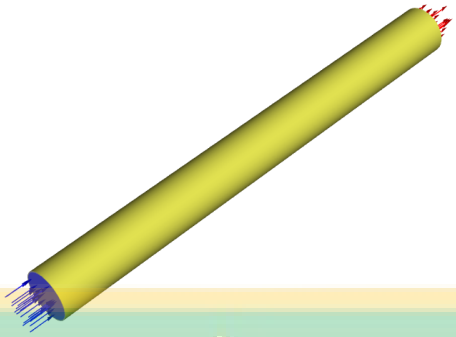
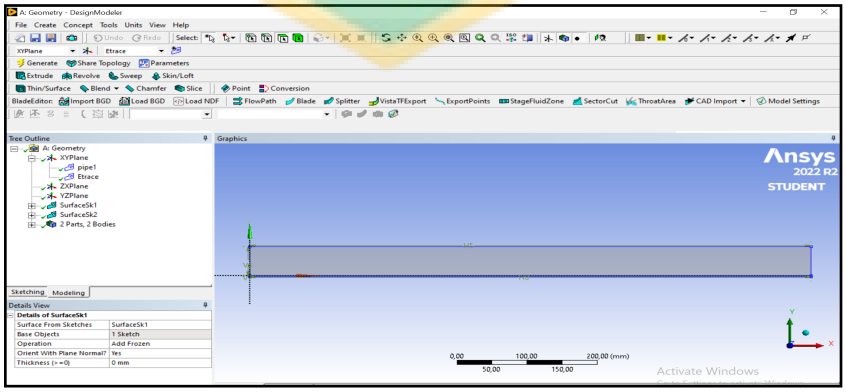
LAMPIRAN

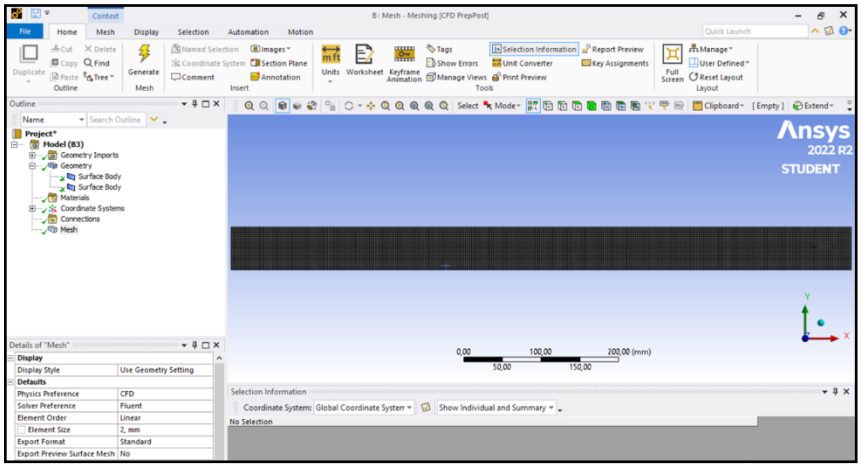


3d geometry pipa isometric

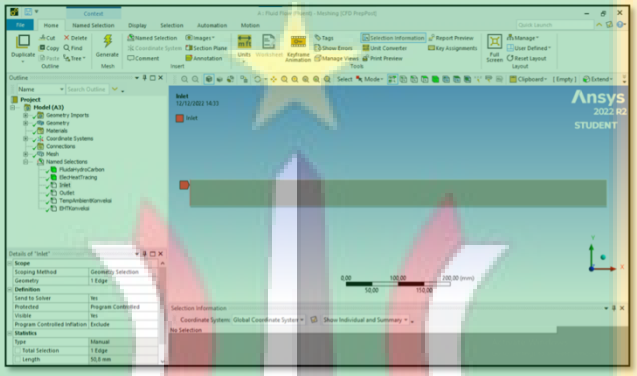
3d geometry pipa dengan electrical heat tracing



3d geometry pipa dengan electrical heat tracing (tampak samping)

