects
- Re-mesh the surface and add substructures

#### **Final Verification**

- Re-mesh the new part
- Analyse under design loads
- Verify adequacy of solution

Figure 5: Topology Optimisation Process-flow (Credit: TWI)

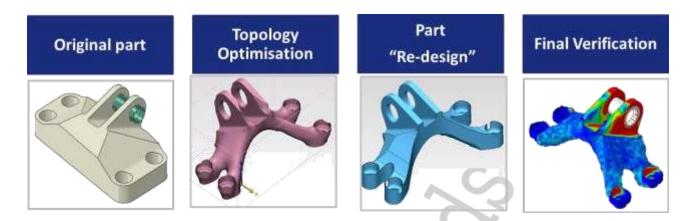


Figure 6: GE engine bracket (Credit:TWI).

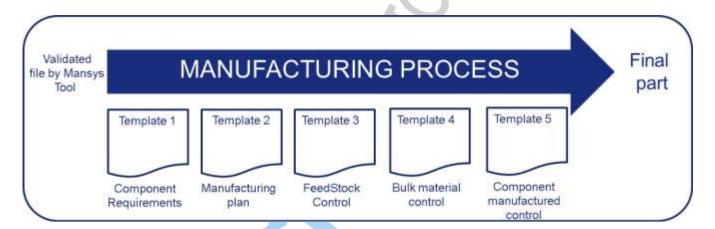


Figure 7: ManSYS Manufacturing quality validation process.

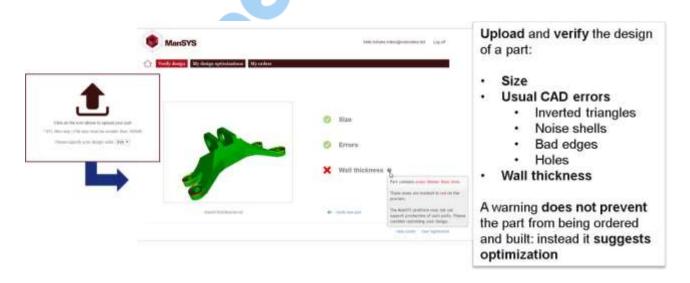


Figure 8: Example of the ManSYS decision making tool analysis.



Figure 9: ManSYS web portal interface.

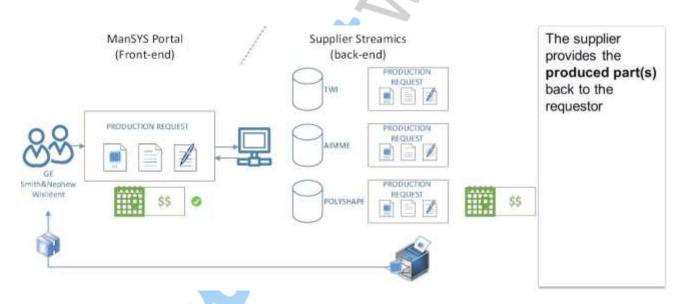


Figure 10: ManSYS Production Requests.

**Table 1 list of participants** 

Participant no.	Participant organisation name	Participant short name	Country		Organisation Type
1	TWI Ltd	TWI	UK		RTO
2	Materialise	MAT	Belgium (USA)	_	LE
3	LPW Technologies Ltd	LPW	UK		SME
4	BCT GmbH	BCT	Germany		SME
5	Polyshape	POL	France		SME
6	Berenschot	BER	Netherlands		LE
7	TNO	TNO	Netherlands		RTO
8	AIMME	AIM	Spain	9	RTO
9	Smith & Nephew	SN	UK (USA)	N N	LE
10	Wisildent (& Twocare)	WIS	Italy		SME
11	GE	GE	Turkey (USA)	C*	LE

Table 2: Overview of Demonstrator Results Achieved from ManSYS for each of the Demonstrators.

	GE	S&N	Wisildent			
Optimization Tool Analysis	75% weight reduction					
Supply Chain Analysis	86% improvement in total purchase ordering and delivery period					
Decision	Automated thin wall detection					
Making Tool	Automated size limitation detection					
Analysis	Automated part error detection for inverted surfaces					
	8.3kWh of specific					
Life Cycle Analysis	energy consumption for the optimized bracket	operay consumption	0.4kWh of specific energy consumption for the optimized bridge			
Business	75% weight reduction	90% reduction in	75% reduction in			
Impact	from one bracket,	manufacturing time manufacturing time				

	equating to \$1,254,000 cost savings per year.	and 68% less raw material, equating to 1,060.000€ cost savings annually.	
Environmental	0.003% reduction in		
impact (material)	fuel consumption per bracket.	240gr less raw material per nail	75% shorter manufacturing time

