AVIS PROFILE

AEQUITAS VERITAS INDUSTRIAL SERVICE

Power	Oil & Gas	Pipelines	Engineering	Metallurgy/Welding
RLA & FFS	Lab Testing	Advisory	Consultancy	Failure Analysis

SOLUTION TO ENHANCE

AVAILABILITY, RELIABILITY AND EFFICIENCY

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AVIS

Safer, Smarter & Sustainable

CONTENT

ABOUT AVIS

Who We Are

- Engineers/consultants to provide solutions to enhance availability, reliability and efficiency improvement
- Partners with talented start-ups and freelancers
- Partners with manufacturers of industrial parts
- Partners with maintenance/repair /technical services

Who Are Our Customers

- Oil & Gas, Power Sector, Process Industry, Manufacturer
- Cross Country Pipeline ,Chemical & Petrochemical
- Onshore & Offshore Projects

AVIS MISSION & VISION

Our Mission

- To support our clients and help them evolve further by providing them “true” advice so that their investment could be “justified”
- Develop next generation “Technocrats/ professionals” in industry

Our Vision

- Become market leader in the industry where “Knowledge based truth” is core values and not the profit based objective in a business deal

Why Us

- Team with Global Experience-Europe, Asia, America
- Team with Highly Technical Expertise
- Team with Highly Skilled Manpower

Our Presence

- Vadodara/ PAN India
- Europe - Norway/ Italy/ UK
- Eurasia- Russia / Iran
- Houston, US
- Middle East- OMAN, UAE & Saudi Arab (KSA)
- Tripoli, Libya

AVIS CORE EXPERTISE

Core Knowledge base

- Mechanical, Metallurgical, Corrosion, Welding & NDT
- Condition Assessment (CA)
- Remaining Life Assessment (RLA)
- Fitness For Services (FFS) - API-579-1/ ASME FFS1
- Failure Analysis & Root Cause Analysis
- Integrity Assessment & Plant Inspections
- Pipeline Integrity Assessment -API 579 /ASME B31G/DNV RP F101
- Power Plant Performance Improvement, Energy Efficiency
- Chemical/Petrochemical/Fertilizer/ Offshore Plants
- Boiler Combustion/Water Chemistry & Turbine Performance
- Reliable Supply Chain Mechanical, Electrical, I&C Items & FAT

AVIS & PARTNERS EXPERTISE

AVIS & Associates Knowledge base

- Plants Integrity & Health Assessment
- Pipelines and Onshore & Offshore Projects
- Subsea Inspection /ROV
- CA & Refurbishment of Hydro, Thermal Power Plants
- Gas & Steam Turbine & Generator Overhauls
- Energy Audit / Energy Efficiency & Performance
- Electrical/ Generator, Motor, Cables, Switchyards
- Control System Upgrade & Electrical Testing/ Inspection
- Water Chemistry, Water Analysis, RO Plants

AVIS LEADERS & TEAM

LEADERS

- Dr.M.K.Sharma, Ph.D (IITR), C.Eng., IWE, LIIM, FIIW, Director
  (Ex-DNVGL Norway, Global Approval Authority - Pipeline, Materials & Welding)
- A.K.Singh, President Power, Ex BHEL & Ex CEO, ERDA
- Prof.S.K.Agrawal, Advisor-Failure Analysis ,Ex-Head, Metallurgy,M.S.Univ.
- Dario Epifani, Head- Oil & Gas/ Line pipe & Pipelines, Europe
- Manoj Sharma, G.M- Power Plant & Commissioning, Oman
- Dr.K.Barai, Head Metallurgy & Plant Inspection, Saudi Arab / Middle East
- S.Chaudhari, Head- Plant Efficiency & Energy Audit, Delhi /India
- Dr.C.Gaur, Head-Corrosion & Water Chemistry, Muscat
- Sagar Gaur, Oil & Gas, Pipeline & Sub-Sea Engineering, Houston, US
- B.S.Chhonkar, Head- Power Plants RLA & IBR Liaising, New Delhi/ India
- S.P.Verma, Head Project Management, Ex Andritz/Projects Director Hydro
- S.K.Naik, NABL / ISO17025 Auditor

LABORATORY

TESTING & ANALYSIS

MATERIALS / WELDING / NDT/ FAILURES

AVIS LABORATORY TESTING

Mechanical Testing	Spectro Analysis	Welding/WPS & PQR
Metallurgical Testing	PMI Testing	NDT / Inspections
Corrosion /HIC/SSCC	Replica Testing	Technical Support
Microstructural Study	Site /Field Testing	Failure Analysis
Tech. Qualification	Training & Development	R &D Projects

AVIS TESTING FACILITIES

Mechanical :

Hardness Test (Brinell, Vickers, Rockwell)
Tensile Test
Bend Test
Nick Break Test
Fracture Test
Shear Test
Flattening Test
Compression Test
Flaring Test/Drift Expansion
Proof Load Test (Nuts)
Wedge Load Test (Bolts)
Permanent Load Test (Washer)
Bend Test for Tubes & Pipe
Straingе Load Test
Charpy Test at Ambient Temperature
Charpy Test at (-60°C / -196°C)

Metallurgical :

Microstructural Studies
Inclusion Rating
Grain Size Measurements
Quantitative Metallography
Microstructure by Non Destructive (Replica)
Case Depth/Decarburisation Depth
Coating Thickness Measurements
Austenitic Grain Size Determination
Macrostructure of welded samples
Macro Examination (Weld/Stud Penetration
Macro Test for Tube to Tube Mock up joints
Ring Test for TMT Bars
Mesh Size Measurements
Ferrite Measurements
Volume Fraction Ferrite measurements
Phase Analysis (Ferrite/Pearlite/ASS,MSS)

Corrosion Testing:

ASTM/ISO/NACE TM 0284/NACE TM 0177
Corrosion Test (ASTM Practice A/B/C)
Corrosion Test (ASTM Practice E)
Hydrogen Induced Cracking (HIC)
Sulphide Stress Corrosion Cracking
SSCC at Elevated Temperature
Chloride Stress Corrosion Cracking
Pitting Corrosion
Crevice Corrosion
Four Point Bend Test

Non Destructive Testing:

Positive Metal Identification (PMI)
Visual Examination (VE)
Ultrasonic Testing (UT)
Magnetic Particle Inspection (MPI)
Dye Penetrant Testing (DPT/LPT)
Thickness Testing by D-Meter (UT-T)
Oxide Thickness Measurements (UT-O)
Portable Hardness Testing
Replica Testing
Fiberscopy /Boroscopy Examination (FOB)

Chemical Analysis: Spectro / PMI

Spectrometer analysis – Ferrous Alloys
Spectrometer analysis – Aluminium Base
Spectrometer analysis –Copper Base
Spectrometer analysis –Nickle Base

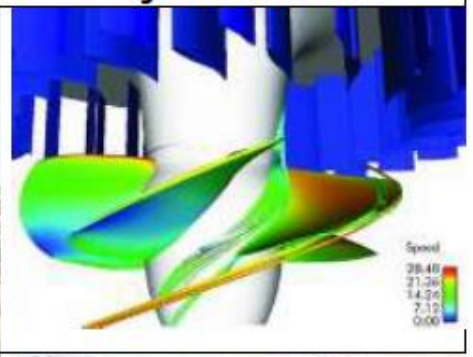
Welding /Others:

Welder Qualification
WPS & PQR / WQT
Failure Analysis / Root Cause Analysis
Technical Audits/ Quality Audits
R&D

POWER PROJECTS

RLA & ENGINEERING SERVICES FOR THERMAL, HYDRO, GAS, NUCLEAR, SOLAR

AVIS- POWER PLANT STUDIES

Thermal Power	Chemical Plants	Hydro Power
		
		
		

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RLA STUDIES ≥ 60 PROJECTS

SR	POWER PLANTS	RLA CONDUCTED	BOILER	TURBINE	TRANSFORMER	GENERATOR	OTHER MECH/MET	CIVIL	AUXI-LIARIES
1	Kachchh TPS	1 X 70 (MW)	Unit # 1	---	---	---	---	---	---
2	Dhuvaran TPS	9 X 63.5 2 X 140	Unit # 1 to 11	Unit # 1	Unit # 1	---	Unit # 1	----	Unit # 1
3	Tarapur NPC	1 X1 60 (MW)	---	---	---	---	Unit # 1	---	----
4	Wanakbori TPS, GEB	1 X 210 (MW)	---	---	---	---	Unit # 2	---	---
5	Faridabad TPS	3 X 60 (MW)	Unit # 1	Unit # 1	Unit # 1	Unit # 1	Unit # 1 to 3	Full Plant	Unit # 1 to 3
6	Ukai TPS, GEB	1 X 210 (MW)	---	Unit # 5	---	Unit # 5	---	---	---
7	Satpura TPS, MP	5 X 62.5 (MW)	---	Unit # 2,4	---	Unit # 2,4	Unit # 2,4	Full Plant	Unit # 1,3,5
8	Faridabad TPS	1 X 60 (MW)	Unit # 2	Unit # 2	Unit # 2	Unit # 2	---	---	---

+ Many more 50 nos.

AVIS – RLA APPROACH

REMAING LIFE ASSESSMENT OF POWER & PROCESS PLANTS COMPONENTS

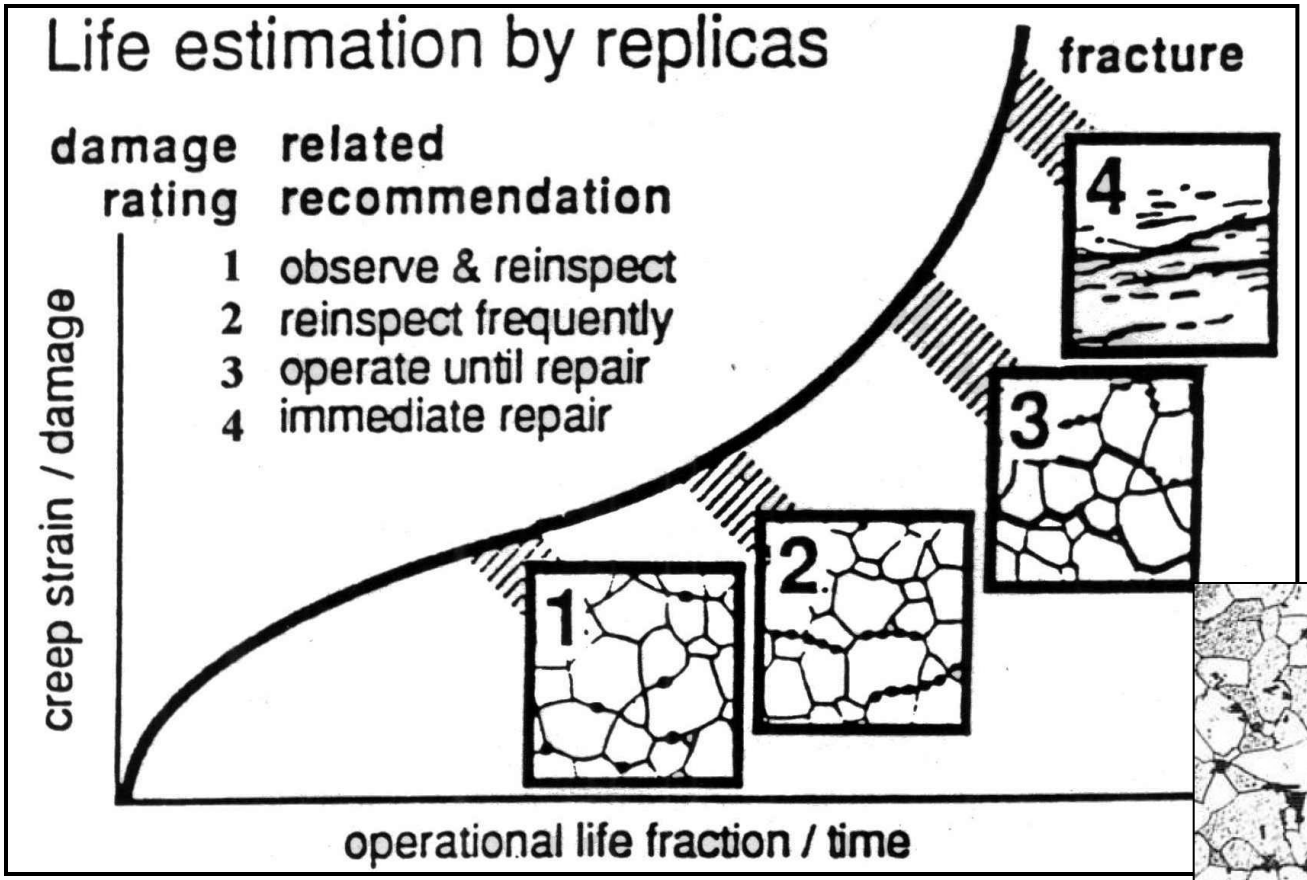
- Boiler
- Turbine
- Auxiliaries of Boiler
- Auxiliaries of Turbine
- Electricals / Generator
- Protection, C&I and others
- Piping Systems & Civil & Structures

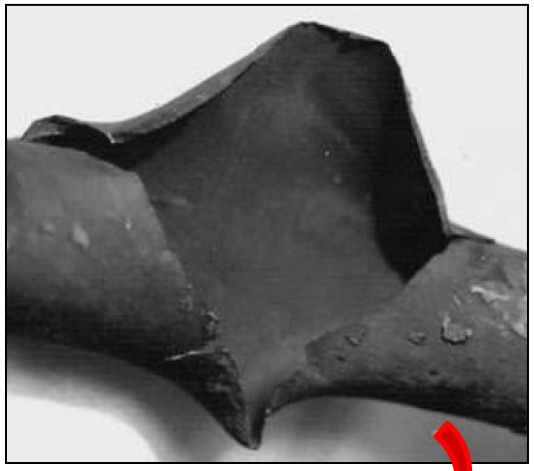
Fatigue
Vibration
Thermal
Corrosion
Lack of quality control
Maintenance cleaning damage
Damage due to improper water chemistry
Material defects / Welding defects