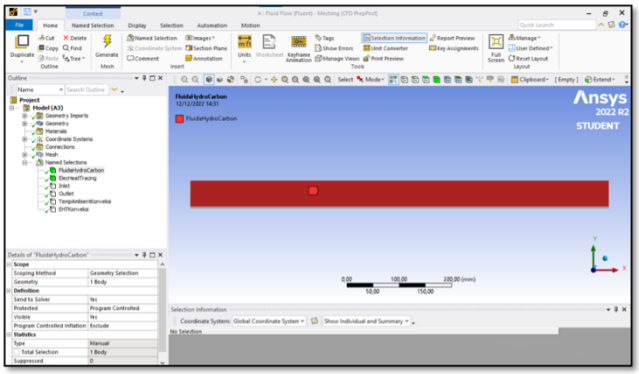


Proses Meshing geometry

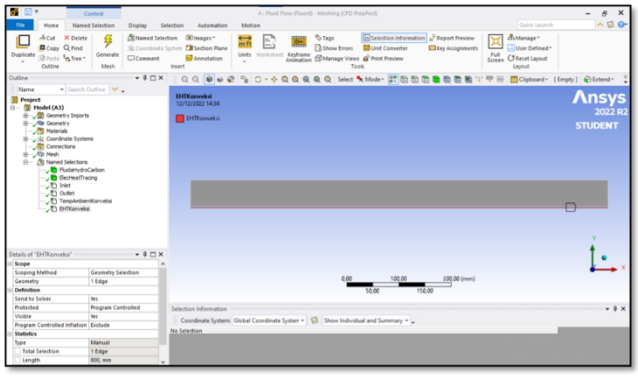


Pengaturan nama bidang Inlet

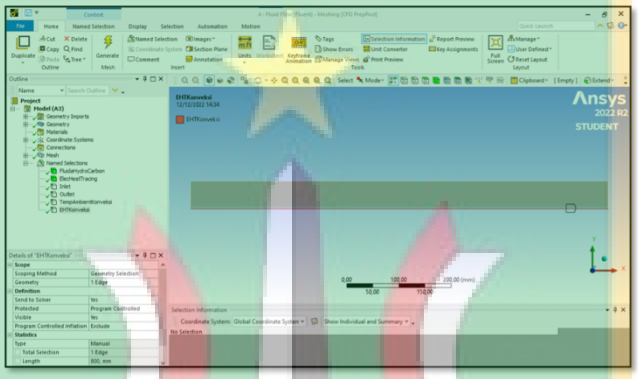
Pengaturan nama bidang Outlet



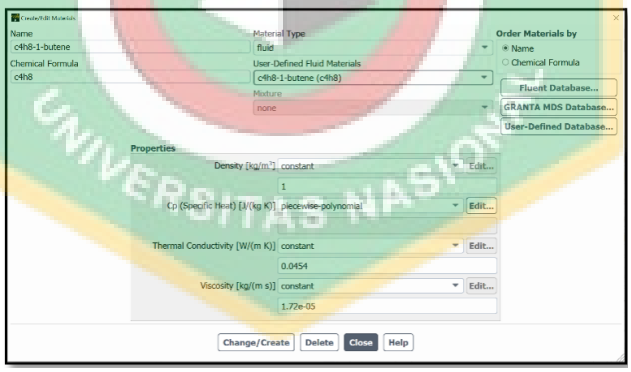
Pengaturan nama bidang Fluida



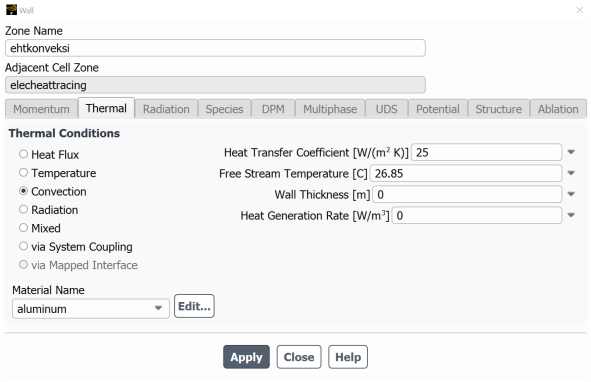
Pengaturan nama bidang Electrical Heat Tracing



