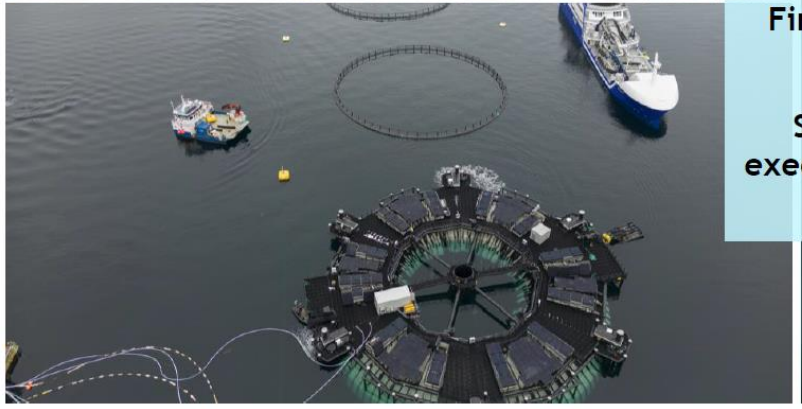
Bluegreen | AquaNor 19.08.25

Bluegreen

Bluegreen Group/SalMar – Marine Donut development licences

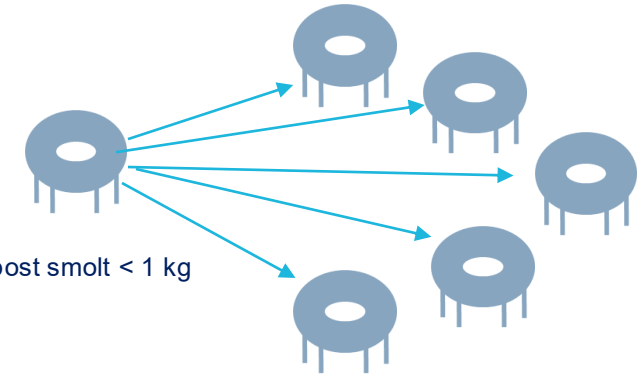


First Marine Donut is currently in operation by SALMAR

Successful harvest of first commercial cycle executed in H2 2024, and second full operational cycle to be harvested in H1 2025

Alternative Production Strategies and Optimal Capacities

Alt. 1



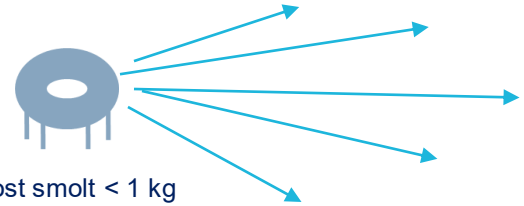
1.000.000 post smolt < 1 kg

< 50 kg/m3

5 x 200.000 fish < 5.5 kg

< 50 kg/m3

Alt. 2



1.000.000 post smolt < 1 kg

< 50 kg/m3

5 x 200.000 fish < 5.5 kg

< 25 kg/m3

Alt. 3 5 x  x 5

5 x 200.000 post smolt < 2.5 kg

< 25 kg/m3

5 x 200.000 fish 2.5 – 5.5 kg

< 50 kg/m3

1st Marine Donut cycle according to developm. Licences: 2,5 – 5 kg

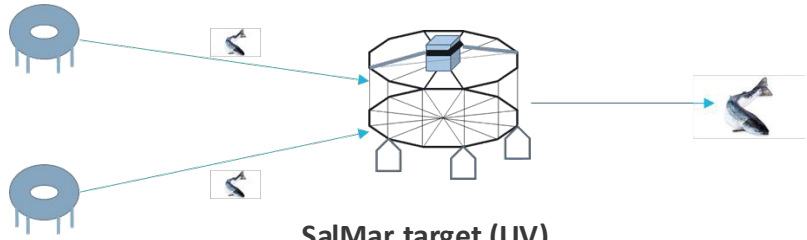
Alt. 4  x 5

5 x 200.000 fish 0.1 – 5.5 kg

< 50 kg/m3

Possible, but inefficient

Alt. 5



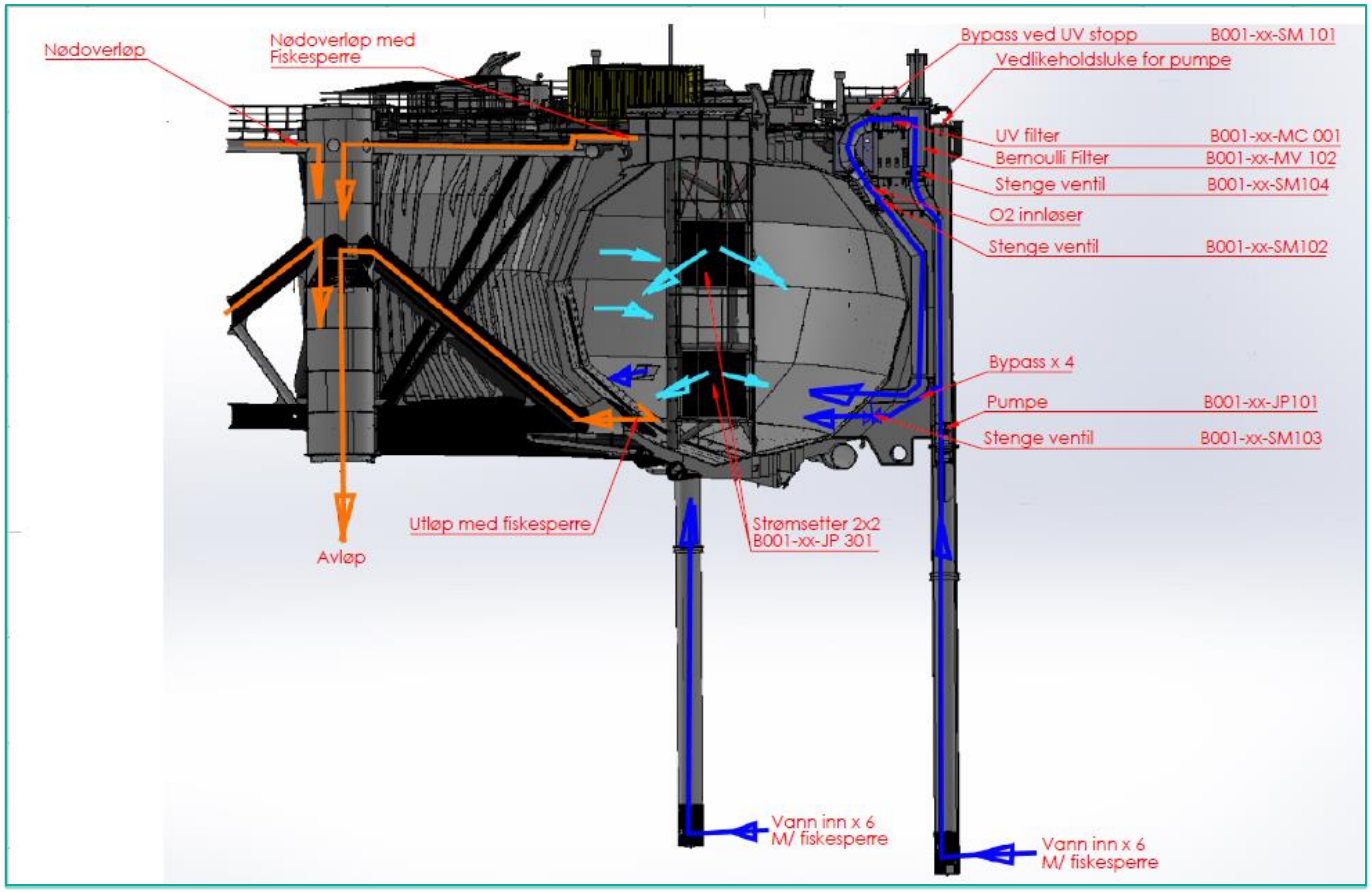
SalMar target (UV)

