

# modeFRONTIER Postprocessing

Topic: Postprocessing

Approved By: Terje Rølvåg

Name: Espen Nilsen, Carl Skaar

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This A3 intends to provide a guide to decision making once an optimization has been done. This briefing shows an approach with the use of modeFRONTIERs built in MCDM(-Multi Criteria Decision Making).

1. When an optimization has been run in modeFRONTIER, it presents all the iterations with its design parameters in a design table.

From this table one can range the smallest to largest and mark the designs that falls within an acceptable range regarding one of the two goals. This is done by highlighting the designs that might be good enough. Right click in the highlighted field and click: mark designs->mark selected. The chosen designs should now be ticked off. In this particular case displacement was chosen as the limiting factor for estimating the best design.

2. A. The next step is: Assessment->Open MCDM panel. Here the variables and goals are displayed in a list in MCDM attributes. Check the boxes regarding goal parameters and proceed. Desired range of the parameters can also be specified manually in the attributes.

ID	RID	M	CATEGORY	Ball_join...	Flange...	Flange_t...	Front_bu...	Hydrobu...	Swing_a...	Thickne...	MAXDisp	mass	min_wel...	Disp_limit	Mass_Ii
158		<input checked="" type="checkbox"/>	SIMPLE...	1.7300E1	1.0000E-1	7.0000E0	1.9100E1	1.6200E1	1.5900E1	1.0000E-2	1.6161E0	1.5258E0	1.5258E0	1.6161E0	1.5258E0
148		<input checked="" type="checkbox"/>	SIMPLE...	1.7700E1	2.7000E-1	6.9000E0	1.8800E1	1.6500E1	1.6000E1	4.0000E-2	1.6238E0	1.5186E0	1.5186E0	1.6238E0	1.5186E0
91		<input checked="" type="checkbox"/>	SIMPLE...	1.7900E1	6.0000E-2	6.9000E0	1.9400E1	1.8000E1	1.5600E1	1.0000E-2	1.6281E0	1.5346E0	1.5346E0	1.6281E0	1.5346E0
201		<input checked="" type="checkbox"/>	SIMPLE...	1.7100E1	1.4000E-1	6.7000E0	1.9700E1	1.7000E1	1.6000E1	1.0000E-2	1.6361E0	1.5073E0	1.5073E0	1.6361E0	1.5073E0
151		<input checked="" type="checkbox"/>	SIMPLE...	1.7500E1	1.0000E-2	6.8000E0	2.0400E1	1.7400E1	1.5600E1	1.0000E-2	1.6391E0	1.5186E0	1.5186E0	1.6391E0	1.5186E0
197		<input checked="" type="checkbox"/>	SIMPLE...	1.7100E1	8.0000E-2	6.6000E0	1.9400E1	1.7400E1	1.6000E1	1.0000E-2	1.6397E0	1.5028E0	1.5028E0	1.6397E0	1.5028E0
192		<input checked="" type="checkbox"/>	SIMPLE...	1.7100E1	2.1000E-1	6.7000E0	1.9100E1	1.6900E1	1.6000E1	1.0000E-2	1.6419E0	1.4988E0	1.4988E0	1.6419E0	1.4988E0
195		<input checked="" type="checkbox"/>	SIMPLE...	1.8000E1	1.0000E-2	6.6000E0	2.1000E1	1.6300E1	1.5700E1	1.0000E-2	1.6464E0	1.5050E0	1.5050E0	1.6464E0	1.5050E0
149		<input checked="" type="checkbox"/>	SIMPLE...	1.7200E1	1.0000E-2	7.0000E0	1.9700E1	1.6600E1	1.5400E1	1.0000E-2	1.6466E0	1.5068E0	1.5068E0	1.6466E0	1.5068E0
90		<input checked="" type="checkbox"/>	SIMPLE...	1.8100E1	2.5000E-1	6.9000E0	1.9800E1	1.8000E1	1.5900E1	5.1000E-1	1.6514E0	1.4903E0	1.4903E0	1.6514E0	1.4903E0
79		<input checked="" type="checkbox"/>	SIMPLE...	1.8100E1	5.1000E-1	6.7000E0	1.9400E1	1.8000E1	1.6000E1	2.6000E-1	1.6604E0	1.4871E0	1.4871E0	1.6604E0	1.4871E0
150		<input checked="" type="checkbox"/>	SIMPLE...	1.7100E1	1.9000E-1	6.5000E0	1.8400E1	1.6700E1	1.6000E1	1.0000E-2	1.6621E0	1.4711E0	1.4711E0	1.6621E0	1.4711E0
157		<input checked="" type="checkbox"/>	SIMPLE...	1.7700E1	3.6000E-1	6.5000E0	1.8000E1	1.6100E1	1.6000E1	1.0000E-2	1.6661E0	1.4696E0	1.4696E0	1.6661E0	1.4696E0
155		<input checked="" type="checkbox"/>	SIMPLE...	1.7300E1	1.2000E-1	6.4000E0	1.8000E1	1.6100E1	1.6000E1	1.0000E-2	1.6662E0	1.4624E0	1.4624E0	1.6662E0	1.4624E0
196		<input checked="" type="checkbox"/>	SIMPLE...	1.7300E1	1.0000E-2	6.7000E0	2.2000E1	1.7900E1	1.5800E1	5.0000E-1	1.6687E0	1.4709E0	1.4709E0	1.6687E0	1.4709E0
109		<input checked="" type="checkbox"/>	SIMPLE...	1.7500E1	1.6000E-1	7.0000E0	1.8000E1	1.8000E1	1.5800E1	7.4000E-1	1.6727E0	1.4534E0	1.4534E0	1.6727E0	1.4534E0
114		<input checked="" type="checkbox"/>	SIMPLE...	1.7600E1	1.0000E-2	6.9000E0	1.8000E1	1.7800E1	1.5900E1	8.8000E-1	1.6752E0	1.4436E0	1.4436E0	1.6752E0	1.4436E0
94		<input checked="" type="checkbox"/>	SIMPLE...	1.8000E1	7.0000E-1	6.9000E0	1.9700E1	1.7900E1	1.5900E1	4.4000E-1	1.6797E0	1.4669E0	1.4669E0	1.6797E0	1.4669E0
108		<input checked="" type="checkbox"/>	SIMPLE...	1.7600E1	1.9000E-1	6.9000E0	1.8000E1	1.7700E1	1.5900E1	7.9000E-1	1.6802E0	1.4406E0	1.4406E0	1.6802E0	1.4406E0
154		<input checked="" type="checkbox"/>	SIMPLE...	1.7400E1	8.0000E-2	6.7000E0	1.9900E1	1.7200E1	1.5300E1	5.0000E-2	1.6815E0	1.4746E0	1.4746E0	1.6815E0	1.4746E0
220		<input checked="" type="checkbox"/>	SIMPLE...	1.7500E1	3.0000E-2	6.5000E0	1.9600E1	1.6900E1	1.5900E1	4.7000E-1	1.6829E0	1.4425E0	1.4425E0	1.6829E0	1.4425E0
273		<input checked="" type="checkbox"/>	SIMPLE...	1.7900E1	9.1000E-1	6.9000E0	1.8200E1	1.8000E1	1.6000E1	3.8000E-1	1.6853E0	1.4591E0	1.4591E0	1.6853E0	1.4591E0
102		<input checked="" type="checkbox"/>	SIMPLE...	1.7800E1	1.1400E0	7.0000E0	1.8500E1	1.7900E1	1.5900E1	1.7000E-1	1.6859E0	1.4700E0	1.4700E0	1.6859E0	1.4700E0