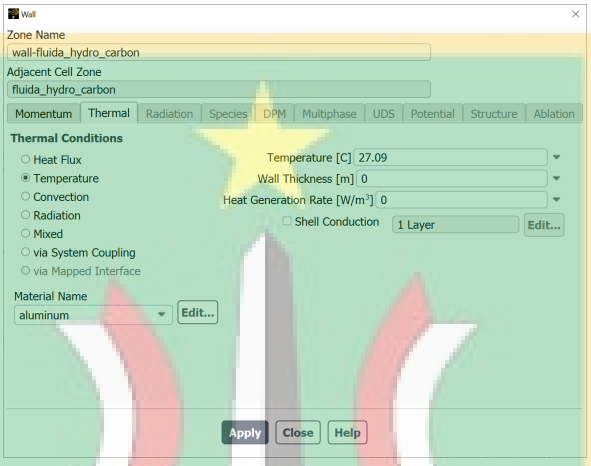
Pengaturan nama bidang konveksi wall



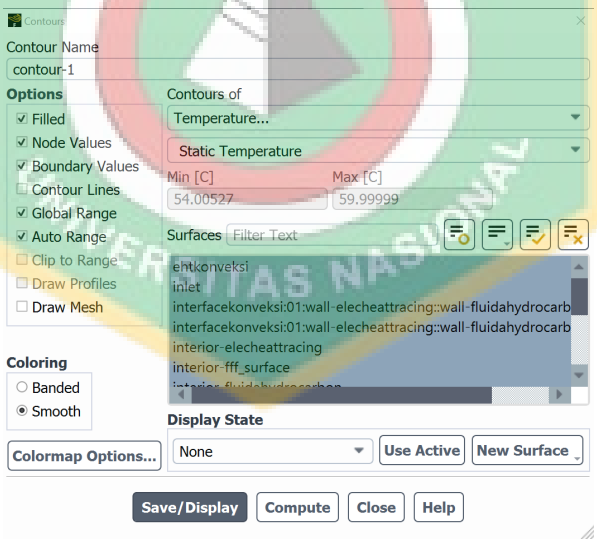
Pengaturan material



Pengaturan parameter fisis geometri



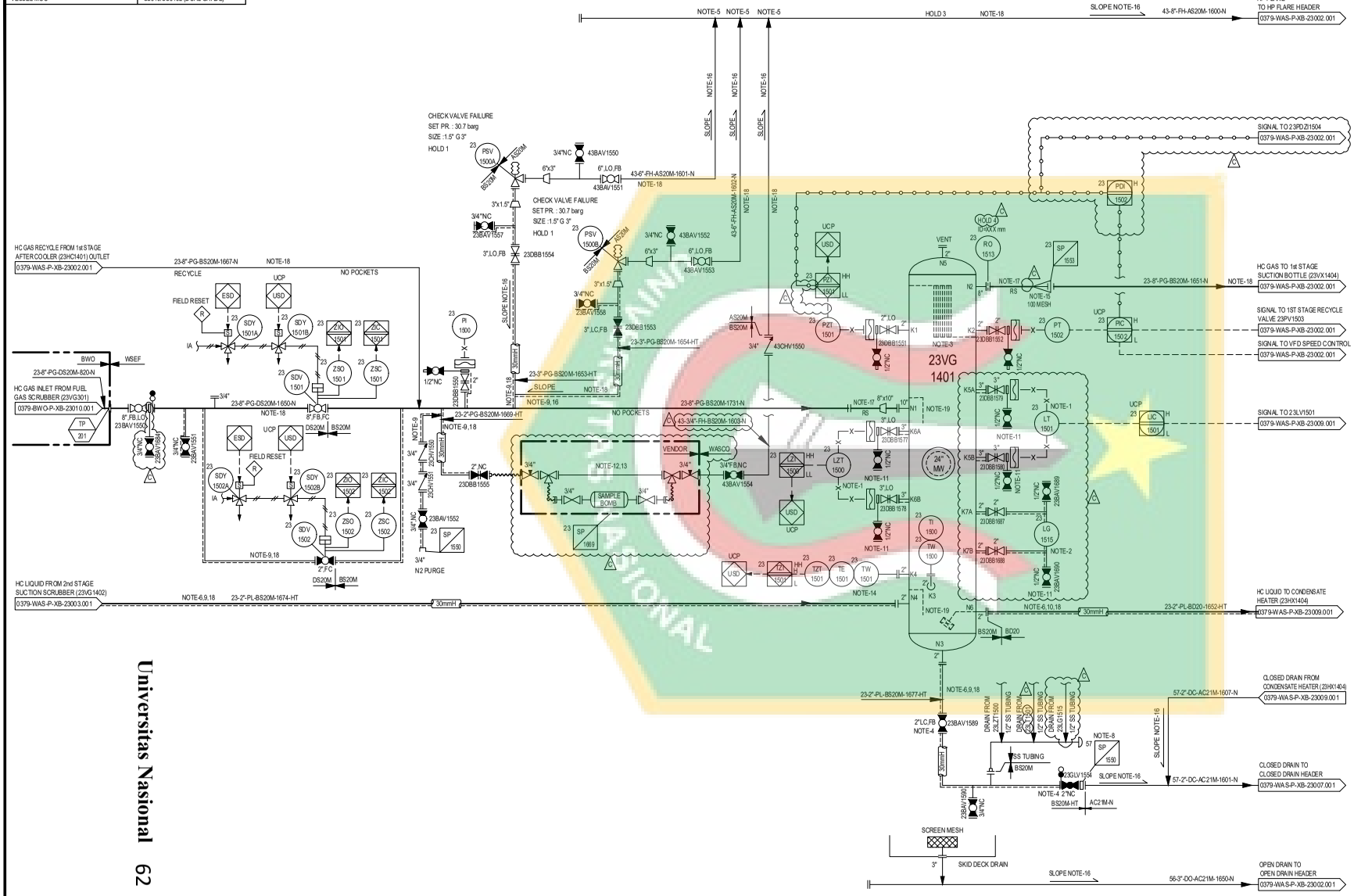
Pengaturan parameter fisis suhu lingkungan



Pengaturan hasil kontur suhu

TAG NUMBER			23VG1401
SERVICE			1ST STAGE SUCTION SCRUBBER
SIZE / DUTY		mm	1500 I/D x 3000 T/T HOLD 2
OPERATING	PRESSURE (NOTE-20)	barg	4.3
	TEMPERATURE	°C	50
DESIGN	PRESSURE	barg	30.7
	TEMPERATURE	°C	-46/100
CAPACITY		MMSCFD	-
VESSEL MOC			SS316/SS316L (DUAL GRADE)

23VG1401	
LEVEL DIAGRAM (mm)	
HHLL	850
HLL	700
NLL	550
LLL	400
LLLL	250
BOTTOM TAN LINE	+0.00



NOTES:

1. DP TYPE LEVEL TRANSMITTER.
2. TRANSPARENT TYPE LEVEL GAUGE.
3. HORIZONTAL FLOW VANE TYPE MIST EXTRACTOR.
4. EQUIPMENT TO BE COMPLETELY DEPRESSURIZED PRIOR TO OPENING THESE VALVES TO PREVENT OVERPRESSURE OF DOWNSTREAM SYSTEM.
5. ALL LINES JOINING RELIEF HEADER SHALL BE TOP ENTRY.
6. LIQUID LINES ARE HEAT TRACED.
7. HIGH POINT VENT AND LOW POINT DRAINS ARE NOT SHOWN IN P&ID'S. THE SAME WILL BE PROVIDED IN PIPING ISOMETRICS.
8. WHENEVER TWO DISSIMILAR MATERIALS ARE TO BE CONNECTED WITH FLANGE JOINTS, INSULATING GASKET KIT SHALL BE USED.
9. HEAT TRACING IS PROVIDED TO MAINTAIN THE TEMPERATURE OF 60°C FOR STAINLESS STEEL PIPING WITH SELF REGULATING CABLE.
10. HEAT TRACING IS PROVIDED TO MAINTAIN THE TEMPERATURE OF 90°C FOR DUPLEX OR CARBON STEEL PIPING WITH SELF REGULATING CABLE.
11. ALL LEVEL INSTRUMENT DRAINS SHALL BE ROUTED TO CLOSED DRAIN HEADER.
12. SAMPLE CONNECTION FOR PRESSURIZED GAS.
13. SAMPLE CONNECTION SHALL BE INSTALLED IN VERTICAL LINE WITH UPWARD FLOW. ALL VALVES SHALL BE ACCESSIBLE.
14. DUAL ELEMENT HIGH VIBRATION RESISTANT RTD.
15. COMMISSIONING MESH TO BE REMOVED AFTER 200 HRS OF OPERATION. CONE TO REMAIN IN PLACE.
16. ALL FLARE, VENT, DRAIN AND APPLICABLE PROCESS LINES SHALL HAVE A MINIMUM SLOPE AS FOLLOWS:
    i). LINES RUNNING AFT TO FORE-1:57
    ii). LINES RUNNING FORE TO AFT-1:100
    iii). LINES RUNNING PORT TO STARBOARD-1:100
17. REMOVABLE SPOOL PIECE FOR MAINTENANCE PURPOSE.
18. LINES TO BE CHEMICALLY CLEANED.
19. INLET DIVERTER.
20. OPERATING PRESSURE FOR OPERATING MODE WITH PACKAGE OUTLET PRESSURE OF 207.5 barg

HOLDS:

1. PSV ORIFICE SIZE AND ITS ASSOCIATED INLET AND OUTLET LINE SIZE.
2. EQUIPMENT SIZE IS PRELIMINARY AND THE SAME WILL BE CONFIRMED BASED ON VENDOR DETAILS.
3. HP FLARE HEADER SIZE.
4. RESTRICTION ORIFICE SIZE.

Rev.	Reason for issue	Date	Drawn	Issued	Checked	Approved
C	ISSUED FOR REVIEW	27.10.21	AG	NT	SK	VA
B	ISSUED FOR REVIEW	27.08.21	AG	NT	SK	VA
A	ISSUED FOR IDC	26.07.21	AG	KV	SK	VA

Client: BW ENERGY DUSSAFU B.V.

Supplier: wasco

Discipline:	System no:	Area/Module:	IMO no:	Project no:	Scale:	Size:
P	23	M23A	8611831	0379	NTS	A3

Unit/Field: 8 MMscfd Gas Lift Compressor for Adolo FPSO

Subject:

PIPING & INSTRUMENTATION DIAGRAM

1st STAGE SUCTION SCRUBBER - GAS LIFT COMPRESSOR

		Rev.	Sheet
BWO doc. no :	0379-WAS-P-XB-23001.001	C	1 of 1
Old BWO doc. no :	-		
Supplier doc. no :	WEI-C372-P-XB-23001		

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Unused gland entries shall be fitted with Ex certified stopping plugs that maintain the Ex certification and IP rating of the equipment.

The heat tracing cables, along with all accessories shall be provided with a valid IECEx Certificate in accordance with IEC 60079 Ref. /20/, from an independent Ex Certification Body approved by the IECEx scheme. Certification shall be in English.

9.3 Heat Tracing Cable

Heat tracing cables shall be of the self-regulating type, designed and constructed in accordance with the relevant IEC standards.

Heat tracing cables shall consist of copper conductors and self-regulating conductive heating element, surrounded with fluoropolymer insulation. Tinned copper braid shall be provided over the electrical insulation with a minimum 80% coverage. A continuous, chemical resistant, fluoropolymer outer jacket shall be provided over the braid.

Heat tracing cables shall have a flat profile, to allow efficient heat transfer and flexibility for spiralling over the pipes, flanges, valves and instruments. SUPPLIER shall indicate the minimum bending radii of the various heat tracing cables on the heat tracing isometric drawings.

Heat tracing cables shall have a burnout proof feature. Overlapping of heat tracing cables is not permitted. Heat tracing cables shall be installed spirally around the pipes as required.

Heat tracing cables shall be held in position with fibreglass tape. The SUPPLIER shall ensure that the fibreglass tape is suitable for the specific piping material.