Load off and local transportation

Installation into mooring system at final destination

Marine Donut

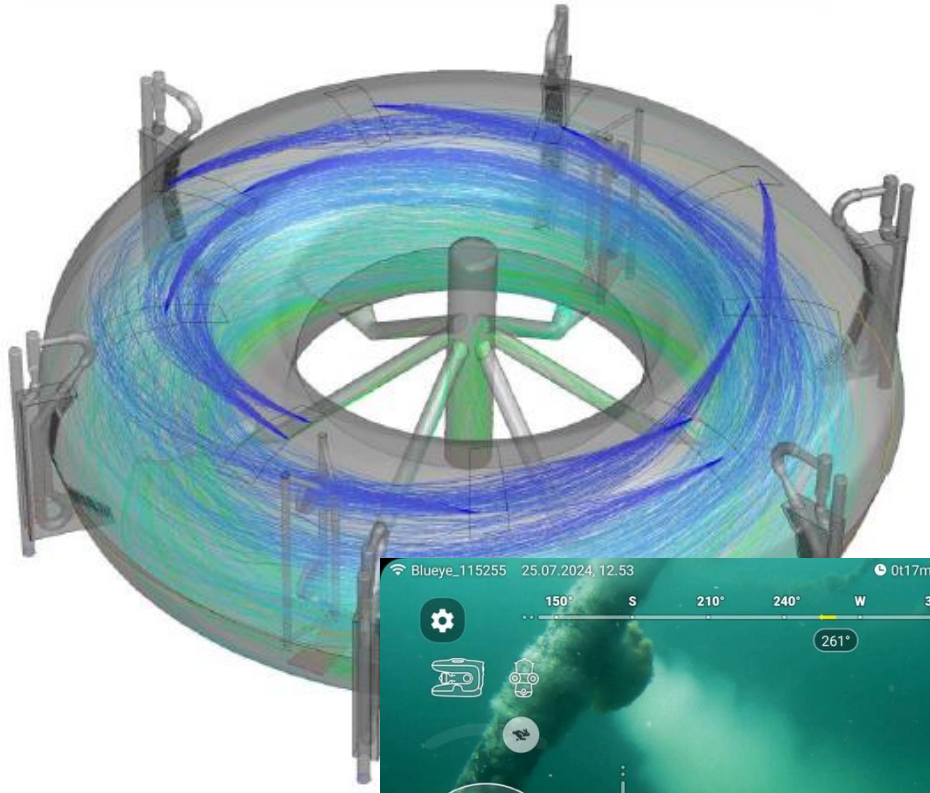
Water flow – cross section



Fish feed particles

- Due to a better overview, only about 500 of the particles are plotted in the figure to the right.

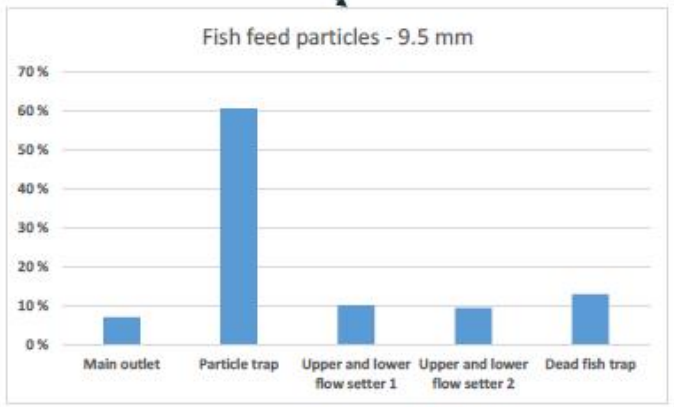
Colored by residence time – 9.5 mm fish feed particles



Fish feed particles – 9.5 mm

- The table below shows the simulation results from Fluent. It shows where each of the particles is «escaping», the amount, and residence times.

Location	Number particles	Min (s)	Max (s)	Average (s)	Std Dev (s)
Escaped - Zone 11	3158	1.151e+02	1.267e+03	1.615e+02	3.888e+01
Escaped - Zone 13	31813	8.365e+01	2.061e+04	1.762e+02	3.524e+02
Escaped - Zone 60	5307	9.647e+00	5.231e+02	1.458e+01	3.340e+01
Escaped - Zone 61	4919	1.484e+01	8.173e+02	1.817e+01	3.498e+01
Escaped - Zone 109	6772	7.886e+01	2.018e+04	1.880e+02	7.201e+02

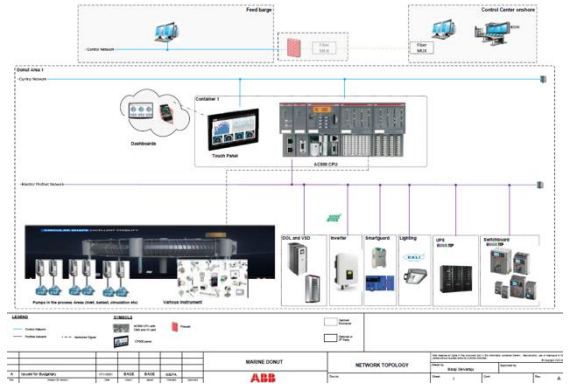


- **About 7%** of the particles are leaving through the **main outlet**, with an average residence time of **162 sec**.
- **About 61%** of the particles are leaving the donut through the **particle traps**, with an average residence time of **177 sec**.
- **About 20%** of the particles are stopped in the **four flow setters**, with an average residence time of **48 sec**.
- **About 13%** of the particles are leaving the donut through the **dead fish trap**, with an average residence time of **188 sec**.