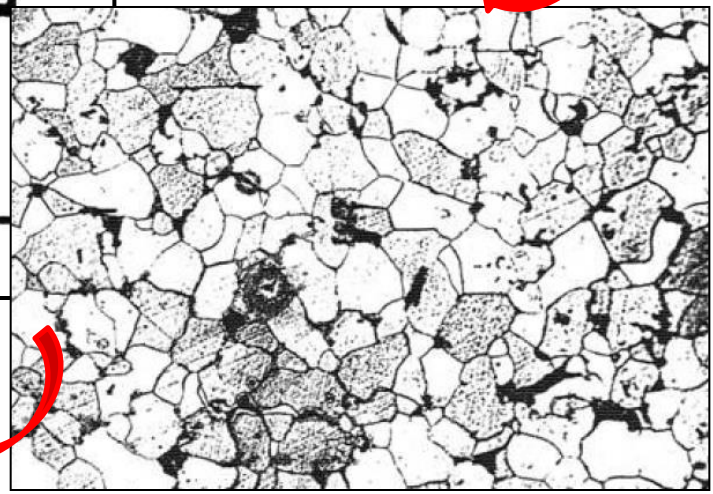
FAILURE MECHANISMS FOR BOILER:
Stress-rupture
Short-term overheating
High-temperature creep
Dissimilar-metal welds
Water-side corrosion
Hydrogen damage
Pitting (localized corrosion)
Stress-corrosion cracking
Fire-side corrosion
Low temperature
Water wall
Oil ash
Erosion
Falling slag
Soot blower

AVIS- POWER PLANT STUDIES

AVIS – RLA APPROACH

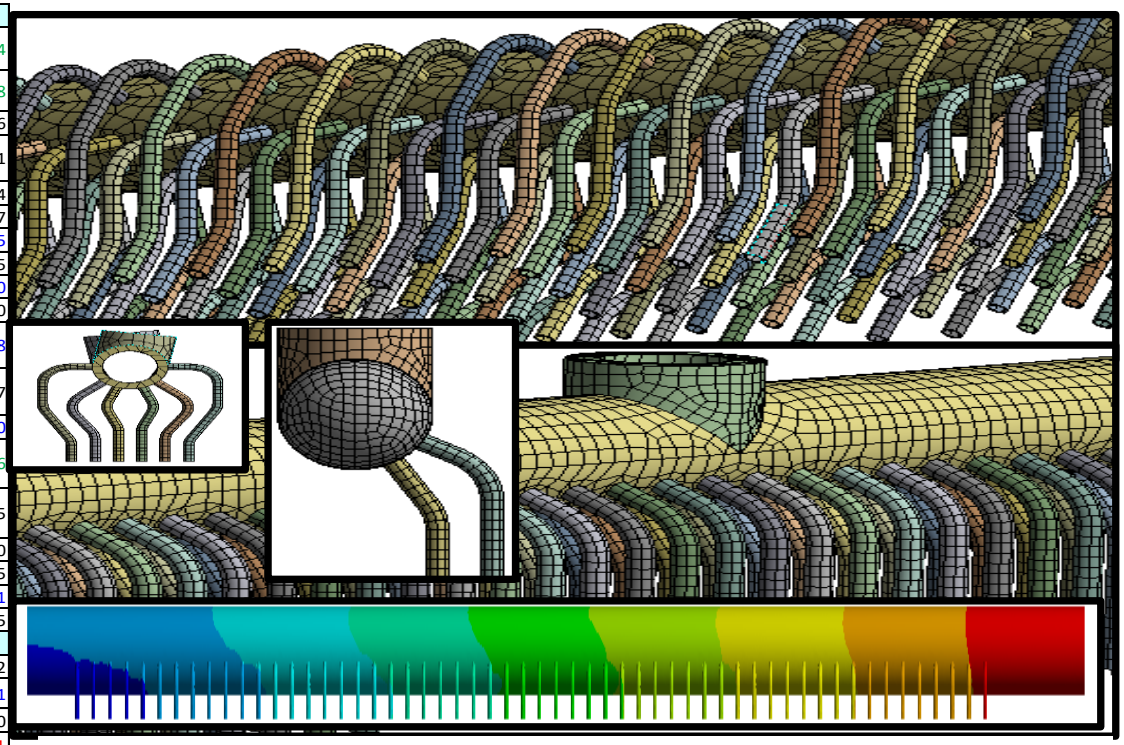


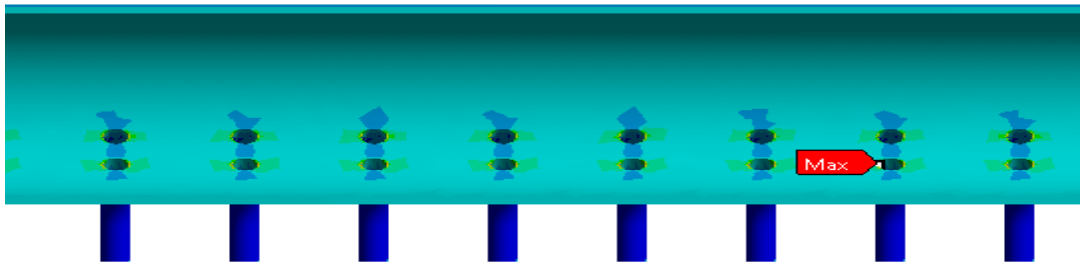




AVIS- RLA & FFS STUDY: CREEP BASED ANALYSIS

Calculation of modified strain range as per T-1432 (e)			
PL+Pb+Q|range	MPa	Spsr	14.94
Salt with K effect	Mpa	Sa	12.48
PL+Pb+Q+F|range=2*Salt with K effect	Mpa	Spr	24.96
Equivalent stress concentration factor =Max(Spr/Spsr,1)	Mpa	K	1.671
2*Salt (without K effect)=Spr/K	Mpa		14.94
Strain range =2 Salt (without K effect) /E	%	Δεmax	0.0087
Time independent allowable S.I at 480 deg C	Mpa	Sm	115
1.5 Sm	Mpa		172.5
Total Life in years	years		20
No of cycles in life for240 hrs/cycle	cycles	N	730
Duration during which 370 deg C is exceeded per cycle	hours		0.02918
Total duration of exceedance in hours in total life	hours		21.30117
Hot temperature	deg C	Th	480
Relaxation stress associated with Hot temeprature Th	Mpa	SrH	46
3Sm Limit = 1.5 Sm + Srh	Mpa	Sm_	218.5
Max strain for Elastic follow up =3 Sm_ /E	%		0.1270
K * Δεmax	%		0.0145
Penalty factor		Ke	1
Modified max eqv strain range= Ke * K * Δεmax	%	Δε mod	0.0145
Adjustment factors *f* and K*ν* 'as per T-1432 (f)			
ratio (Δε mod * E/ 3Sm_) for Kv'			0.1142
Plastic poison's ratio adj factor @ ratio (Δε mod * E/ 3Sm_)		Kv'	1
Factor f			0
Multiaxial Plasticity & poission's ratio adjustment factor =1+f*(kv'-1)		Kν	1
Creep strain as per T-1432 (g), (h)			
Parameter Z =X		Z	0.0576
Effective creep stress=Z.Sy	Mpa	σc	9.6182
1.25 times the effective creep stress=1.25σc	Mpa	1.25σc	12.02
For 12.02275 MPa, Accumulated creep strain in entire service life	%	εc	0.002
creep strain increment per cycle =εc/N	%	Δεc	2.74E-06
Total strain range per cycle=Kv.Δεmod+K.Δεc	%	εt	0.0145
Total strain range per cycle=Kv.Δεmod+K.Δεc in absolute	mm/mm	εt	1.45E-04
No of allowable cycles		Nd	1000000
Fatigue damage=N/Nd			0.00073