Heat tracing cables trace out shall have a minimum 10% margin from heat loss calculation to ensure that the cables is suitable for the temperature design.

9.4 Heat Tracing Accessories

The SUPPLIER shall provide all heat tracing materials, including:

- Junction boxes;
- Thermostats;
- Splices;
- Tee joints;
- End seal;
- Power connectors;
- Mounting brackets;
- Pipe straps;
- Fibreglass tape;
- Warning labels;
- Cable glands.

End seals shall be of the type fitted with a light which protrudes above the piping insulation to give an indication that the circuit is energised. The lights shall be long life LED type and green in colour.

9.5 Thermostats

Thermostat controls for protection against over temperature and burnout shall be provided for each heat tracing circuit as required.

Thermostats shall have an adjustable set point.

Calibration certificates shall be provided for each thermostat.

Universitas Nasional

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WS ENGINEERING & FABRICATION PTE LTD
FIELD REPORT

Company		WS ENGINEERING & FABRICATION PTE LTD.		Conducted by:	COMMISSIONING & ENGINEERING TEAM OF WASCO
Client / Site location / Equipment name		BW Offshore - Adolo FPSO / 8 Mmscfd Gas Lift Compressor package		(Names, Designation) (Date)	
Prepare by:	Jaimbik Maheta	Review by:	Vijay Kumar	Last Review Date:	NA
Designation:	Lead Commissioning	Designation:	Engineering Manager	Next Review Date:	-
Date:	7th Nov 2022	Date:	7th Nov 2022	Ref No:	WEFL-RA-007
Signature		Signature		Revison:	-

1. TEMPERATURE IDENTIFICATION

No.	Site Work Activities	Method	Time	Ambient Temperature (C)	Process Design Temperature (C)	Remarks
1	Pre Commissioning Field Temperature Report	Fluke 971	7:00 AM	26.5	60	-
2	Pre Commissioning Field Temperature Report	Fluke 971	8:00 AM	27.4	60	-
3	Pre Commissioning Field Temperature Report	Fluke 971	10:00 AM	28.5	60	-
4	Pre Commissioning Field Temperature Report	Fluke 971	11:00 AM	28.7	60	-
5	Pre Commissioning Field Temperature Report	Fluke 971	1:00 PM	28.9	60	-
6	Pre Commissioning Field Temperature Report	Fluke 971	2:00 PM	27.8	60	-
7	Pre Commissioning Field Temperature Report	Fluke 971	4:00 PM	26.3	60	-
8	Pre Commissioning Field Temperature Report	Fluke 971	5:00 PM	26.1	60	-
9	Pre Commissioning Field Temperature Report	Fluke 971	7:00 PM	25.5	60	-
10	Pre Commissioning Field Temperature Report	Fluke 971	8:00 PM	25.2	60	-

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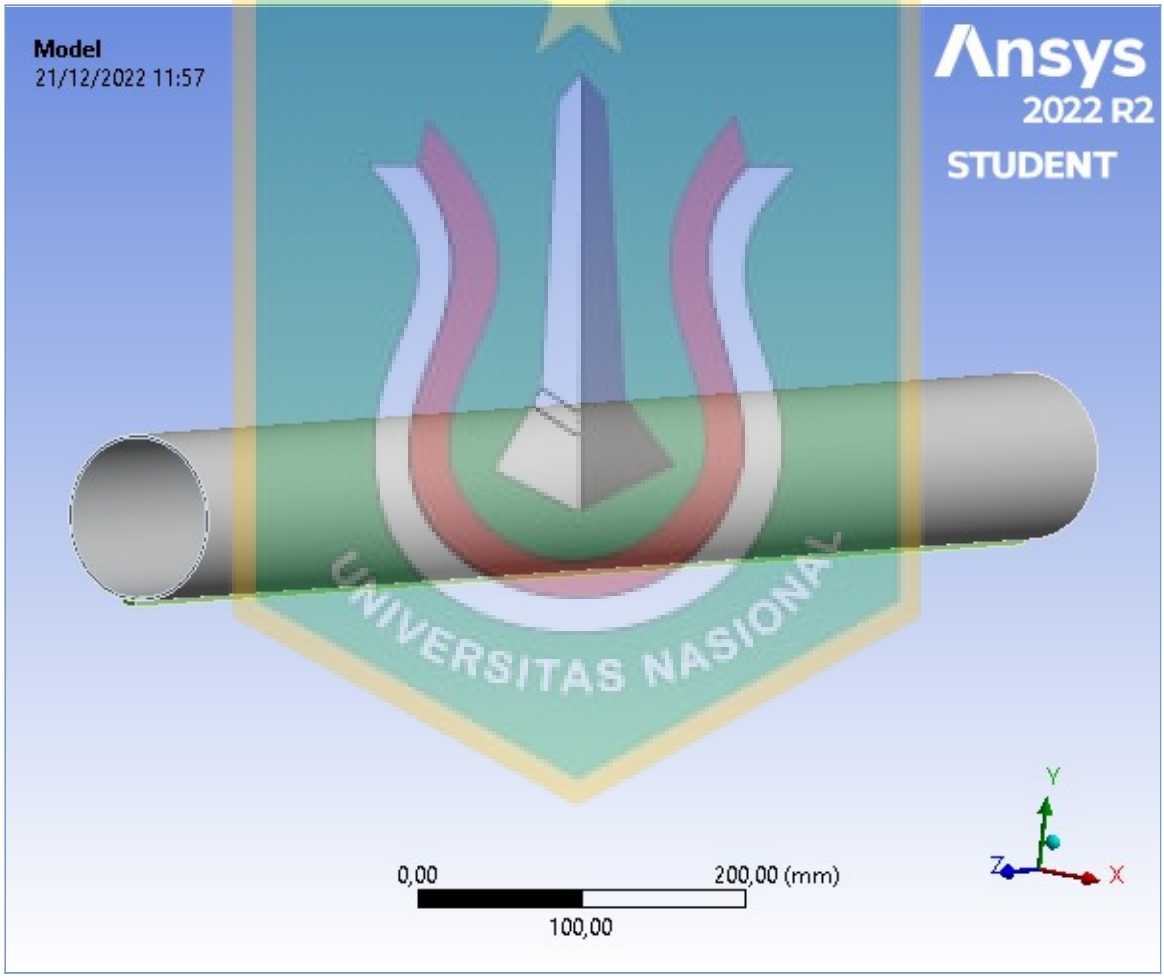
Project