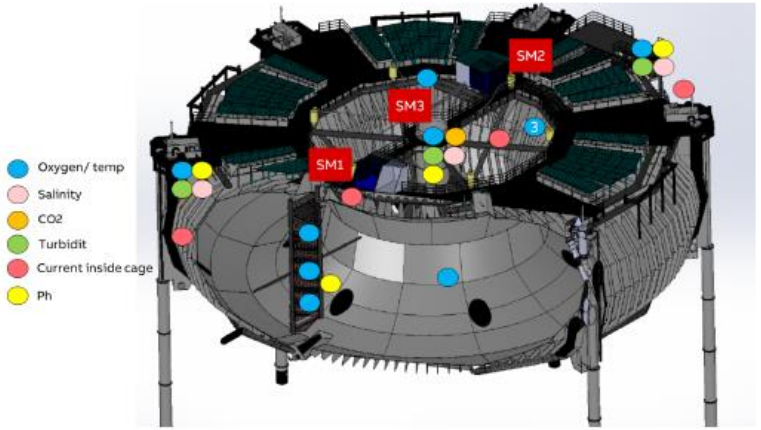
Sensors and instrumentation

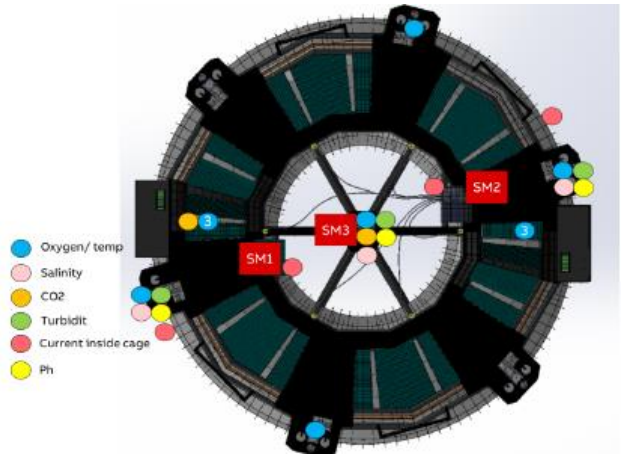
Bill of Material

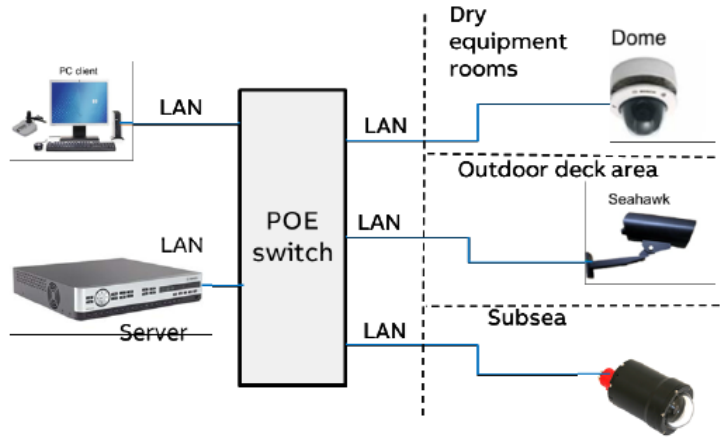
Sensors	
Equipment	**Qty. and comments**
Oxygen/temperature sensor	11
Salinity sensor	3 Integrated in Sensor cluster
Turbidity sensor	3 Integrated in Sensor cluster
Flow sensor outside Donut	4
Sensor clusters	3
pH sensor	3 Integrated in Sensor cluster
Betton level sensors	12



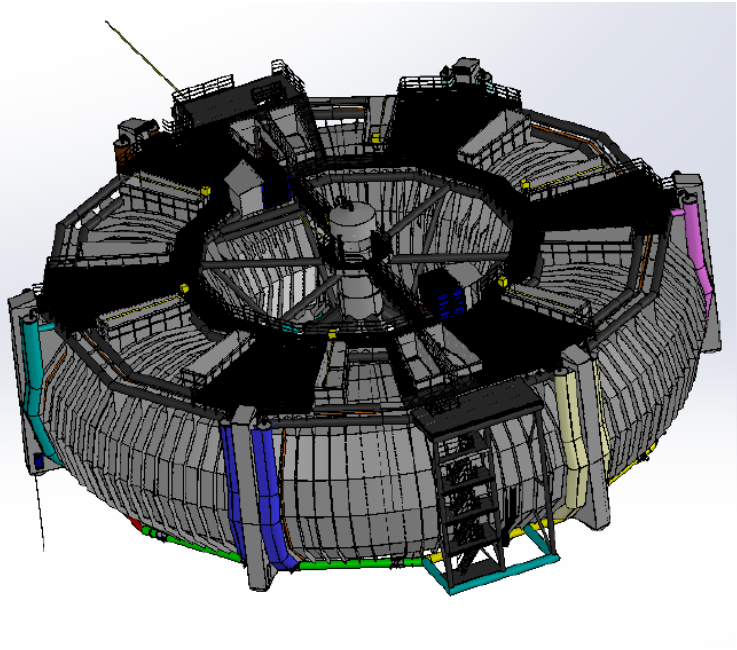
Fixed sub sea camera	12
Fixed camera	6
PTZ dome camera	6
POE switch	3
Communication cabinets	3