212		<input checked="" type="checkbox"/>	SIMPLE...	1.7300E1	6.0000E-2	6.7000E0	2.0800E1	1.7500E1	1.5600E1	4.5000E-1	1.6870E0	1.4518E0	1.4518E0	1.6870E0	1.4518E0
270		<input checked="" type="checkbox"/>	SIMPLE...	1.7700E1	1.1200E0	7.0000E0	1.8400E1	1.7700E1	1.5800E1	9.0000E-2	1.6883E0	1.4694E0	1.4694E0	1.6883E0	1.4694E0
121		<input checked="" type="checkbox"/>	SIMPLE...	1.7100E1	6.0000E-2	7.0000E0	1.8600E1	1.8000E1	1.5900E1	1.0000E0	1.6885E0	1.4305E0	1.4305E0	1.6885E0	1.4305E0
107		<input checked="" type="checkbox"/>	SIMPLE...	1.7400E1	3.3000E-1	6.9000E0	1.9100E1	1.8000E1	1.6000E1	8.5000E-1	1.6886E0	1.4355E0	1.4355E0	1.6886E0	1.4355E0
113		<input checked="" type="checkbox"/>	SIMPLE...	1.7400E1	1.0000E-2	6.9000E0	1.8400E1	1.8000E1	1.5900E1	1.0000E0	1.6889E0	1.4296E0	1.4296E0	1.6889E0	1.4296E0
193		<input checked="" type="checkbox"/>	SIMPLE...	1.7400E1	1.0000E-2	6.0000E0	2.0400E1	1.7300E1	1.6000E1	1.0000E-2	1.6891E0	1.4504E0	1.4504E0	1.6891E0	1.4504E0
216		<input checked="" type="checkbox"/>	SIMPLE...	1.7600E1	9.0000E-2	6.2000E0	1.9000E1	1.7500E1	1.6000E1	2.8000E-1	1.6893E0	1.4411E0	1.4411E0	1.6893E0	1.4411E0
146		<input checked="" type="checkbox"/>	SIMPLE...	1.7400E1	1.0000E-2	6.0000E0	2.1100E1	1.7100E1	1.6000E1	1.0000E-2	1.6895E0	1.4492E0	1.4492E0	1.6895E0	1.4492E0
204		<input checked="" type="checkbox"/>	SIMPLE...	1.7400E1	4.0000E-2	6.6000E0	2.1400E1	1.7700E1	1.5600E1	4.4000E-1	1.6906E0	1.4514E0	1.4514E0	1.6906E0	1.4514E0
111		<input checked="" type="checkbox"/>	SIMPLE...	1.7200E1	2.2000E-1	7.0000E0	1.8200E1	1.7800E1	1.6000E1	1.0000E0	1.6916E0	1.4242E0	1.4242E0	1.6916E0	1.4242E0
96		<input checked="" type="checkbox"/>	SIMPLE...	1.8000E1	8.5000E-1	6.8000E0	1.9500E1	1.7800E1	1.5900E1	3.3000E-1	1.6917E0	1.4581E0	1.4581E0	1.6917E0	1.4581E0
256		<input checked="" type="checkbox"/>	SIMPLE...	1.7900E1	1.4000E-1	6.3000E0	1.8000E1	1.7700E1	1.6000E1	4.6000E-1	1.6920E0	1.4331E0	1.4331E0	1.6920E0	1.4331E0
167		<input checked="" type="checkbox"/>	SIMPLE...	1.7400E1	1.7000E-1	6.3000E0	1.8300E1	1.6300E1	1.5800E1	3.0000E-2	1.6933E0	1.4399E0	1.4399E0	1.6933E0	1.4399E0
231		<input checked="" type="checkbox"/>	SIMPLE...	1.7700E1	4.0000E-2	6.3000E0	1.9000E1	1.7100E1	1.6000E1	5.0000E-1	1.6937E0	1.4277E0	1.4277E0	1.6937E0	1.4277E0
211		<input checked="" type="checkbox"/>	SIMPLE...	1.7600E1	7.0000E-2	6.3000E0	1.9300E1	1.6900E1	1.6000E1	4.4000E-1	1.6939E0	1.4284E0	1.4284E0	1.6939E0	1.4284E0
227		<input checked="" type="checkbox"/>	SIMPLE...	1.7700E1	6.0000E-2	6.3000E0	1.9300E1	1.7200E1	1.6000E1	5.0000E-1	1.6942E0	1.4287E0	1.4287E0	1.6942E0	1.4287E0
263		<input checked="" type="checkbox"/>	SIMPLE...	1.7900E1	1.0300E0	6.9000E0	1.8200E1	1.8000E1	1.6000E1	3.8000E-1	1.6946E0	1.4514E0	1.4514E0	1.6946E0	1.4514E0
214		<input checked="" type="checkbox"/>	SIMPLE...	1.7600E1	1.0000E-2	6.2000E0	1.8500E1	1.7000E1	1.6000E1	3.8000E-1	1.6953E0	1.4250E0	1.4250E0	1.6953E0	1.4250E0
124		<input checked="" type="checkbox"/>	SIMPLE...	1.7300E1	3.7000E-1	7.0000E0	1.8600E1	1.7800E1	1.6000E1	9.6000E-1	1.6962E0	1.4232E0	1.4232E0	1.6962E0	1.4232E0
164		<input checked="" type="checkbox"/>	SIMPLE...	1.7600E1	3.0000E-1	6.4000E0	1.8300E1	1.6300E1	1.5700E1	3.0000E-2	1.6962E0	1.4432E0	1.4432E0	1.6962E0	1.4432E0
97		<input checked="" type="checkbox"/>	SIMPLE...	1.7600E1	5.9000E-1	6.9000E0	1.8300E1	1.7700E1	1.6000E1	7.3000E-1	1.6965E0	1.4269E0	1.4269E0	1.6965E0	1.4269E0
171		<input checked="" type="checkbox"/>	SIMPLE...	1.7500E1	2.5000E-1	6.3000E0	1.8000E1	1.6100E1	1.5800E1	1.0000E-2	1.6972E0	1.4371E0	1.4371E0	1.6972E0	1.4371E0
165		<input checked="" type="checkbox"/>	SIMPLE...	1.7400E1	1.0000E-2	6.0000E0	1.8400E1	1.6400E1	1.6000E1	1.0000E-2	1.6975E0	1.4295E0	1.4295E0	1.6975E0	1.4295E0
218		<input checked="" type="checkbox"/>	SIMPLE...	1.7600E1	6.0000E-2	6.2000E0	1.9200E1	1.7700E1	1.6000E1	4.2000E-1	1.6975E0	1.4295E0	1.4295E0	1.6975E0	1.4295E0
286		<input checked="" type="checkbox"/>	SIMPLE...	1.7900E1	3.5000E-1	6.5000E0	1.8200E1	1.7900E1	1.5900E1	4.9000E-1	1.6977E0	1.4340E0	1.4340E0	1.6977E0	1.4340E0
87		<input checked="" type="checkbox"/>	SIMPLE...	1.7900E1	9.8000E-1	7.0000E0	1.8600E1	1.8000E1	1.5500E1	1.0000E-1	1.6980E0	1.4684E0	1.4684E0	1.6980E0	1.4684E0
234		<input checked="" type="checkbox"/>	SIMPLE...	1.7700E1	7.0000E-2	6.3000E0	1.9400E1	1.7100E1	1.6000E1	5.3000E-1	1.6981E0	1.4238E0	1.4238E0	1.6981E0	1.4238E0
126		<input checked="" type="checkbox"/>	SIMPLE...	1.7400E1	4.5000E-1	7.0000E0	1.8800E1	1.7800E1	1.6000E1	9.4000E-1	1.6984E0	1.4218E0	1.4218E0	1.6984E0	1.4218E0
132		<input checked="" type="checkbox"/>	SIMPLE...	1.7600E1	4.8000E-1	7.0000E0	1.8600E1	1.8000E1	1.5900E1	8.8000E-1	1.6987E0	1.4268E0	1.4268E0	1.6987E0	1.4268E0
168		<input checked="" type="checkbox"/>	SIMPLE...	1.7200E1	1.0000E-1	6.1000E0	1.8500E1	1.6700E1	1.6000E1	1.0000E-2	1.6989E0	1.4291E0	1.4291E0	1.6989E0	1.4291E0
233		<input checked="" type="checkbox"/>	SIMPLE...	1.7600E1	9.0000E-2	6.4000E0	1.9600E1	1.7500E1	1.5900E1	5.6000E-1	1.6996E0	1.4268E0	1.4268E0	1.6996E0	1.4268E0
209		<input checked="" type="checkbox"/>	SIMPLE...	1.7300E1	1.0000E-1	6.8000E0	2.1100E1	1.7600E1	1.5100E1	2.0000E-1	1.7000E0	1.4602E0	1.4602E0	1.7000E0	1.4602E0