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AVIS ASSOCIATED ENGINEERING PROJECTS

POWER : ***AVIS & Partners in INDIA & ABROAD can execute the following type of engineering projects***

- **Boiler, Turbine & Generators and Plant Commissioning**
- **Design And Implementation Of Engineered "Retrofit" And "Upgrade" Solution To Enhance Availability, Reliability And Efficiency**
- **Performing Boiler And Heat Exchanger Acid/Chemical Cleaning**
- **Do Mechanical Cleaning And High Pressure Jet Washing**
- **Provides Condenser Air Leakage Inspection For Vacuum Improvement**
- **Supervise Air Preheater Installation/ Performance Improvement Works**
- **High Precision Machining And Casting Works**
- **Provides Digital Services To Enhance Condition Monitoring And Management Solution (CMMS), Reliability Centered Maintenance (RCM) Practice, And Enterprise Resource Planning (ERP)**

OIL & GAS

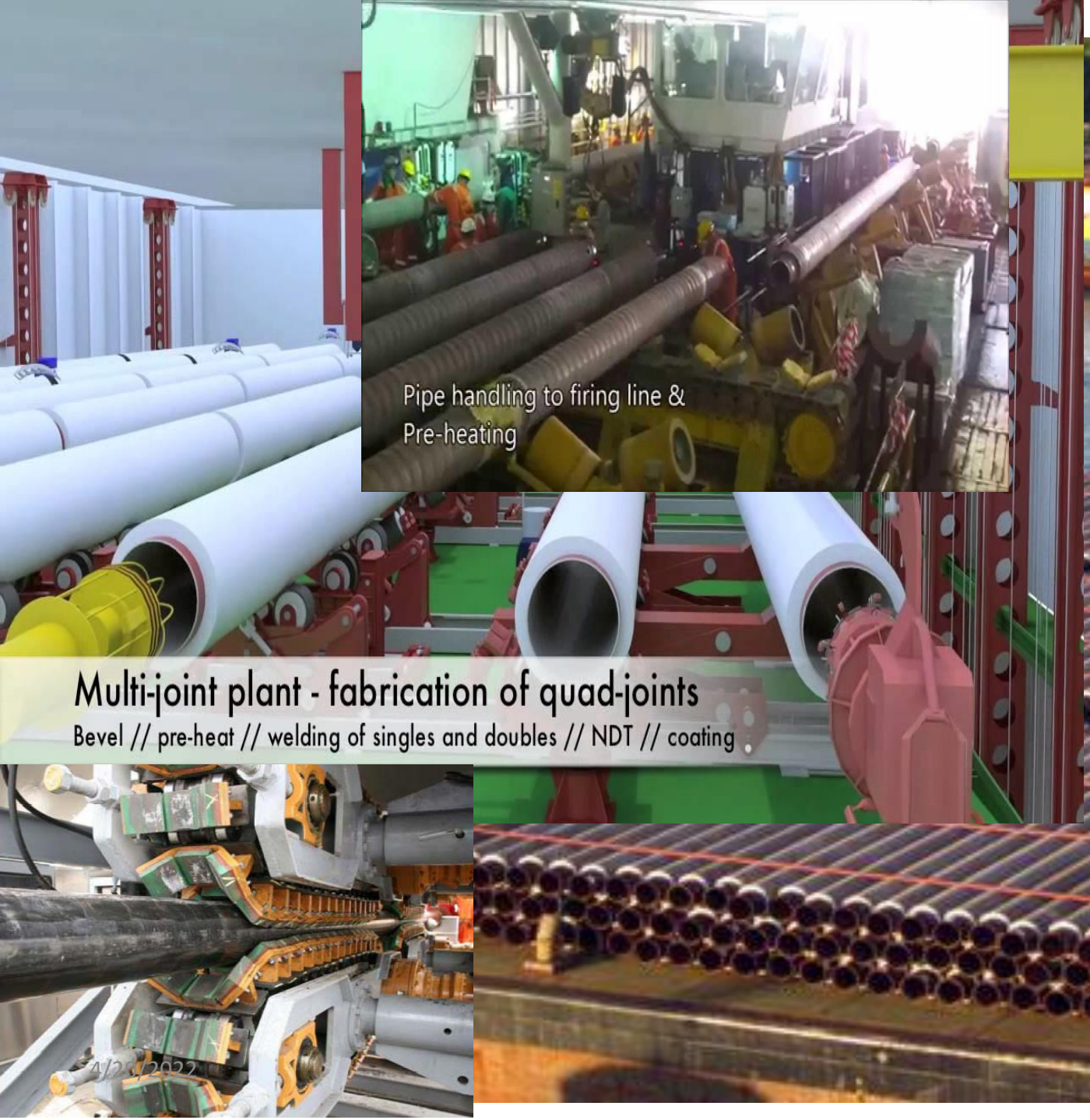
ONSHORE & OFFSHORE PROJECTS

PIPE LINES & INTEGRIRTY ASSESSMENT

SUBSEA AND TECHNICAL SERVICES

AVIS - OIL & GAS

- Pipeline Life Evaluation and Life Extension for safe operations
- Risers, Umbilical and Flexible pipe Analysis
- Free Span and lateral Buckling Analysis
- FEA Advance Analysis for Ship-Jacket Impact
- Strain Base Design, HPHT/ Low Cycle Fatigue Design, Pipe-in-Pipe
- Advanced Pipeline & Risers Design
- Subsea Pipeline and Risers
- Subsea Structures and Piping
- Materials Integrity & Engineering Consultancy
- Material & Corrosion Study for Subsea Production System/Pipeline
- Topside Structure, Elbow, Bends, Pressure Vessel Study
- Welding & NDT - Construction, Installation & Operation Phase


Pipe handling to firing line &
Pre-heating
Multi-joint plant - fabrication of quad-joints
Bevel // pre-heat // welding of singles and doubles // NDT // coating

AVIS - OIL & GAS

- Risk Base inspection & Testing
- Risk Base Assessment & Integrity Management
- Operational Remaining Life Assessment
- End of Life & Beyond Study and Life Extension
- Project specific Study, Testing & Inspection and Monitoring
- Engineering Critical Assessment-API579-1, API1104, RP-F108,BS-7910
- Fracture & Fatigue Analysis- Crack Growth, BS-7608, RP-C201
- Fatigue Assessment of Risers
- Corroded & Non-Corroded pipeline Free Span Assessment
- Subsea Assessment-Corroded Pipeline & Structures, DNV-RP-F101, ASME B31G, ASME FFS1, API-579-1, BS 7910
- Safe Working Pressure for Critical Corrosion Assets,
- Analysis & Interpretation of ILI Pigging Data