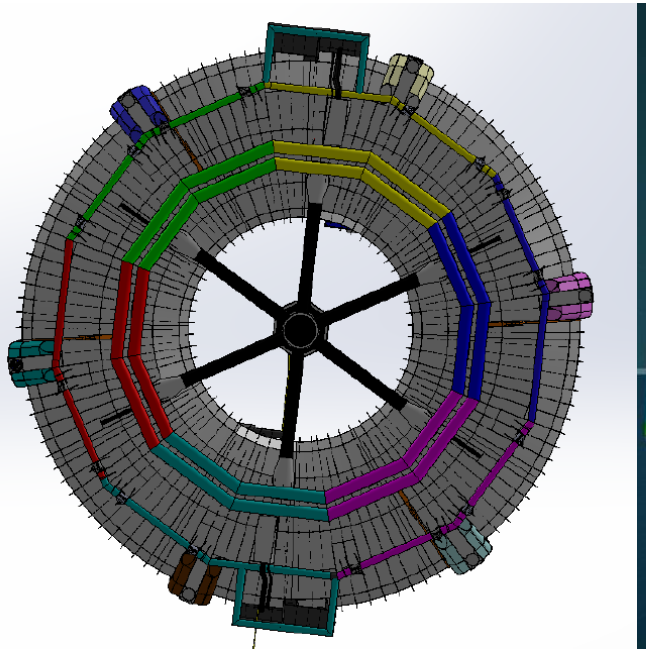






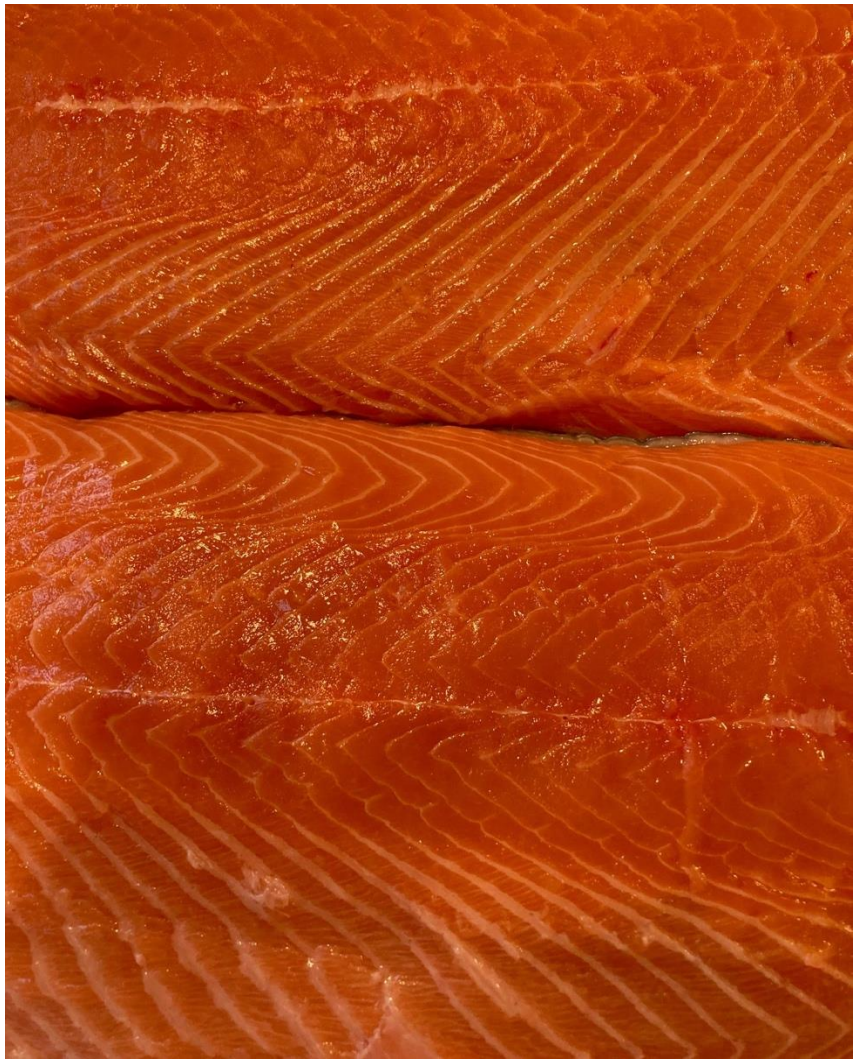
Six ballast zones for elevating, submersing and trimming the structure