MCDM Setup

MCDM Attributes

MCDM Designs

MCDM Algorithms

Linear MCDM




GA MCDM

Hurwicz MADM

Savage MADM

2A

Attributes

Bounds		Manual				
 Mark Selected ▾		 Set Maximize selected ▾		 Set Linear selected ▾		
	Attribute	M	Min	Max	Goal	Type
0	Ball_joint_blend	<input type="checkbox"/>	1.7100E1	1.8100E1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1	Flange_offset	<input type="checkbox"/>	1.0000E-2	2.9600E0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	Flange_thickness	<input type="checkbox"/>	6.0000E0	7.0000E0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	Front_bushing_blend	<input type="checkbox"/>	1.8000E1	2.2000E1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	Hydrobushing_blend	<input type="checkbox"/>	1.6000E1	1.8000E1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5	Swing_arm_flange_thickness	<input type="checkbox"/>	1.2000E1	1.6000E1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6	Thickness_main_plate	<input type="checkbox"/>	1.0000E-2	1.0000E0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
7	MAXDisp	<input checked="" type="checkbox"/>	1.6161E0	1.7050E0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
8	mass	<input checked="" type="checkbox"/>	1.3500E0	1.4500E0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

# modeFRONTIER Postprocessing

Topic: Postprocessing

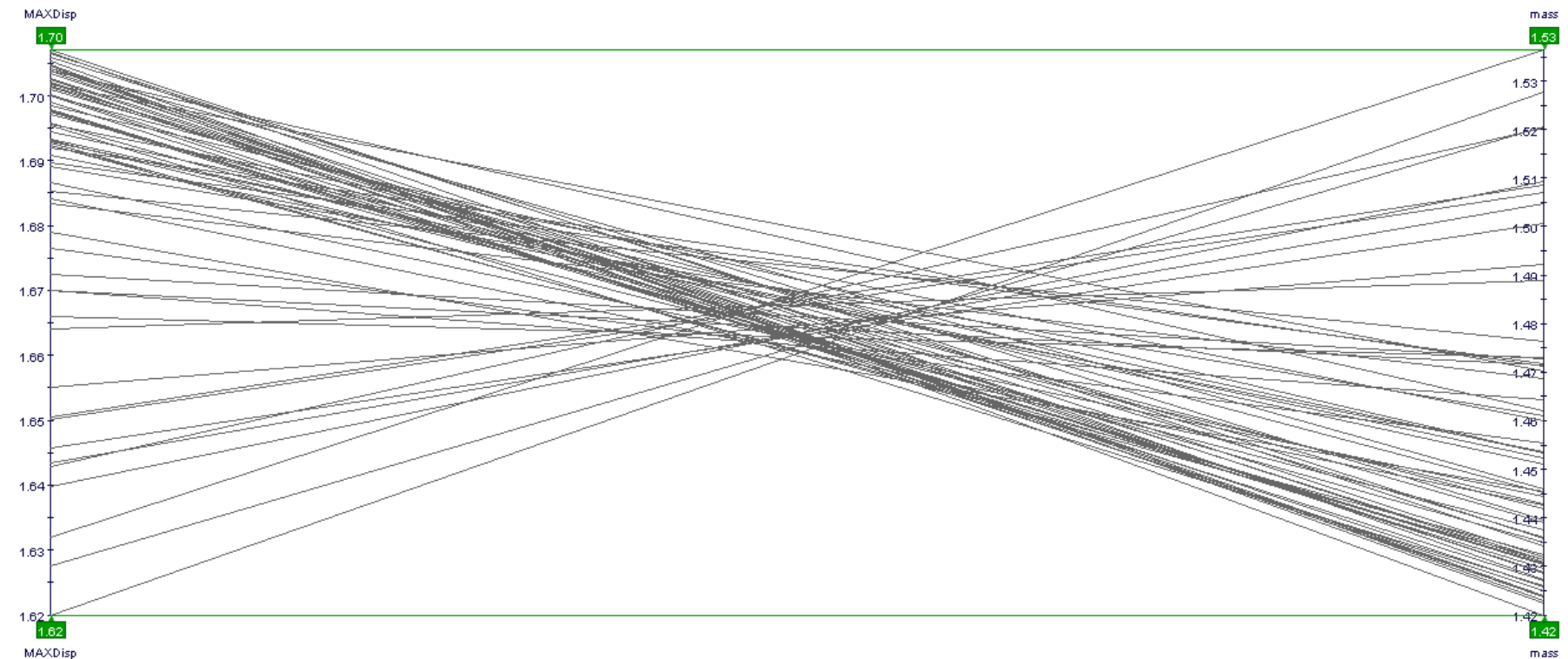
Approved By: Terje Rølvåg

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2. B. Choose the tab called MCDM designs in the left top corner. Here the designs is presented in both a table and a parallel chart. It is possible to slide the green numbers on the chart to isolate the designs within a given range. This chart is mainly to see which designs that are related to each other.