First Saved	Wednesday, December 21, 2022
Last Saved	Wednesday, December 21, 2022
Product Version	2022 R2
Save Project Before Solution	No
Save Project After Solution	No



Contents

- Units
- Model (A3)
  - Geometry Imports
    - Geometry Import (A2)
  - Geometry
    - Parts
  - Materials
  - Coordinate Systems
  - Connections
    - Contacts
      - Contact Regions
  - Mesh

Units

TABLE 1

Unit System	Metric (mm, kg, N, s, mV, mA) Degrees rad/s Celsius
Angle	Degrees
Rotational Velocity	rad/s
Temperature	Celsius

Model (A3)

TABLE 2
Model (A3) > Geometry Imports

Object Name	*Geometry Imports*
State	Solved

TABLE 3
Model (A3) > Geometry Imports > Geometry Import (A2)

Object Name	*Geometry Import (A2)*
State	Solved
Definition	
Source	C:\Users\Aditya Mulyana\3d Skripsi_files\dp0\FFF\DM\FFF.agdb
Type	DesignModeler
Basic Geometry Options	
Parameters	Independent
Parameter Key	
Advanced Geometry Options	
Compare Parts On Update	No
Analysis Type	3-D

Geometry

TABLE 4
Model (A3) > Geometry

Object Name	*Geometry*

State	Fully Defined
Definition	
Source	C:\Users\Aditya Mulyana\3d Skripsi_files\dp0\FFF\DM\FFF.agdb
Type	DesignModeler
Length Unit	Meters
Bounding Box	
Length X	101,6 mm
Length Y	104,8 mm
Length Z	1000, mm
Properties	
Volume	8,1473e+006 mm³
Scale Factor Value	1,
Statistics	
Bodies	3
Active Bodies	3
Nodes	1773146
Elements	1655515
Mesh Metric	None
Update Options	
Assign Default Material	No
Basic Geometry Options	
Parameters	Independent
Parameter Key	
Attributes	Yes
Attribute Key	
Named Selections	Yes
Named Selection Key	
Material Properties	Yes
Advanced Geometry Options	
Use Associativity	Yes
Coordinate Systems	Yes
Coordinate System Key	
Reader Mode Saves Updated File	No
Use Instances	Yes
Smart CAD Update	Yes
Compare Parts On Update	No
Analysis Type	3-D
Import Facet Quality	Source
Clean Bodies On Import	No
Stitch Surfaces On Import	None
Decompose Disjoint Geometry	Yes
Enclosure and Symmetry Processing	No

TABLE 5
Model (A3) > Geometry > Parts

Object Name	*Pipe*	*Fluida*	*ElectricalHeatTracing*
State	Meshed		
Graphics Properties			
Visible	Yes		
Transparency	1	0,1	1
Definition			
Suppressed	No		

Coordinate System	Default Coordinate System		
Treatment	None		
Reference Frame	Lagrangian		
Material			
Assignment			
Fluid/Solid	Defined By Geometry (Solid)	Defined By Geometry (Fluid)	Defined By Geometry (Solid)
Bounding Box			
Length X	101,6 mm	97,6 mm	10, mm
Length Y	101,6 mm	97,6 mm	4, mm
Length Z	1000, mm		
Properties			
Volume	6,2581e+005 mm³	7,4815e+006 mm³	40000 mm³
Centroid X	9,6787e-015 mm	7,9656e-016 mm	-1,2132e-015 mm
Centroid Y	1,6835e-014 mm	1,3987e-015 mm	-52, mm
Centroid Z	500, mm		
Statistics			
Nodes	157628	1606500	9018
Elements	80661	1569854	5000
Mesh Metric	None		