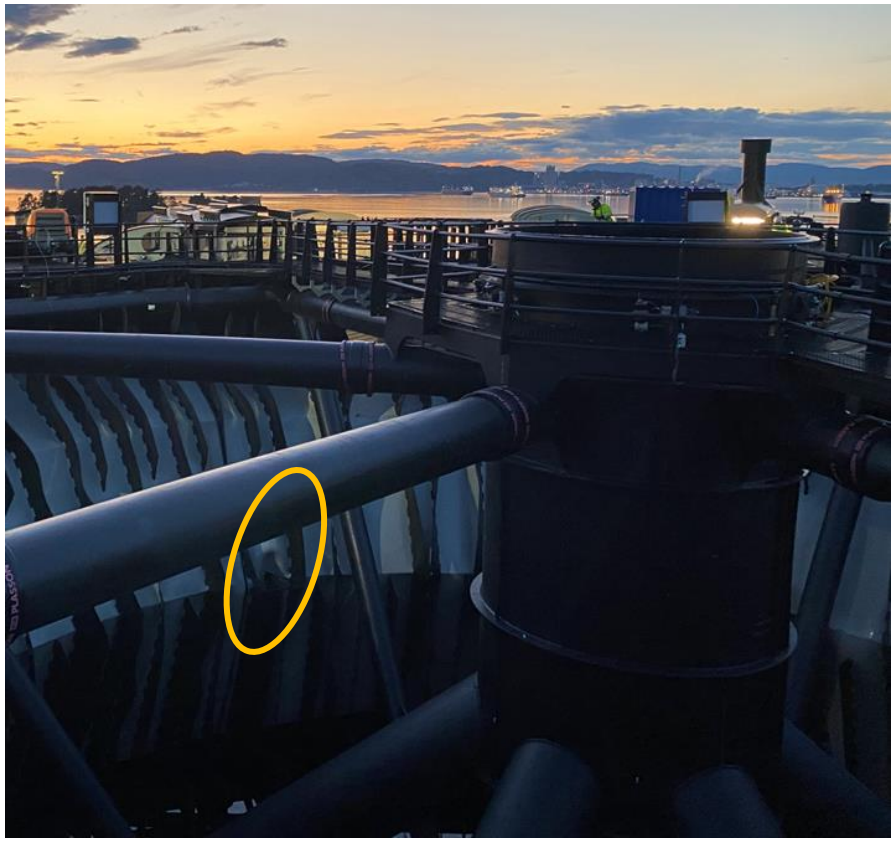


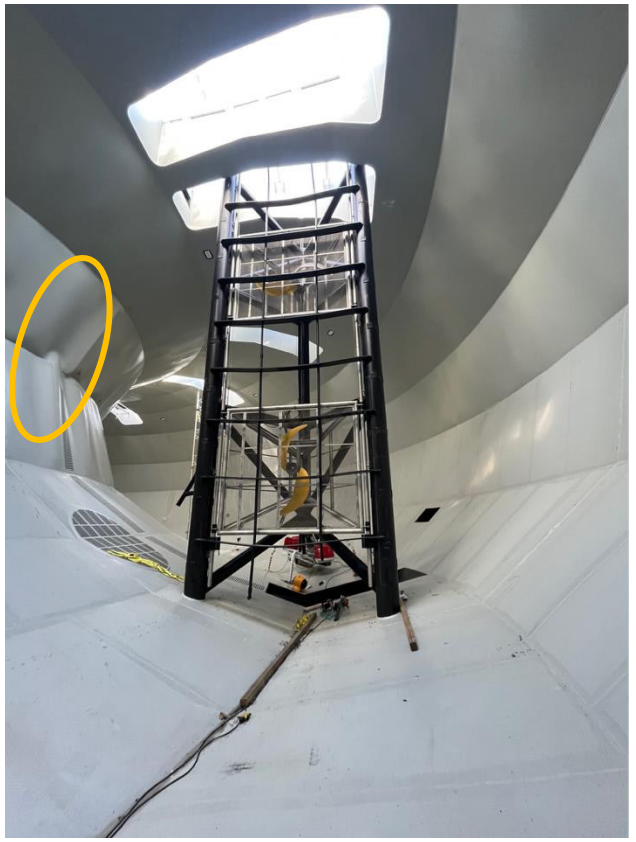
Very Successful Fish Delivery x 3

Superior Quality Salmon



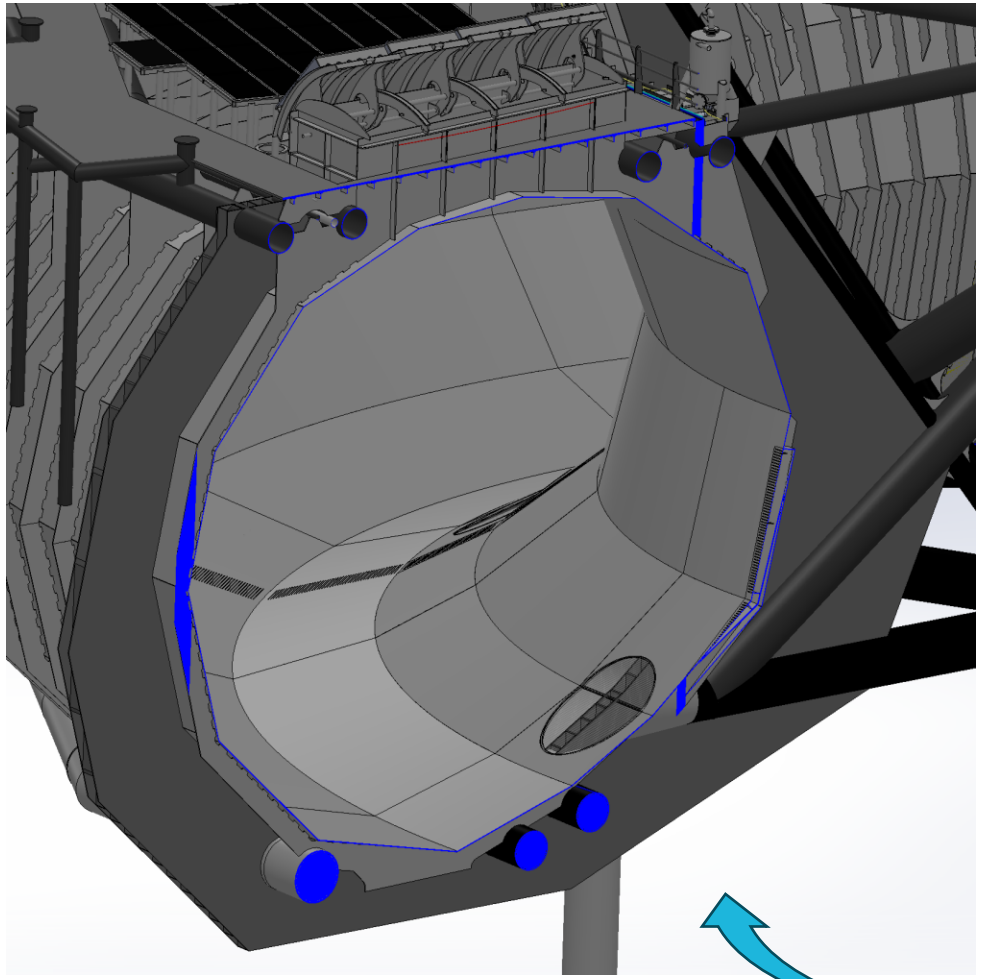
Some structural challenges due to increased loads and E-modulus



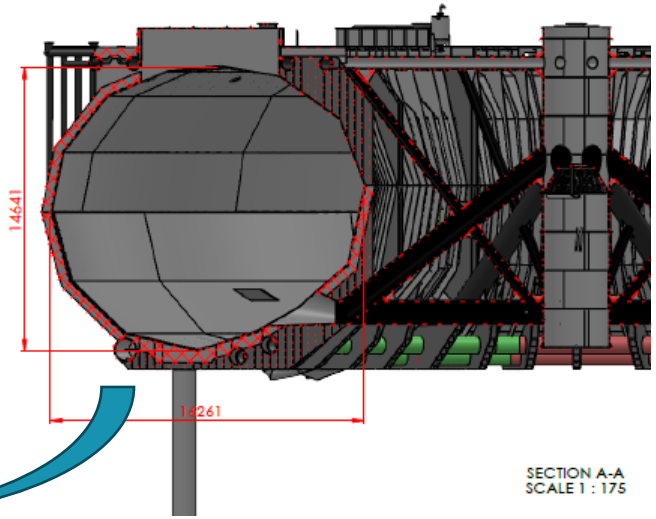


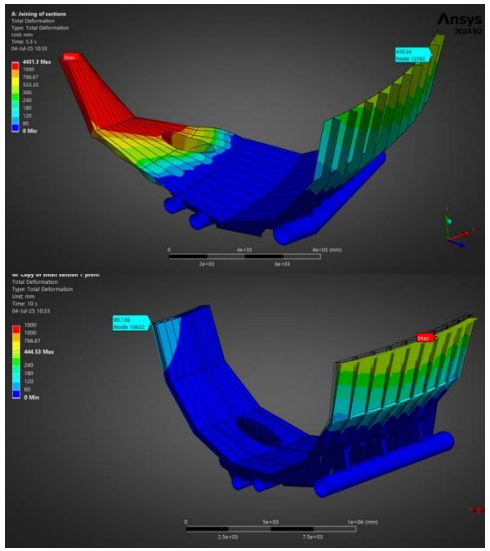
- Structural challenges from construction phase of the full scale pilot - solved in new design