3. From here one is given the choice between different algorithms and preferences regarding these. The linear MCDM seems to give the best results in this particular example. Click create MCDM.



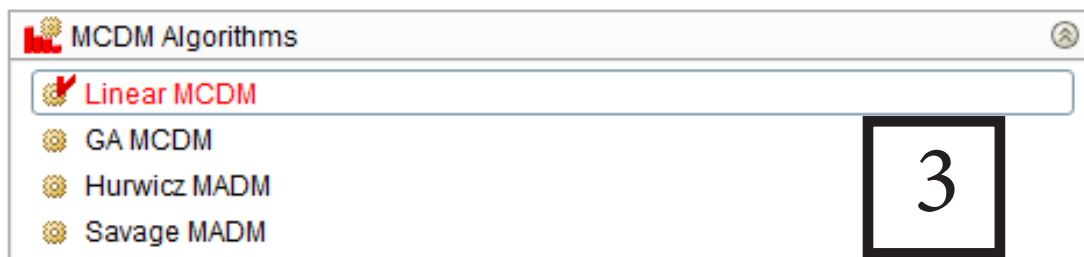
## Linear MCDM

Linear Search Algorithm for MCDM. It helps the research of a reasonable solution among a set of available ones. Main features are :

- 1) Respects all the attributes relationships
- 2) Respects all the designs relationships
- 3) Generates a ranking list of solutions
- 4) Is very precise and fast with few attributes
- 5) Does not allow the use of more than 4 attributes

## Parameters

Training Cycles	[0,28]	28
Preference Margin	[0.0,1.0]	1.0
Indifference Margin	[0.0,1.0]	0.01





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4. A. ModeFRONTIER now creates results under MCDM utilities. The attributes tab shows information regarding the setup. The most interesting is the designs tab that contains designs in ranked order.

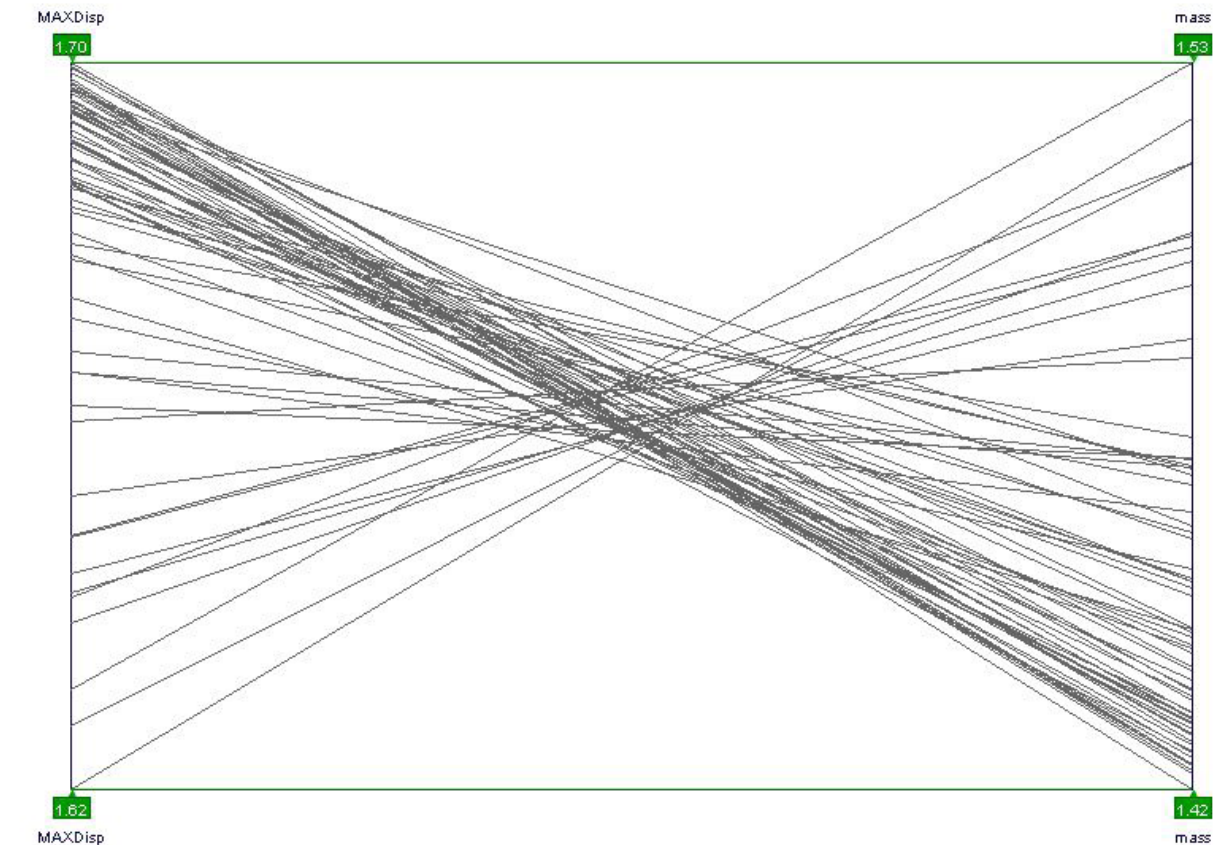
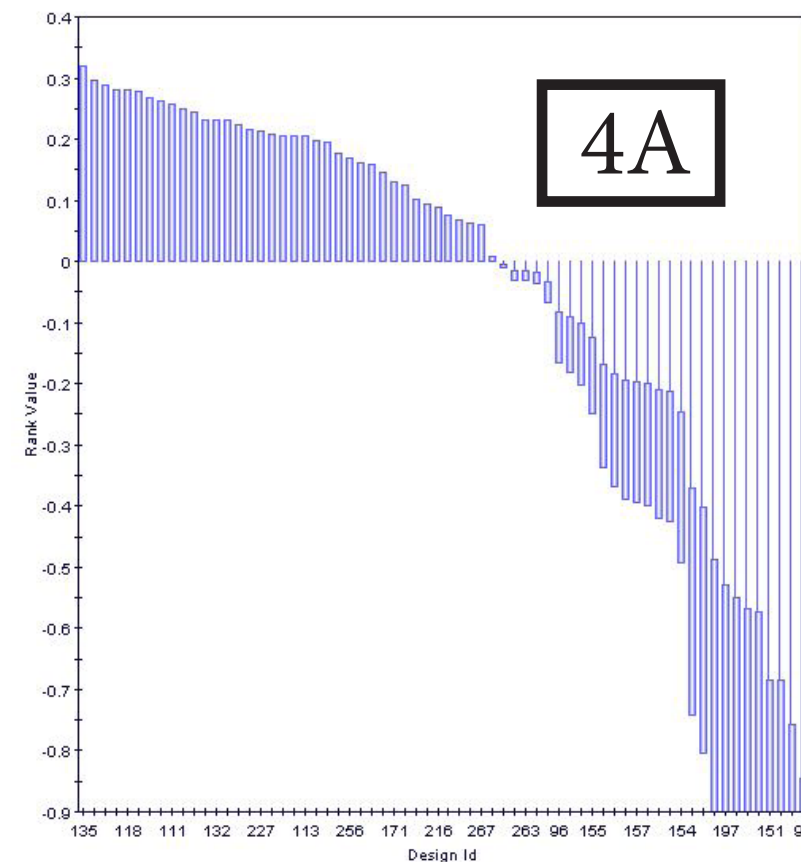
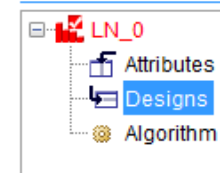
4. B. This can be exported to the modeFRONTIER desktop by right clicking MCDM utility(LN\_0 in this case) and choose mcdm ranking.