1

2

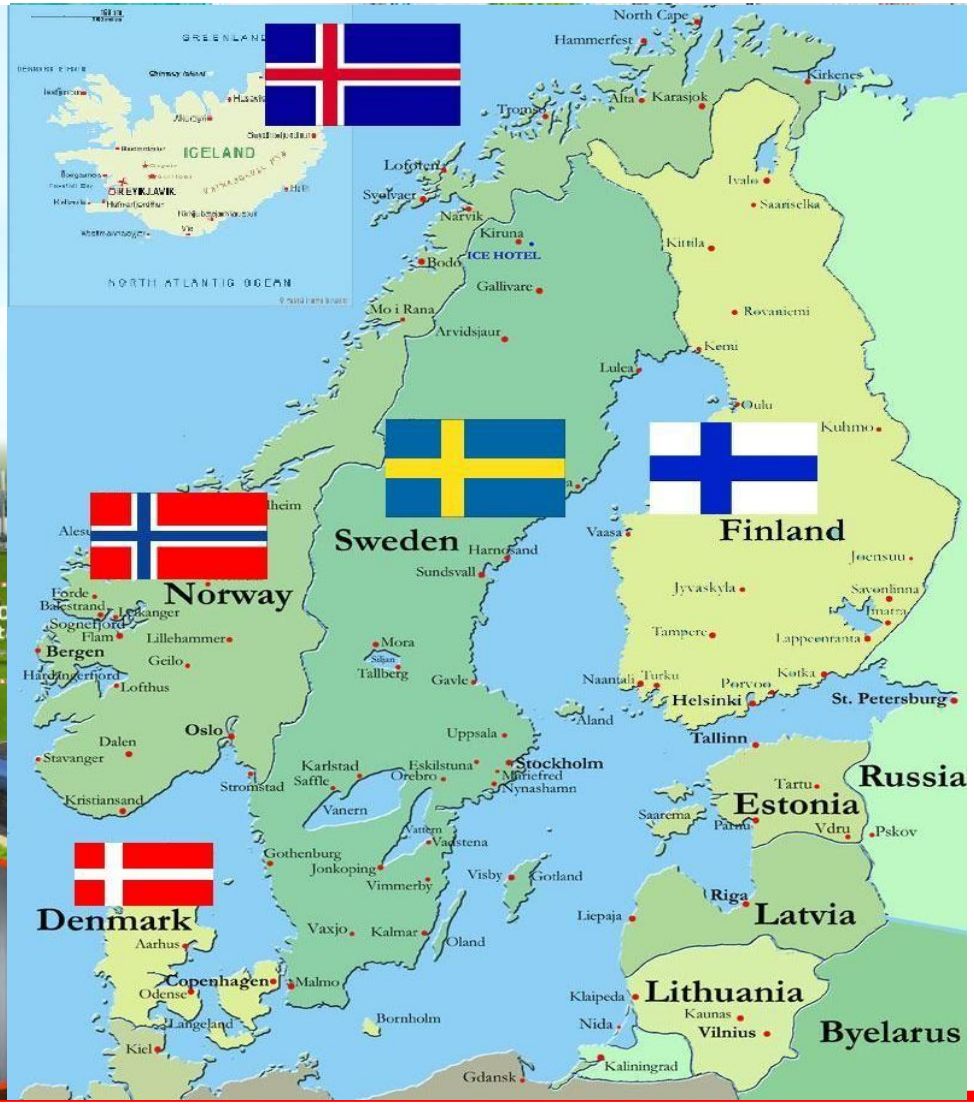
AVIS

OIL & GAS PROJECTS > 40 PROJECTS

IMPORTANT PROJECTS IN NORTH SEA, OSLO, EUROPE & UK

- **Statoil Gullfack Project,** North Sea Pipeline
- **South Stream / Intecsea Project**: Pipeline Russia to Bulgarian & S. Europe, DNV- OS-F101
- **Statoil/Technip-** North Sea - 25Cr DJ Spool Pipe project.
- **North Stream Project:** Pipeline Russia to Germany via Baltic sea. DNV SAWL 485 FD,
- **Statoil Dudgeon** offshore project- Scot Hydro Renewables-UK, Mooring Pile-Karan project,
- **Ivar Aasen & Marting Linge** Development Project – North Sea
- **MOHO-Total Nord Project, Aker Solutions** – Baltic Sea
- **Det Norske Ivar Aasen Project/ENI saipem** – Southern Norway
- **North Sea Projects**-Freudenburg Technology-Hebron Project, Cowdor, FMC, Subsea, Exxon,
- **Pipe Mill Qualification:** Bao Steel China, Steel Flower S.Korea, Vyksa Pipe Mill Russia, JFE
- **Ichthys Onshore LNG Gas** Export Pipeline Project, Australia
- **Petrobras** Technical Specifications Advisory- Submarine Pipeline specification
- **Technology Qualification**: Laser Systems,OMK-Russia, LEEMA-Sweden & OMS-UK.

Oil & Gas- North Sea Project Overview



PLANT INTEGRITY ASSESSMENT

RLA & FFS

Chemical & Petrochemical Plants

Onshore & Offshore Plants

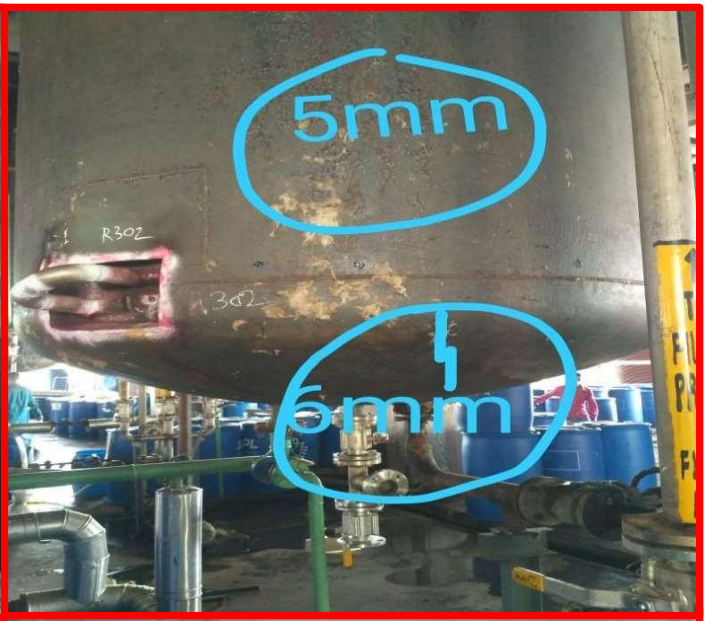
Pressure Vessels, Boilers, Reactors, Reformer tubes, heat exchangers etc