TABLE 6
Model (A3) > Materials

Object Name	*Materials*
State	Fully Defined
Statistics	
Materials	0
Material Assignments	0

Coordinate Systems

TABLE 7
Model (A3) > Coordinate Systems > Coordinate System

Object Name	*Global Coordinate System*
State	Fully Defined
Definition	
Type	Cartesian
Coordinate System ID	0,
Origin	
Origin X	0, mm
Origin Y	0, mm
Origin Z	0, mm
Directional Vectors	
X Axis Data	[1, 0, 0,]
Y Axis Data	[0, 1, 0,]
Z Axis Data	[0, 0, 1,]

Connections

TABLE 8
Model (A3) > Connections

Object Name	*Connections*
State	Fully Defined

Auto Detection	
Generate Automatic Connection On Refresh	Yes
Transparency	
Enabled	Yes

TABLE 9
Model (A3) > Connections > Contacts

Object Name	*Contacts*
State	Fully Defined
Definition	
Connection Type	Contact
Scope	
Scoping Method	Geometry Selection
Geometry	All Bodies
Auto Detection	
Tolerance Type	Slider
Tolerance Slider	0,
Tolerance Value	2,5265 mm
Use Range	No
Face/Face	Yes
Face-Face Angle Tolerance	75, °
Face Overlap Tolerance	Off
Cylindrical Faces	Include
Face/Edge	No
Edge/Edge	No
Priority	Include All
Group By	Bodies
Search Across	Bodies
Statistics	
Connections	3
Active Connections	3

TABLE 10
Model (A3) > Connections > Contacts > Contact Regions

Object Name	*Contact Region*	*Contact Region 2*	*Contact Region 3*
State	Fully Defined		
Scope			
Scoping Method	Geometry Selection		
Contact	1 Face		
Target	1 Face		
Contact Bodies	Pipe		Fluida
Target Bodies	Fluida	ElectricalHeatTracing	
Protected	No		
Display			
Element Normals	No		
Advanced			
Small Sliding	Program Controlled		

Mesh

TABLE 11
Model (A3) > Mesh

Object Name	*Mesh*
State	Solved
Display	
Display Style	Use Geometry Setting
Defaults	
Physics Preference	CFD
Solver Preference	Fluent
Element Order	Linear
Element Size	2, mm
Export Format	Standard
Export Preview Surface Mesh	No
Sizing	
Use Adaptive Sizing	No
Growth Rate	Default (1,2)
Max Size	Default (4, mm)
Mesh Defeaturing	Yes
Defeature Size	Default (1,e-002 mm)
Capture Curvature	Yes
Curvature Min Size	Default (2,e-002 mm)
Curvature Normal Angle	Default (18,°)
Capture Proximity	No
Bounding Box Diagonal	1010,6 mm
Average Surface Area	75035 mm²
Minimum Edge Length	4, mm
Quality	
Check Mesh Quality	Yes, Errors
Target Skewness	Default (0,9)
Smoothing	Medium
Mesh Metric	None
Inflation	
Use Automatic Inflation	None
Inflation Option	Smooth Transition
Transition Ratio	0,272
Maximum Layers	5
Growth Rate	1,2
Inflation Algorithm	Pre
View Advanced Options	No
Advanced	
Number of CPUs for Parallel Part Meshing	Program Controlled
Straight Sided Elements	
Rigid Body Behavior	Dimensionally Reduced
Triangle Surface Mesher	Program Controlled
Topology Checking	Yes
Pinch Tolerance	Default (1,8e-002 mm)
Generate Pinch on Refresh	No
Statistics	
Nodes	1773146
Elements	1655515