4. C. These tables is now located in design space tab->desktop tab.

Designs

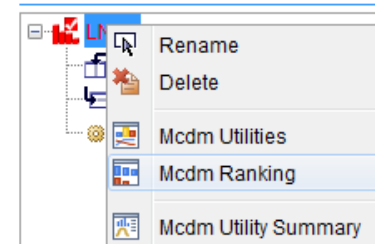
ID	MAXDisp	mass	Rank Value
135	1.7009E0	1.4180E0	0.320
130	1.7010E0	1.4204E0	0.296
241	1.7015E0	1.4211E0	0.289
126	1.6984E0	1.4218E0	0.282
118	1.7001E0	1.4219E0	0.281
239	1.7003E0	1.4221E0	0.279
124	1.6962E0	1.4232E0	0.268
234	1.6981E0	1.4238E0	0.262
111	1.6916E0	1.4242E0	0.258
214	1.6953E0	1.4250E0	0.250
292	1.7029E0	1.4255E0	0.245
233	1.6996E0	1.4268E0	0.232
132	1.6987E0	1.4268E0	0.232
97	1.6965E0	1.4269E0	0.231
231	1.6937E0	1.4277E0	0.223
211	1.6939E0	1.4284E0	0.216
227	1.6942E0	1.4287E0	0.213
168	1.6989E0	1.4291E0	0.209
218	1.6975E0	1.4295E0	0.205
165	1.6975E0	1.4295E0	0.205
113	1.6889E0	1.4296E0	0.204
290	1.7004E0	1.4301E0	0.199
121	1.6885E0	1.4305E0	0.195
208	1.7033E0	1.4323E0	0.177
256	1.6920E0	1.4331E0	0.169
298	1.7027E0	1.4339E0	0.161
286	1.6977E0	1.4340E0	0.160
107	1.6886E0	1.4355E0	0.145
171	1.6972E0	1.4371E0	0.129