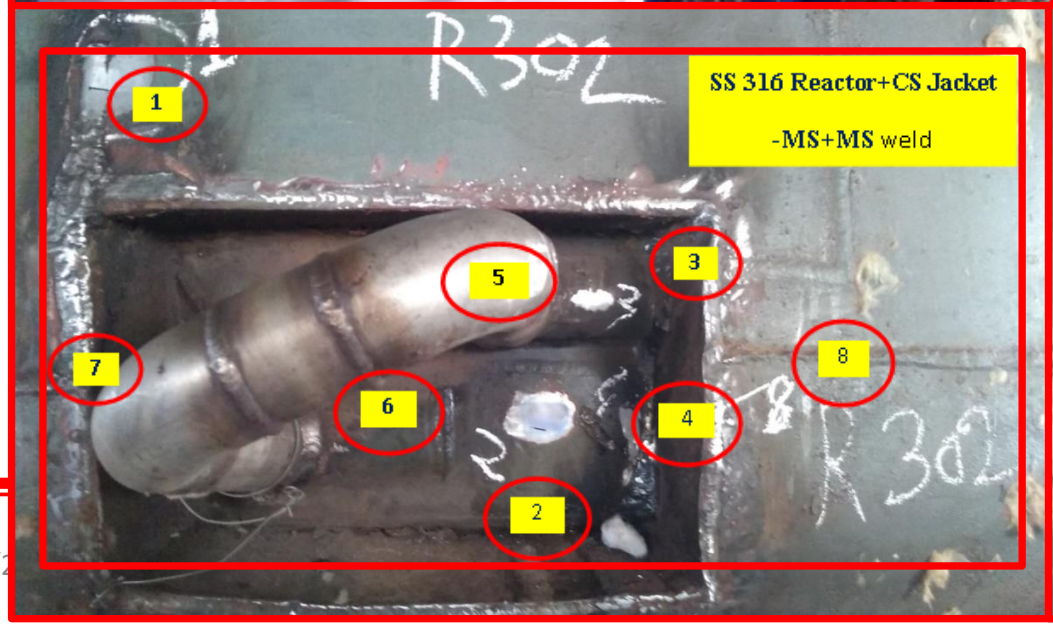
AVIS – AGEING PLANT STUDIES

Chemical Plants piping problem/ Structural Integrity

AVIS – AGEING PLANT STUDIES

SS Reactor + CS Jacket- Leakage/Lacking Problem





AVIS- FITNESS-FOR-SERVICE - API 579-1/ASME FFS

- **Data Requirement**
  - Original Design Data
  - O & M History
  - Load & Stresses
  - Materials Properties
  - Damage Characterisation
  - Inspection/Measurement
- **Assessment Level**
  - General View overall
  - Level-1
  - Level-2
  - Level-3 when required
- **Remaining Life Assessment**
  - Overview & Materials
  - Creep-Rupture Life
  - Creep- Fatigue Interaction
  - Creep Crack Growth
  - Creep Buckling
  - Creep-Fatigue of Dissimilar Weld Joint
  - Microstructural Approach
- **Remediation**
- **In-Service Monitoring**

Final Outcome is Run, Repair, Re-rate or Replacement

AVIS – FFS ASSESSMENT LEVEL

Level 1 :

- where the acceptability for continued service is based on the Heat Exposure Zone and the material of construction. The screening criteria are conservative, and calculations are not required to establish suitability for continued service.

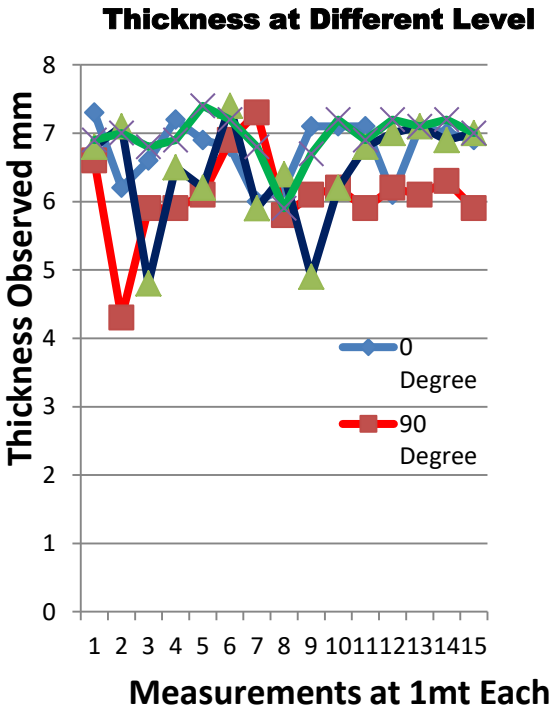
Level 2 : (Zone-5: 425°-730°C)

- Procedure determines the structural integrity of a component by evaluating the material strength. Assessment procedures include evaluation methods for flaws & damage (e.g. local thin areas, crack-like flaws and shell distortions) & means to rerate the components.

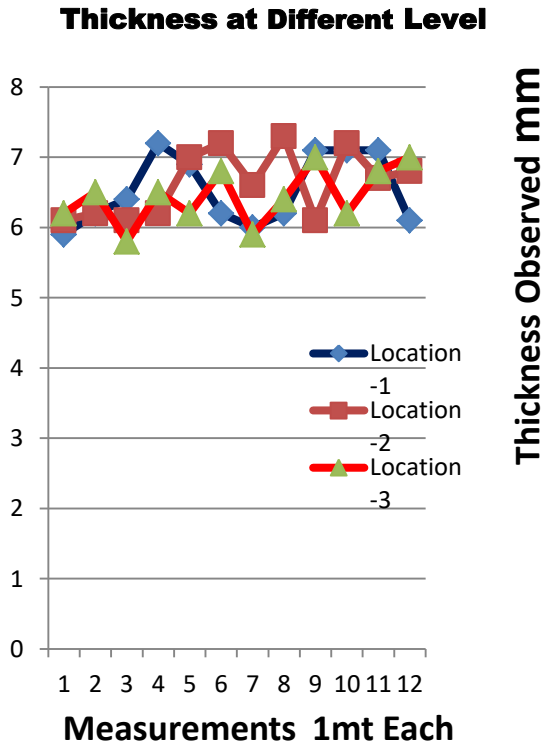
Level 3 :

- If the current material strength is unacceptable by Lv-2. Replication or in-situ field metallography, the removal and testing of material samples & detailed stress Analysis/FEA may be done.

