ELONATIC CONSULTING & ENGINEERING

CAESES - CADMATIC link in Concept Design

Markus Jokinen @ CAESES User Meeting, Berlin 2019-09-20







Who am I?



Markus Jokinen

Project Engineer

M.Sc. (Naval Arch.) Aalto University, Finland

Work Experience

- Since 02.2016 Permanent Employee at Elomatic
- 02.-09.2016 Master Thesis at Elomatic



Elomatic



Intelligent engineering

Key facts

- Consulting and engineering
- 50 years of tradition
- 1000+ specialists
- Multidisciplinary
- Globally operating
- Cadmatic 3D software







Battery-driven DE Ferry



Holiship WP17 Application case Double Ended Ferry



CAESES - CADMATIC Agenda



- 1. Objective of Holiship
- 2. Design process in Caeses Cadmatic
- 3. Parameters in Cadmatic
- 4. Starting point for optimization
- 5. Caeses model and optimization







Objective of Holiship









Target to produce Intelligent General Arrangement







Optimization link between Caeses and Cadmatic

Caeses modifies:

- Hull shape and
- Parameters in batch mode
- Parametric views and plates will update in certain time intervals
- Hull shape and parameters optimized based on:
 - Stability,
 - Resistance (OPEX)
 - Required areas and volumes (car lanes, tanks, etc.)





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CAESES - CADMATIC Parameters



• Idea of Parameters table:

- Define bulkhead and deck positions and angles
- Use formulas to define positions and angles
- Quickly change geometry by changing parameters
- Formulas can define bulkhead and deck positions (Value):
 - in respect of other bulkheads
 - using required area or volume as a precondition

Gen	erai					0 0
				Parameters		
Filter	Ind	ex Type	Name	Expression	Value	Comment
	1	length	frame	700	700	
	2	length	MFB1	-48*frame	-33600	
🔽 Length	3	length	MFB2	MFB1+16*frame	-22400	
😺 Breadth	4	length	MFB3	MFB2+16*frame	-11200	
	5	length	MFB4	MFB3+8*frame	-5600	
M Height	6	length	MFB5	-1*MFB4	5600	
🚺 Distance	7	length	MFB6	-1*MFB3	11200	
_	8	length	MFB7	-1*MFB2	22400	
🔽 Angle	9	length	MFB8	-1*MFB1	33600	
	10	length	TBH040101	MFB4-4*frame	-8400	Sewage tank TBH on deck 01, MVZ4
	11	length	TBH050101	MFB4+2*frame	-4200	MDO tanks on deck 01, MVZ5
	12	length	TBH050102	TBH050101	-4200	Waste oil tank on deck 01, MVZ5
	13	length	TBH050103	MFB4+2*frame	-4200	Sea chest on deck 01, MVZ5
	14	length	TBH050104	TBH050101+6*frame	0	TBH between MDO, bilge & lubrication tanks on (
	15	length	TBH050105	TBH050104+4*frame	2800	Bilge & lubrication tank TBH on deck 01, MVZ5
	16	length	TBH060101_F	PMFB6-4*frame	8400	Fresh water tank on deck 01, MVZ6
	17	length	TBH010201	MFB1-4*frame	-36400	Fire station on deck 02, MVZ1
	18	length	TBH020201	MFB1+1*frame	-32900	TBH between fire station & Escape room on dec
	19	length	TBH020202	TBH020201+3*frame	-30800	Store TBH on deck 02, MVZ2
	20	length	TBH030201	MFB3	-11200	TBH between Embarkation area & Pax inva area
	Ind	ex Type	Name	Expression	Value	Comment

Parameters stored as xml format -> can be changed by Caeses



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• After going through first design spiral, we have:

- Initial GA (Cadmatic)
- Room types and weights
- Initial steel structure + weight (Cadmatic Hull)
- Main component weights (optional, Cadmatic Outfitting)
- Initial cost (Caeses)
- Power Res. (Caeses + CFD)
- Next hull shape and geometry are modified via Caeses

Link between Cadmatic Hilltop & Caeses is established via xml files

Starting point for

optimization

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CAESES - CADMATIC Case Study



Features:

- Operates in archipelago
- Ice strenghtened vessel
- Battery-driven ferry

Table 3. Initial sizing of the ferry

	INITIAL	RANGE
CARS	150	150+
PAX	400	400
LANES	7	6-8
L [M]	121	Max. 129,9
B [M]	19,2	16,7-22
T [M]	2,5	No limit
D [M]	4,5	Freeboard
DWT [TONS]	400	400+





CAESES - CADMATIC Route









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Caeses model

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Functions in Caeses

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FScope	freeboard	0		0.715999	_	
FScope	iceClass	0	Opex / year	01_parameters	0	
FScope	A NetPresentValue	0	[M€]	derived OPEX		
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FParameter	NPV_ME		Interest rate	6	0	•
FParameter	NPV_Optimal	0	[%]			
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FScope	Electricity_cost	0	Time in		0	
FScope	Engine_power	0	years	inetime_in_years	-	
FParameter	🕟 crew_cost_day	0				
FParameter	📐 Fuel_cost_per_day	2	Percentage			

Connections Optimization Visualization Features View Help



File

CAD

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CAESES - CADMATIC Optimization



- Optimization run in batch mode
- Ways:
 - Either directly changing Cadmatic model or
 - By previously created surrogate model (responce surface method RSM)





Optimization

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DakotaNPV

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CAESES - CADMATIC To Future







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