MCDM Utilities



4B

MCDM Utilities



4C



suplight

# modeFRONTIER Postprocessing

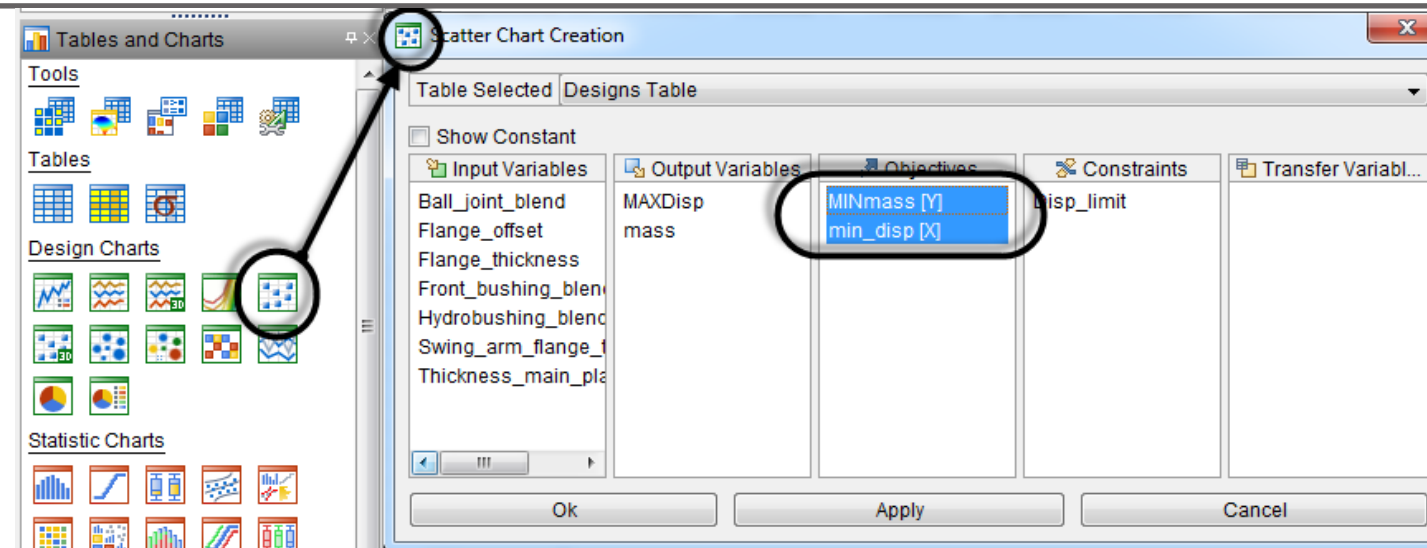
Topic: Postprocessing

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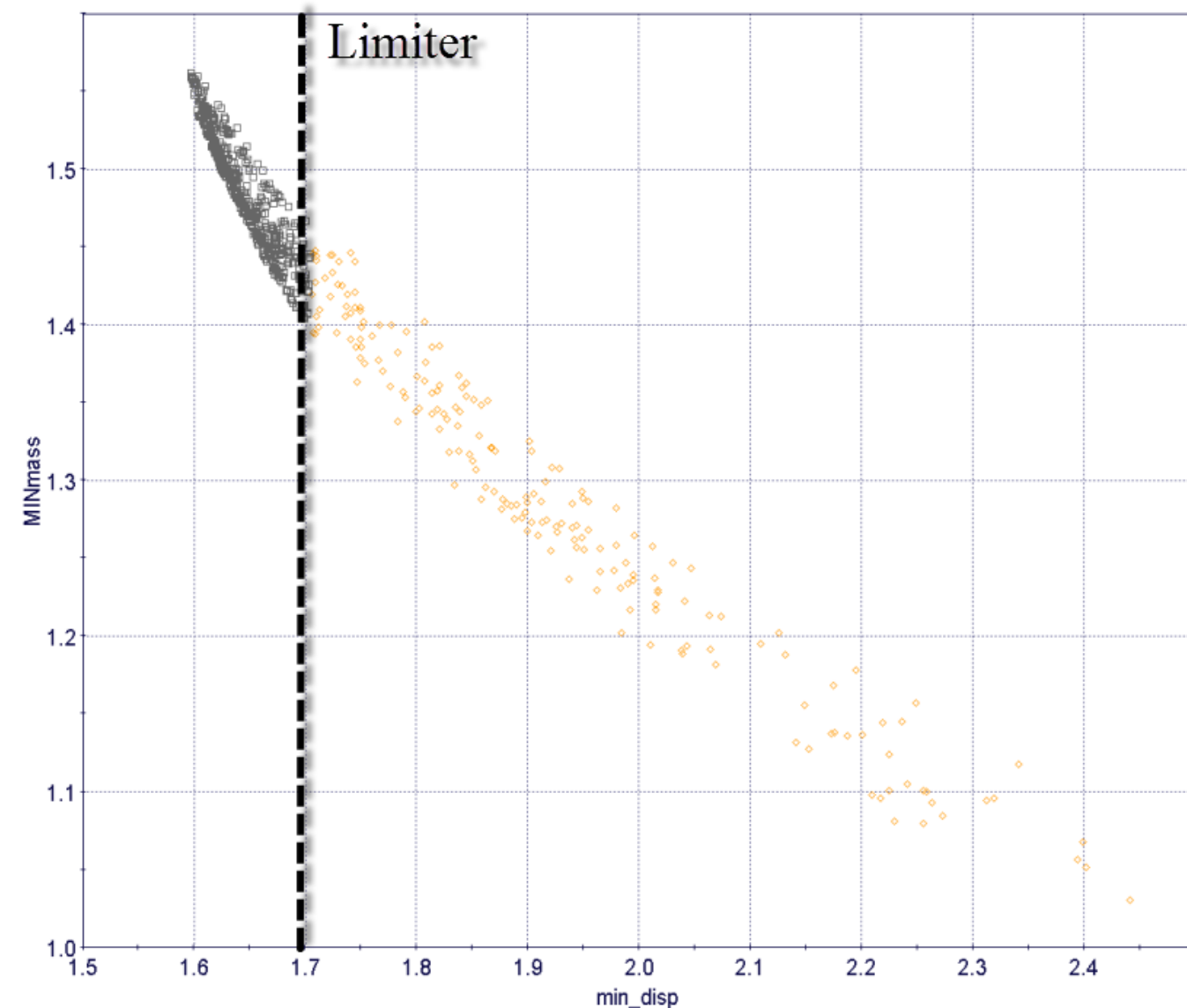
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5. In the design desktop it is possible to generate a pareto curve by creating a scatter plot of goals. This is done by clicking scatter plot under tables and chart and then select what to display on X and Y axes, as shown to the right. Right clicking the scatter plot gives an option to mark pareto designs(if they exist). Right click: mark designs->mark pareto designs->only real. Here the best designs can be identified visually and marked manually to identify the best results.



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# modeFRONTIER Postprocessing