AVIS – CHIMNEY RLA & CORROSION ASSESSMENT



CTP & RSF Based



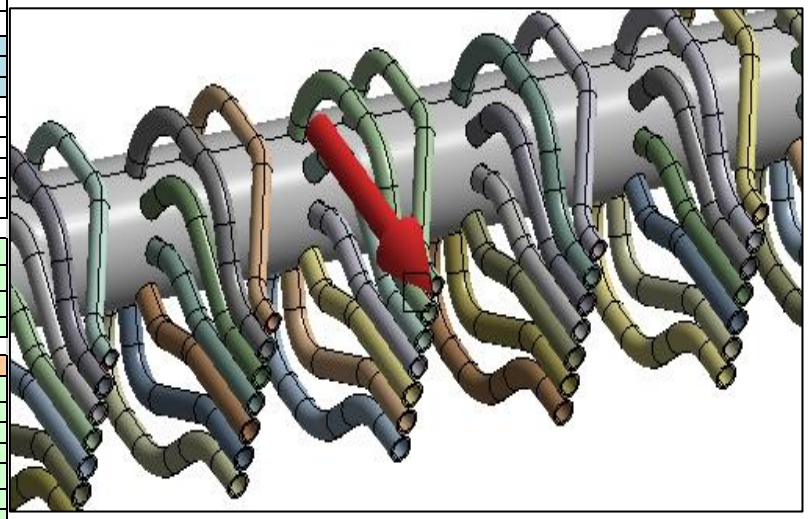
AVIS- RLA & FFS STUDY: FATIGUE BASED ANALYSIS

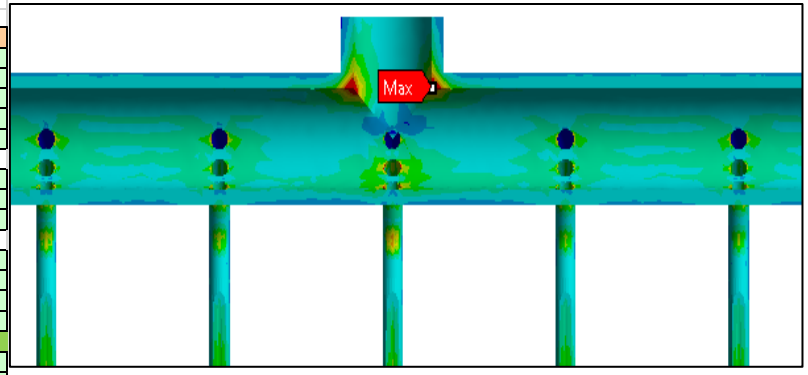
Low cycle fatigue calculation as per ASME Section-VIII Division-2									
Stress type	**SX**	**SY**	**SZ**	**Sxy**	**Syz**	**Szx**	**S1**	**S2**	**S3**
Membrane	155.60	4.25	8.85	0.14	4.39	3.29	155.68	11.44	1.58
Bending (Inside)	81.25	-8.46	-16.45	-1.02	-6.79	-1.55	81.29	-4.58	-20.37
Bending (Outside)	-81.25	8.46	16.45	1.02	6.79	1.55	20.37	4.58	-81.29
Membrane+Bending (Inside)	236.85	-4.22	-7.60	-0.88	-2.40	1.74	236.87	-2.98	-8.85
Membrane+Bending (Center)	155.60	4.25	8.85	0.14	4.39	3.29	155.68	11.44	1.58
Membrane+Bending (Outside)	74.35	12.71	25.30	1.15	11.17	4.84	74.91	31.31	6.15
Peak (Inside)	0.04	0.00	-0.01	0.00	0.00	0.00	0.04	0.00	-0.01
Peak (Center)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Peak (Outside)	-0.04	0.00	0.01	0.00	0.00	0.00	0.01	0.00	-0.04
Total (Inside)	236.89	-4.22	-7.61	-0.88	-2.41	1.74	236.90	-2.98	-8.86
Total (Center)	155.60	4.25	8.85	0.14	4.39	3.29	155.68	11.44	1.58
Total (Outside)	74.32	12.71	25.31	1.16	11.18	4.84	74.87	31.31	6.15

Von Mises Elastic stress range	$\Delta\sigma_{eq}^{V.Mises}$	242.8	Mpa	
Tresca Elastic stress range	$\Delta\sigma_{eq}^{Tresca}$	245.7	Mpa	
Principle Elastic stress range	$\Delta\sigma_{eq}^{M.Pr.}$	236.9	Mpa	
Elastic stress range	Δσeq	245.7	Mpa	

Neuber & Ramberg Osgood equation solution				
Total elastic strucutre stress range	$\Delta\sigma_e$	245.7	MPA	
Modulus of Elasticity	E	156000	MPA	
Total ealstic strucutre strain range	Δεe	0.0016	mm/mm	
	Δσe*Δεe	0.387		
Ramberg- Osgood constant	YS_{02}	693	MPA	ASME Sec-8 D2 table 3D.2
Ramberg- Osgood constant	n	0.132		ASME Sec-8 D2 table 3D.2
Total stress range from Stress relaxation	Δσk1	108.8	MPA	
Total strain range from Stress relaxation	Δεk	0.0036		
	Δσk*Δεk	0.387		Verification

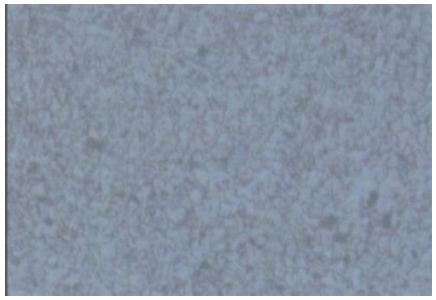
Calculation of allowable number of cycles as per ASME BPVC Sec-VIII Div-2 (Ed.2013) Clause 3F.2 of Annex.3F				
Modulus of elasticity of carbon steel at ambient temperature or	Eacs	200000	Mpa	
Modulus of elasticity of material under evaluation	Et	156000	MPa	
	Fmt = Et / Eacs	0.78		
Conversion factor	Cusm	14.1483		
Environmental correction factor to the welded joint fatigue curve	fe	1		
Statistical basis according to 3-F.2.2	Lower 99% prediction interval (-3σ)			
From Table 3-F.10M	C	11577.9		
From Table 3-F.10M	h	0.3195		
Alternating stress amplitude	Sa	54.4	Mpa	
Alternating stress range	⌂Sess,k	108.8	Mpa	
Factor	q	-0.0419		
Factor	fi	3.2703		
Allowable number of cycles as per code	**N**	**3.32E+06**	**Cycles**	
Number of service cycles	n	1.00E+04	Cycles	Assumed
Fatigue damage factor (Minor's equation)	D = n/N	0.0030		





AVIS- METALLURGICAL APPROACH

Recent case Study



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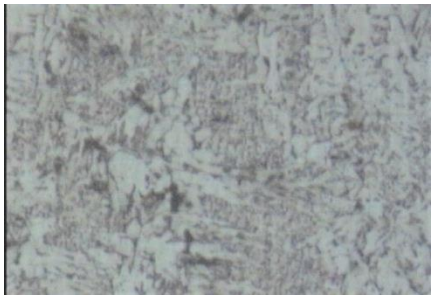

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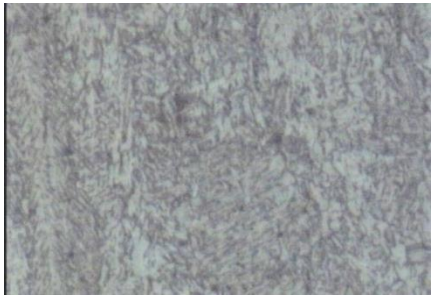