PROJECT :					INSULATION MATERIAL :			THERMAL CONDUCTIVITY :		DESIGN MARGIN:				SUPPLY VOLTAGE :			MIN AMB TEMPERATURE :			MAX. HEATER EXPOSURE TEMP.			BARTEC MIDDLE EAST FZE							
8MMSCFD GAS LIFT COMPRESSOR FOR ADOLO FPSO					CELLULAR GLASS			0.022 & 0.023 W/MK		10%				230 V ± 0% , 60 Hz, 1Ph			-25 DEG.C			130 DEG.C										
SL. No.	REV. No.	EHT CIRCUIT No.	LINE No. / INSTRUMENT TAG No.	PIPE MAINTENANCE TEMPERATURE	OPERATING TEMPERATURE (POWER ON)	DESIGN TEMPERATURE (POWER OFF)	PIPE SIZE	PIPE LENGTH	HEATER TAG No.	QUANTITY			INSULATION THK	HEAT LOSS	HEAT TRACER CABLE TYPE	TRACER OUTPUT @230 V, @ MAINTAIN TEMP.	TRACE RATIO / PIPE	M STRIP / VALVE	M STRIP / FLANGE	M STRIP / SUPPORT	HEATING LENGTH / PIPE	TOTAL HEATING CABLE LENGTH	MARSHALLING JUNCTION BOX TAG No.	POWER JUNCTION BOX CUM THERMOSTAT TAG No.	TOTAL OPERATING LOAD	TOTAL OPERATING CURRENT	TOTAL STARTUP CURRENT	CIRCUIT BREAKER RATING	REMARKS
										VALVE	FLANGE	SUPPORT																	
				Deg.C	Deg.C	Deg.C	Inch	Mtrs.		Nos.	Nos.	Nos.	MM	W/M		W/M	Mtrs.	Mtrs.	Mtrs.	Mtrs.	Mtrs.	Mtrs.			KW	A	A	A	
1	A	HT-101	23-Z"-PG-BS20M-1669-HT	60	55	100	2.0	1.0	HT101-1/1	1	0	0	30	37.6	20MSB2	41.0	1.0	0.7	0.4	0.4	3.7	88.0	MJB-101	PJB-101-01	3.6	15.7	28.0	40	
2	A		23-Z"-PG-BS20M-1669-HT		55	100	0.75	1.7	HT101-1/1	3	0	2	30	22.1	20MSB2	41.0	1.0	0.5	0.3	0.3	4.8								
3	A		23-8"-PG-BS20M-1731-N		55	100	2.0	1.6	HT101-2/1	1	1	1	30	37.6	20MSB2	41.0	1.0	0.7	0.4	0.4	5.1			PJB-101-02					
4	A		23-3"-PG-BS20M-1653-HT		55	100	8.0	1.0	HT101-3/1	0	0	2	50	69.0	20MSB2	41.0	2.0	1.6	1.0	1.0	6.0			PJB-101-03					
5	A		23-3"-PG-BS20M-1653-HT		55	100	3.0	4.7	HT101-3/1	1	0	2	50	34.4	20MSB2	41.0	1.0	1.0	0.5	0.5	7.1								
6	A		23-3"-PG-BS20M-1653-HT		55	100	1.5	0.3	HT101-3/1	1	0	0	30	32.1	20MSB2	41.0	1.0	0.7	0.3	0.3	1.3								
7	A		23-3"-PG-BS20M-1653-HT		55	100	0.75	0.4	HT101-3/1	1	0	0	30	22.1	20MSB2	41.0	1.0	0.5	0.3	0.3	1.3								
8	A		23-3"-PG-BS20M-1654-HT		55	100	2.0	1.9	HT101-3/1	1	0	1	30	37.6	20MSB2	41.0	1.0	0.7	0.4	0.4	3.7								
9	A		23-3"-PG-BS20M-1654-HT		55	100	1.5	0.3	HT101-3/1	1	0	0	30	32.1	20MSB2	41.0	1.0	0.7	0.3	0.3	1.3								
10	A		23-3"-PG-BS20M-1654-HT		55	100	0.75	0.4	HT101-3/1	1	0	0	30	22.1	20MSB2	41.0	1.0	0.5	0.3	0.3	1.3								
11	A		23-Z"-PG-GS20-1774-HT		55	100	2.0	0.6	HT101-4/1	1	0	0	30	37.6	20MSB2	41.0	1.0	0.7	0.4	0.4	3.3			PJB-101-04					
12	A		23-Z"-PG-GS20-1774-HT		55	100	0.75	3.7	HT101-4/1	3	0	4	30	22.1	20MSB2	41.0	1.0	0.5	0.3	0.3	7.4								
13	A		23-3"-PG-GS20-1706-HT		55	100	3.0	3.5	HT101-5/1	1	0	1	50	34.4	20MSB2	41.0	1.0	1.0	0.5	0.5	7.0			PJB-101-05					
14	A		23-Z"-PL-DS20M-1723-HT		55	100	2.0	9.4	HT101-6/1	0	4	2	30	37.6	20MSB2	41.0	1.0	0.7	0.4	0.4	13.8			PJB-101-06					
15	A		23-Z"-PL-DS20M-1723-HT		55	100	1.0	0.1	HT101-6/1	0	0	0	30	25.2	20MSB2	41.0	1.0	0.6	0.3	0.3	0.2								
16	A		23-Z"-PL-ES20M-1722-HT		55	100	2.0	4.9	HT101-6/1	3	1	2	30	37.6	20MSB2	41.0	1.0	0.7	0.4	0.4	8.4								
17	A		23-Z"-PL-ES20M-1722-HT		55	100	1.0	2.3	HT101-6/1	2	0	1	30	25.2	20MSB2	41.0	1.0	0.6	0.3	0.3	4.3								
18	A		23-Z"-PL-ES20M-1722-HT		55	100	2.0	2.5	HT101-6/1	2	1	1	30	37.6	20MSB2	41.0	1.0	0.7	0.4	0.4	4.9								
19	A		23-Z"-PL-ES20M-1722-HT		55	100	0.75	1.2	HT101-6/1	2	0	0	30	22.1	20MSB2	41.0	1.0	0.5	0.3	0.3	3.2								
20	A		23-Z"-PL-BS20M-1673-HT		55	100	2.0	4.0	HT102-1/1	2	1	3	30	37.6	20MSB2	41.0	1.0	0.7	0.4	0.4	10.2								
21	A		23-Z"-PL-BS20M-1673-HT		55	100	1.0	0.2	HT102-1/1	1	0	0	30	25.2	20MSB2	41.0	1.0	0.6	0.3	0.3	1.4								

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