Topic: Sensitivity analysis

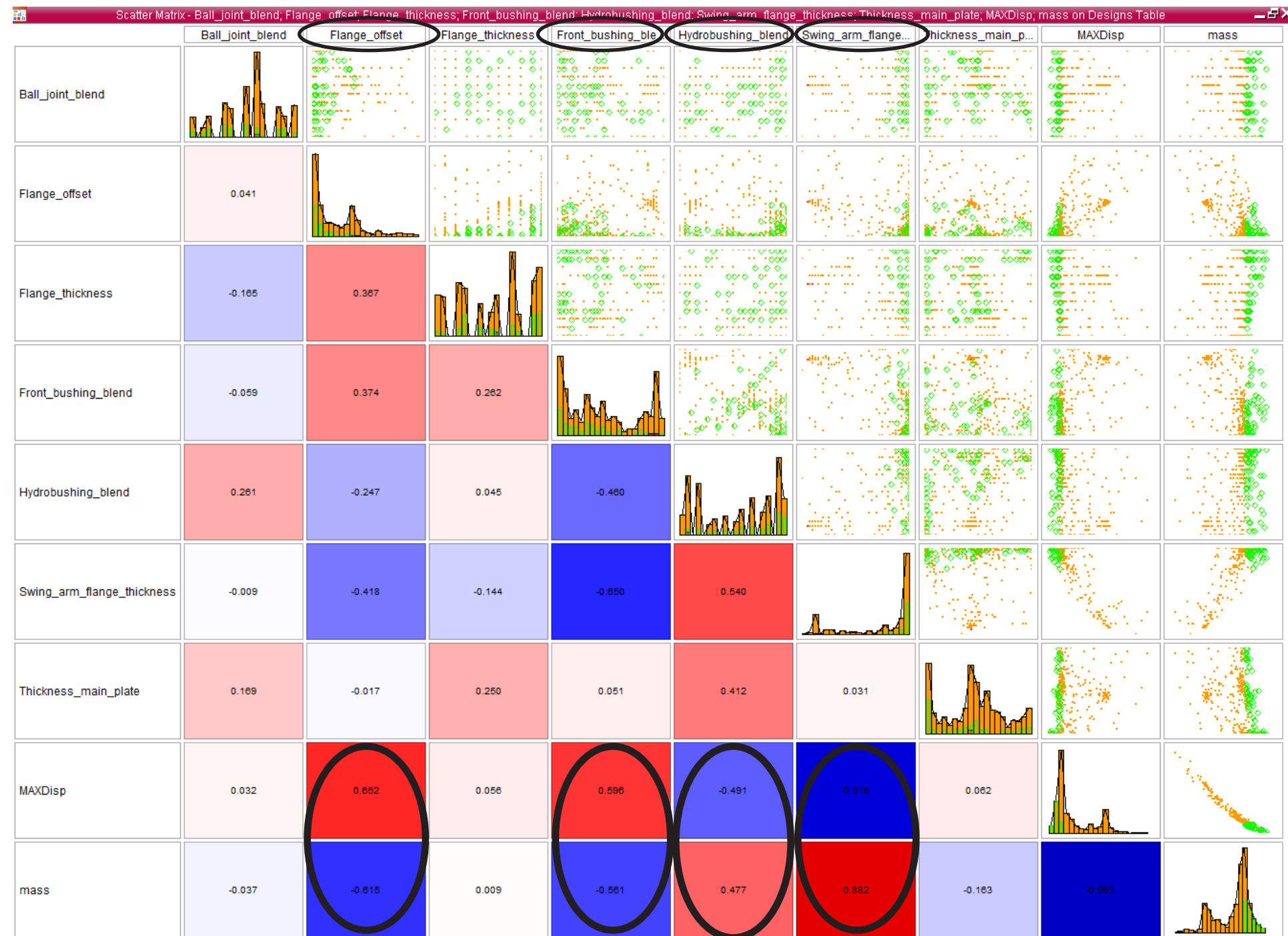
Approved By: Terje Rølvåg

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6. In case parameter sensitivity is of interest, this can be created by the scatter matrix chart under statistics chart. These tools is located in the left bottom corner of the modeFRONTIER desktop.(remember to be located in:design space tab->desktop tab) Choose all the input and output variables. Click ok and the matrix scatter to the right appears. This shows the correlation between parameters and goals. The four most important parameters is highlighted and shows by a strong color and correlation value, the impact each parameter has on the goal. As one can see the parameters has almost an opposite effect on the conflicting goals as one would expect. This can be used to identify parameters that can be excluded from optimizations to save time. As an example in this case one can see that Flange\_offset has a great impact on MAXDisp and the same parameter has almost exactly the opposite effect on mass.

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 **suplight**



# modeFRONTIER Postprocessing

Topic: Manual extraction of designs

Approved By: Terje Rølvåg

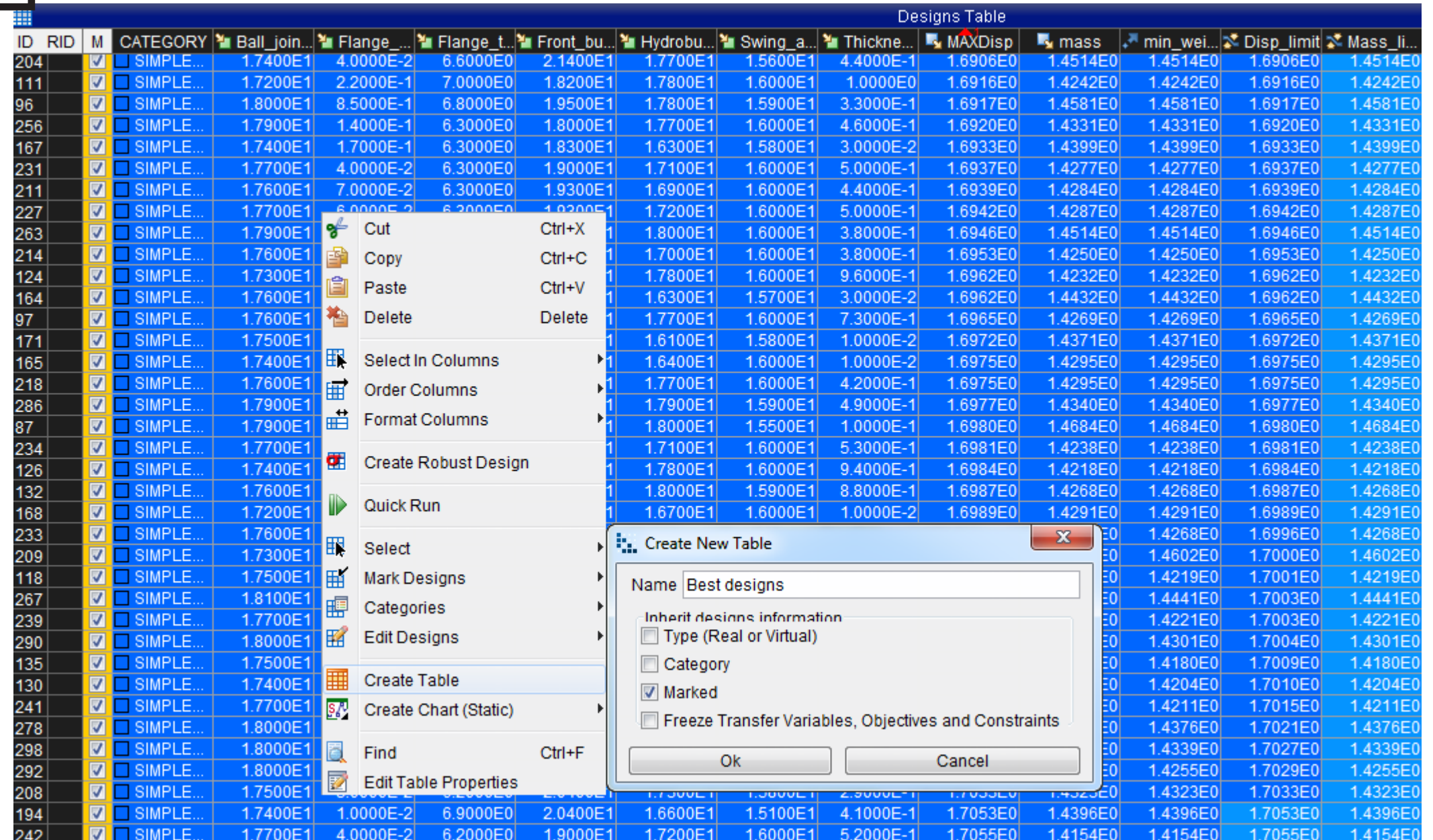
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In case the MCDM utility does not work satisfactory or modeFRONTIER is unable to mark pareto designs automatically, it is of course possible to do the process manual. One of the ways of doing that is described in detail in the following.

7. First one would have to rank the displacement in descending order from lowest to highest. Then one would have to mark the feasible design that meets the requirements. Right click and choose create table and only keep marked ticked in the next dialog box.