Reinforced design for Marine Donut 2.0

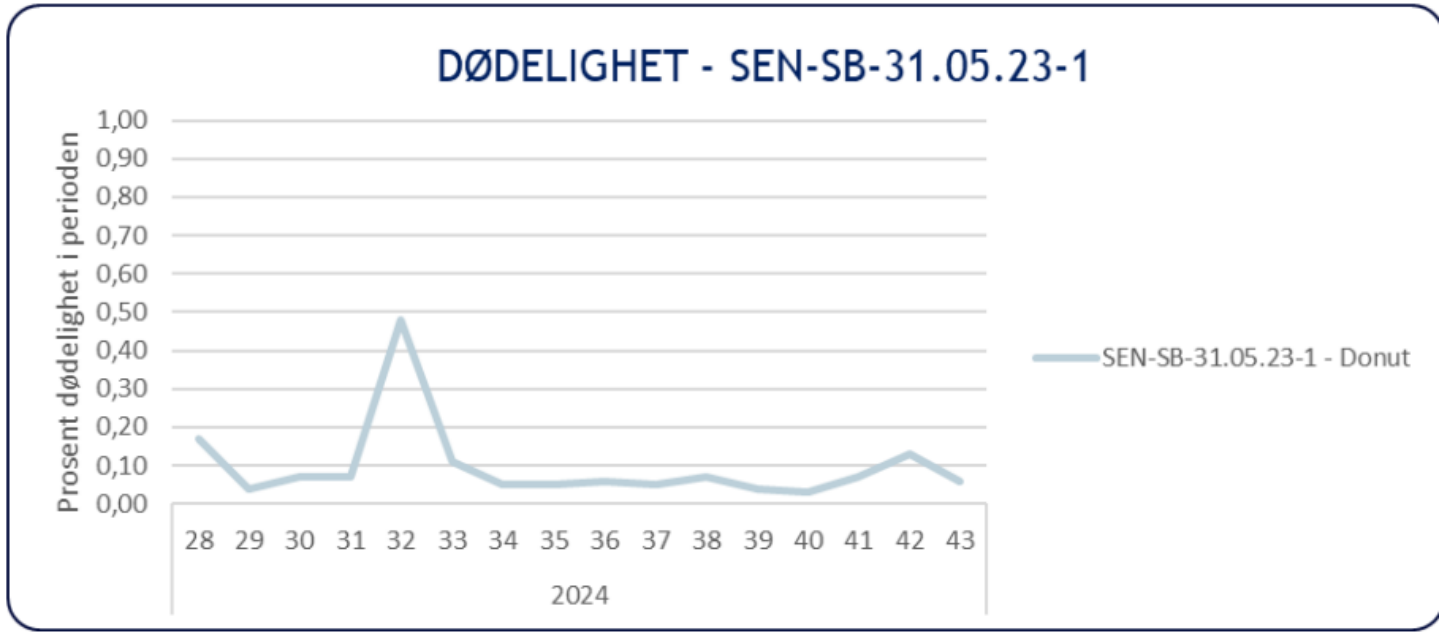


- E-modulus 380 MPa from 1000 MPa
- Long term effects of importance
- Reflecting real deformations over time vs simulations
- Reinforcing design with stiffening elements
- Eliminating challenges for MD 2.0