ID	RID	M	CATEGORY	Ball_join...	Flange...	Flange_t...	Front_bu...	Hydrobu...	Swing_a...	Thickne...	MAXDisp	mass	min_wel...	Disp_limit	Mass_li...
204		✓	SIMPLE...	1.7400E1	4.0000E-2	6.6000E0	2.1400E1	1.7700E1	1.5600E1	4.4000E-1	1.6906E0	1.4514E0	1.4514E0	1.6906E0	1.4514E0
111		✓	SIMPLE...	1.7200E1	2.2000E-1	7.0000E0	1.8200E1	1.7800E1	1.6000E1	1.0000E0	1.6916E0	1.4242E0	1.4242E0	1.6916E0	1.4242E0
96		✓	SIMPLE...	1.8000E1	8.5000E-1	6.8000E0	1.9500E1	1.7800E1	1.5900E1	3.3000E-1	1.6917E0	1.4581E0	1.4581E0	1.6917E0	1.4581E0
256		✓	SIMPLE...	1.7900E1	1.4000E-1	6.3000E0	1.8000E1	1.7700E1	1.6000E1	4.6000E-1	1.6920E0	1.4331E0	1.4331E0	1.6920E0	1.4331E0
167		✓	SIMPLE...	1.7400E1	1.7000E-1	6.3000E0	1.8300E1	1.6300E1	1.5800E1	3.0000E-2	1.6933E0	1.4399E0	1.4399E0	1.6933E0	1.4399E0
231		✓	SIMPLE...	1.7700E1	4.0000E-2	6.3000E0	1.9000E1	1.7100E1	1.6000E1	5.0000E-1	1.6937E0	1.4277E0	1.4277E0	1.6937E0	1.4277E0
211		✓	SIMPLE...	1.7600E1	7.0000E-2	6.3000E0	1.9300E1	1.6900E1	1.6000E1	4.4000E-1	1.6939E0	1.4284E0	1.4284E0	1.6939E0	1.4284E0
227		✓	SIMPLE...	1.7700E1	6.0000E-2	6.3000E0	1.9200E1	1.7200E1	1.6000E1	5.0000E-1	1.6942E0	1.4287E0	1.4287E0	1.6942E0	1.4287E0
263		✓	SIMPLE...	1.7900E1				1.8000E1	1.6000E1	3.8000E-1	1.6946E0	1.4514E0	1.4514E0	1.6946E0	1.4514E0
214		✓	SIMPLE...	1.7600E1				1.7000E1	1.6000E1	3.8000E-1	1.6953E0	1.4250E0	1.4250E0	1.6953E0	1.4250E0
124		✓	SIMPLE...	1.7300E1				1.7800E1	1.6000E1	9.6000E-1	1.6962E0	1.4232E0	1.4232E0	1.6962E0	1.4232E0
164		✓	SIMPLE...	1.7600E1				1.6300E1	1.5700E1	3.0000E-2	1.6962E0	1.4432E0	1.4432E0	1.6962E0	1.4432E0
97		✓	SIMPLE...	1.7600E1				1.7700E1	1.6000E1	7.3000E-1	1.6965E0	1.4269E0	1.4269E0	1.6965E0	1.4269E0
171		✓	SIMPLE...	1.7500E1				1.6100E1	1.5800E1	1.0000E-2	1.6972E0	1.4371E0	1.4371E0	1.6972E0	1.4371E0
165		✓	SIMPLE...	1.7400E1				1.6400E1	1.6000E1	1.0000E-2	1.6975E0	1.4295E0	1.4295E0	1.6975E0	1.4295E0
218		✓	SIMPLE...	1.7600E1				1.7700E1	1.6000E1	4.2000E-1	1.6975E0	1.4295E0	1.4295E0	1.6975E0	1.4295E0
286		✓	SIMPLE...	1.7900E1				1.7900E1	1.5900E1	4.9000E-1	1.6977E0	1.4340E0	1.4340E0	1.6977E0	1.4340E0
87		✓	SIMPLE...	1.7900E1				1.8000E1	1.5500E1	1.0000E-1	1.6980E0	1.4684E0	1.4684E0	1.6980E0	1.4684E0
234		✓	SIMPLE...	1.7700E1				1.7100E1	1.6000E1	5.3000E-1	1.6981E0	1.4238E0	1.4238E0	1.6981E0	1.4238E0
126		✓	SIMPLE...	1.7400E1				1.7800E1	1.6000E1	9.4000E-1	1.6984E0	1.4218E0	1.4218E0	1.6984E0	1.4218E0
132		✓	SIMPLE...	1.7600E1				1.8000E1	1.5900E1	8.8000E-1	1.6987E0	1.4268E0	1.4268E0	1.6987E0	1.4268E0
168		✓	SIMPLE...	1.7200E1				1.6700E1	1.6000E1	1.0000E-2	1.6989E0	1.4291E0	1.4291E0	1.6989E0	1.4291E0
233		✓	SIMPLE...	1.7600E1							1.4268E0	1.6996E0	1.4268E0	1.6996E0	1.4268E0
209		✓	SIMPLE...	1.7300E1							1.4602E0	1.7000E0	1.4602E0	1.7000E0	1.4602E0
118		✓	SIMPLE...	1.7500E1							1.4219E0	1.7001E0	1.4219E0	1.7001E0	1.4219E0
267		✓	SIMPLE...	1.8100E1							1.4441E0	1.7003E0	1.4441E0	1.7003E0	1.4441E0
239		✓	SIMPLE...	1.7700E1							1.4221E0	1.7003E0	1.4221E0	1.7003E0	1.4221E0
290		✓	SIMPLE...	1.8000E1							1.4301E0	1.7004E0	1.4301E0	1.7004E0	1.4301E0
135		✓	SIMPLE...	1.7500E1							1.4180E0	1.7009E0	1.4180E0	1.7009E0	1.4180E0
130		✓	SIMPLE...	1.7400E1							1.4204E0	1.7010E0	1.4204E0	1.7010E0	1.4204E0
241		✓	SIMPLE...	1.7700E1							1.4211E0	1.7015E0	1.4211E0	1.7015E0	1.4211E0
278		✓	SIMPLE...	1.8000E1							1.4376E0	1.7021E0	1.4376E0	1.7021E0	1.4376E0
298		✓	SIMPLE...	1.8000E1							1.4339E0	1.7027E0	1.4339E0	1.7027E0	1.4339E0
292		✓	SIMPLE...	1.8000E1							1.4255E0	1.7029E0	1.4255E0	1.7029E0	1.4255E0
208		✓	SIMPLE...	1.7500E1							1.4323E0	1.7033E0	1.4323E0	1.7033E0	1.4323E0
194		✓	SIMPLE...	1.7400E1	1.0000E-2	6.9000E0	2.0400E1	1.6600E1	1.5100E1	4.1000E-1	1.7053E0	1.4396E0	1.4396E0	1.7053E0	1.4396E0
242		✓	SIMPLE...	1.7700E1	4.0000E-2	6.2000E0	1.9000E1	1.7200E1	1.6000E1	5.2000E-1	1.7055E0	1.4154E0	1.4154E0	1.7055E0	1.4154E0

# modeFRONTIER Postprocessing

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8. The next step is to identify the best design manually in the generated table by considering displacement and mass. This can be visualized better by creating a X - Y scatter of the selected designs. This is done by creating a scatter plot containing the designs from the new table. This scatter resembles the method already shown on a previous slide, but this one is narrowed down to contain only designs that is within a certain range. Clicking on the desired design shows the value and id. This makes it possible to locate the design in the table.