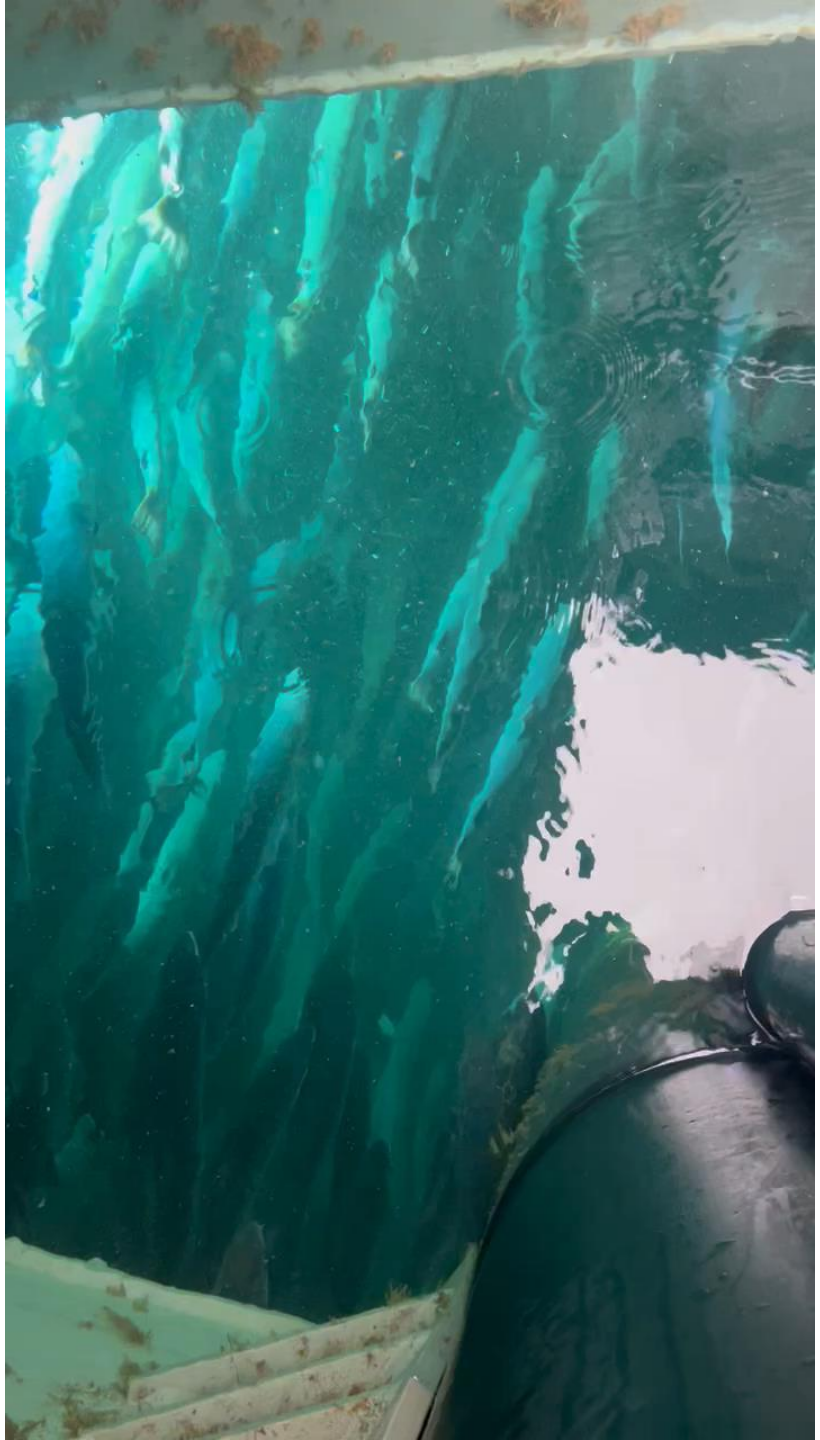




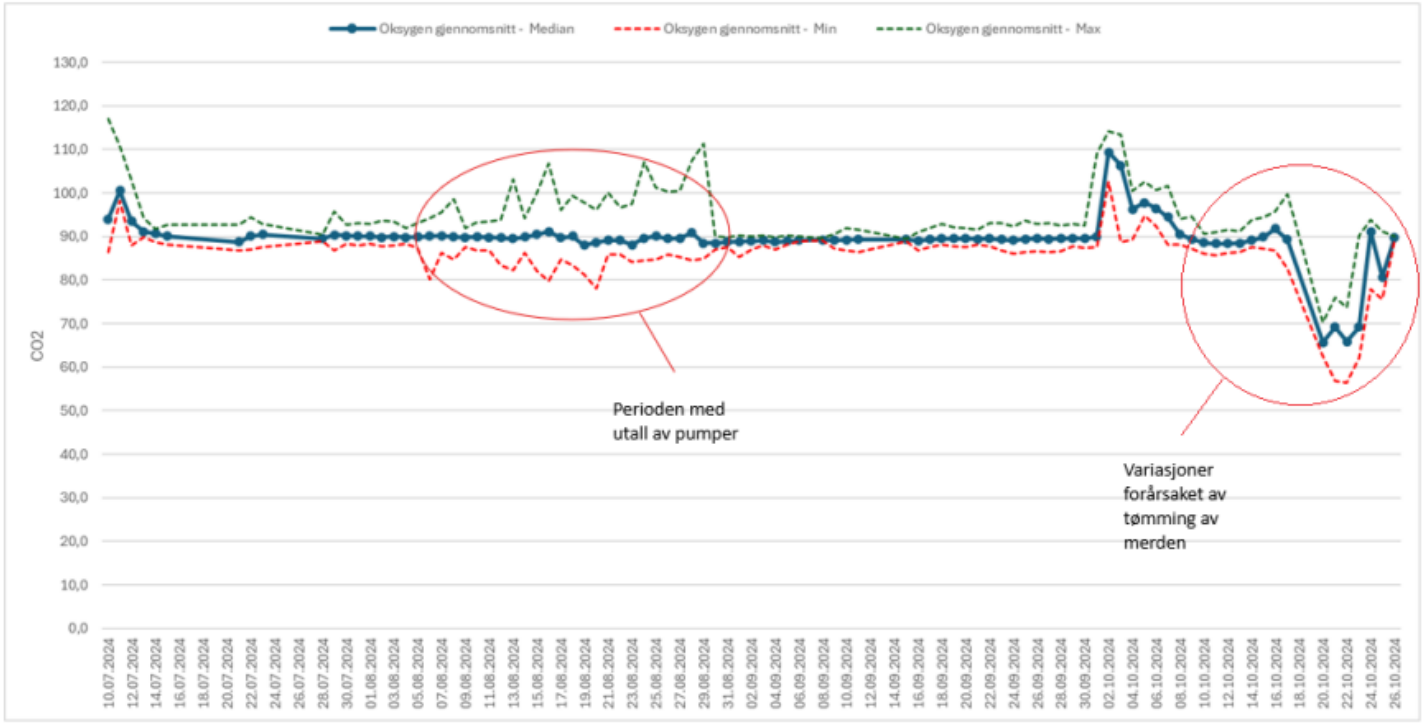
Very low mortality and good results



Figur 21 Dødelighet. Grafen viser ukentlig dødelighet for fiskegruppe SEN-SB-31.05.23-1 f.o.m uke 28 t.o.m uke 43, 2024. Dødelighetstoppen i uke 32 skyldes avlusing med hydrolicer på lokalitet Myrane, før resten av fiskegruppen ble flyttet til Donuten.

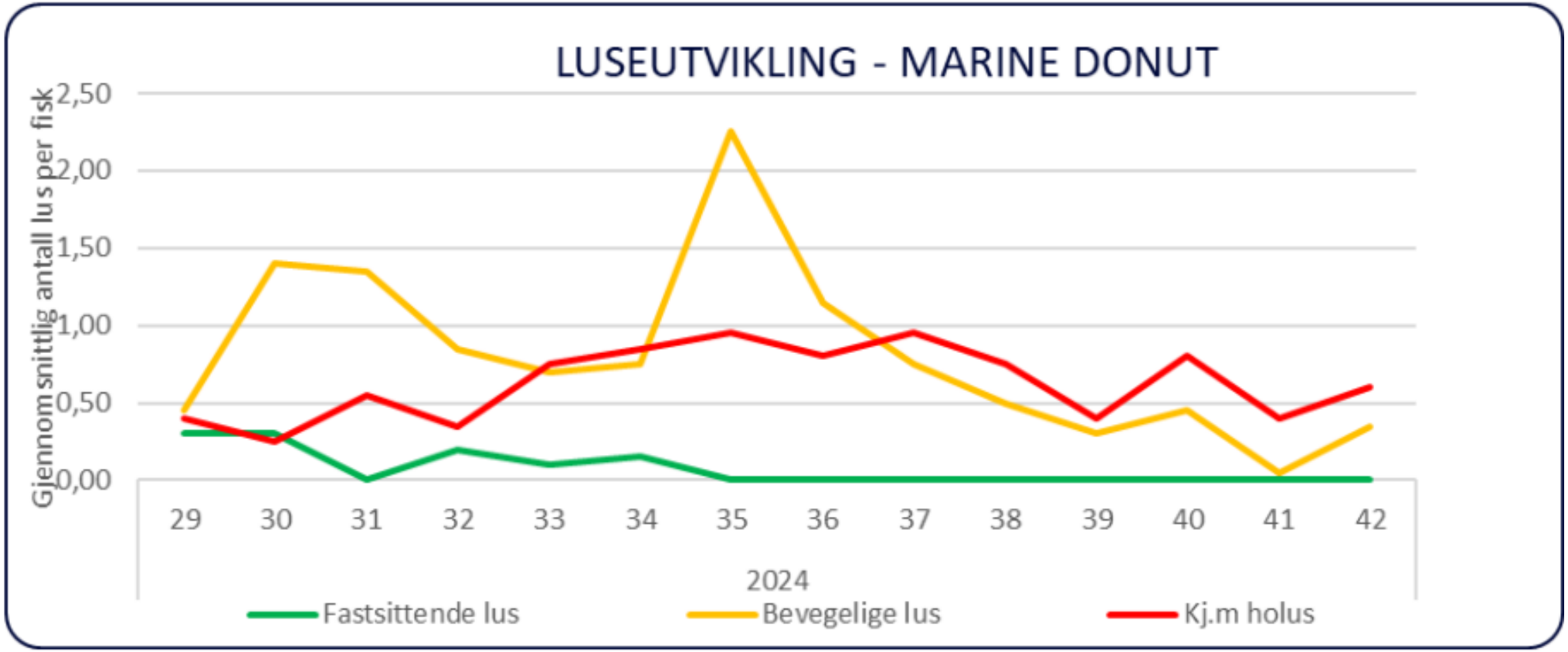


Biological performance Marine Donut



Figur 2 Oksygennivåer i MD produksjonssyklus 1

Sea lice from 2,5 – 3 kg fish and development in Marine Donut



Figur 22 Grafen viser luseutviklingen i Donut f.o.m uke 29 t.o.m uke 39. Det har ikke blitt gjennomført lusebehandlinger mens fisken har stått i Donuten.

Marine Donut Return On Investment (ROI) vs Net Pens

Y axis shows MCAD, X axis shows years, for Marine Donut in Blue and Net Pens in orange

The graph illustrates net cashflow/payback over time based
on cash generated over time, related to investments (CAPEX)
over 20 years

Fabrication Progress – 6 x MD in 21 months (2 + 2 + 2)

Alternativ kost for Mowi ved tentativ plan = 40MNOK

Fremdrift og leveranse	mai.25	jun.25	jul.25 Oppstart	aug.25	sep.25	okt.25	nov.25	des.25	jan.26	feb.26	mar.26	apr.26	mai.26	jun.26	jul.26 MD #1 og	aug.26	sep.26 Overlevering MD #1 og #2	okt.26 MD #3 og #4 Klar for fiskeinnsett 1	nov.26	des.26 Overlevering MD #3 og #4	jan.27 MD #5 og #6 Klar for fiskeinnsett 1	feb.27	mar.27 Overlevering MD #5 og #6	apr.27 Klar for fiskeinnsett 1 april
Rigg og drift																								
Marine Donut #1 Engineering og forberedende arbeider			200	200	200																			
Modulproduksjon					500	1500	1500	1000																
Sammenstilling					1088	1088	1088	1088	1088	1088	1088	1088	1088											
Utstyrsmontasje								960	960	960	960	960	960	960										
Klargjøring for transport														200										
Transport, off-load og idriftsettelse															953	953	953							
Marine Donut #2 Engineering og forberedende arbeider			200	200	200																			
Modulproduksjon					500	1500	1500	1000																
Sammenstilling					1088	1088	1088	1088	1088	1088	1088	1088	1088											
Utstyrsmontasje								960	960	960	960	960	960	960										
Klargjøring for transport														200										
Transport, off-load og idriftsettelse															953	953	953							
Marine Donut #3 Engineering og forberedende arbeider						200	200																	
Modulproduksjon								1500	1500	1500														
Sammenstilling							979	979	979	979	979	979	979	979	979	979								
Utstyrsmontasje										960	960	960	960	960	960	960	960							
Klargjøring for transport																	200							
Transport, off-load og idriftsettelse																		953	953	953				
Marine Donut #4 Engineering og forberedende arbeider						200	200																	
Modulproduksjon								1500	1500	1500														
Sammenstilling							979	979	979	979	979	979	979	979	979	979								
Utstyrsmontasje										960	960	960	960	960	960	960	960							
Klargjøring for transport																								
Transport, off-load og idriftsettelse																		953	953	953				
Marine Donut #5 Engineering og forberedende arbeider								200	200															
Modulproduksjon										500	1500	1500	1500											
Sammenstilling										979	979	979	979	979	979	979	979	979	979					
Utstyrsmontasje														960	960	960	960	960	960	960				
Klargjøring for transport																				200				
Transport, off-load og idriftsettelse																					953	953	953	
Marine Donut #6 Engineering og forberedende arbeider								200	200															
Modulproduksjon										500	1500	1500	1000											
Sammenstilling										979	979	979	979	979	979	979	979	979	979					
Utstyrsmontasje														960	960	960	960	960	960	960				
Klargjøring for transport																				200				
Transport, off-load og idriftsettelse																					953	953	953	

Signering kontrakt Betalingsmilepæl 1

Betalingsmilepæl 2

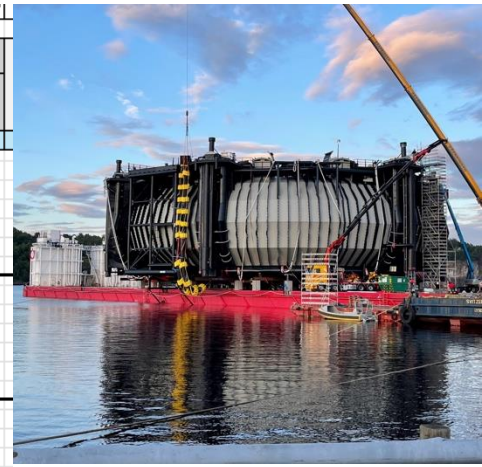
Betalingsmilepæl 3

Månedlig ift produsjon / verdiskåpning

Betalingsmilepæl 4

Betalingsmilepæl 5

Betalingsmilepæl 6



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