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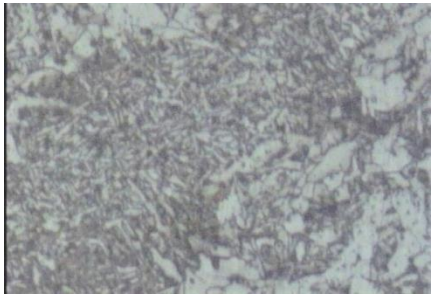

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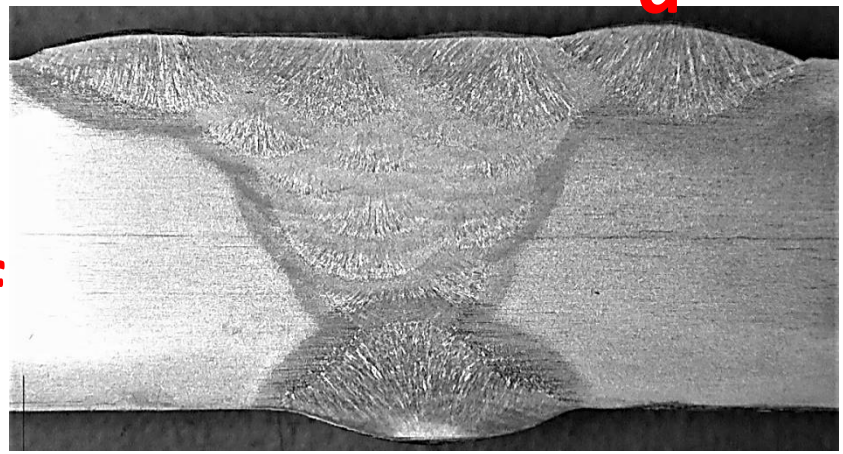

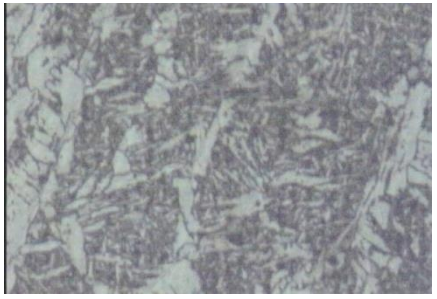

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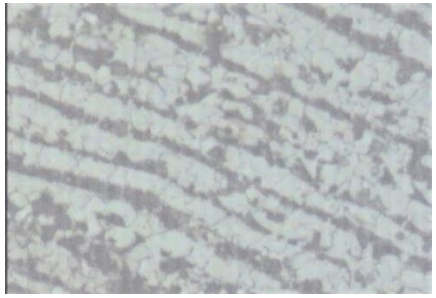

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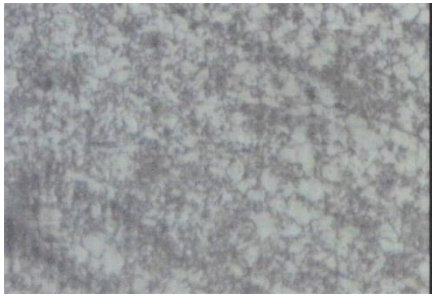
Metallurgical Approach



a

AVIS- Polypropylene Plant Accident, Yanbu- KSA

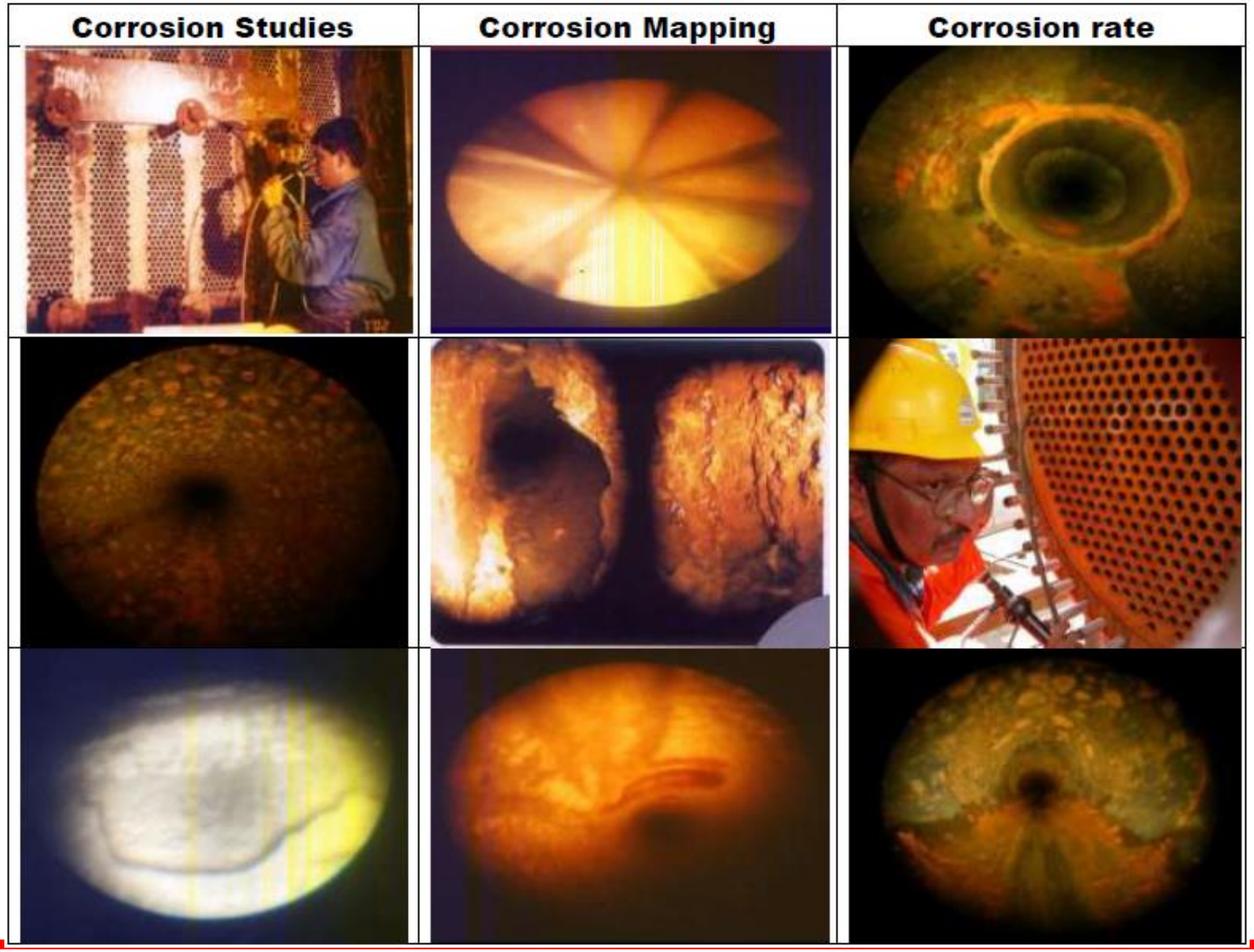
Team -Fitness for Service as per API-579 at Saudi Arabia

All 50 Equipment Destroyed due to Tank Blast & Big Fire

CORROSION & EROSION

CORROSION MAPPING & STUDIES

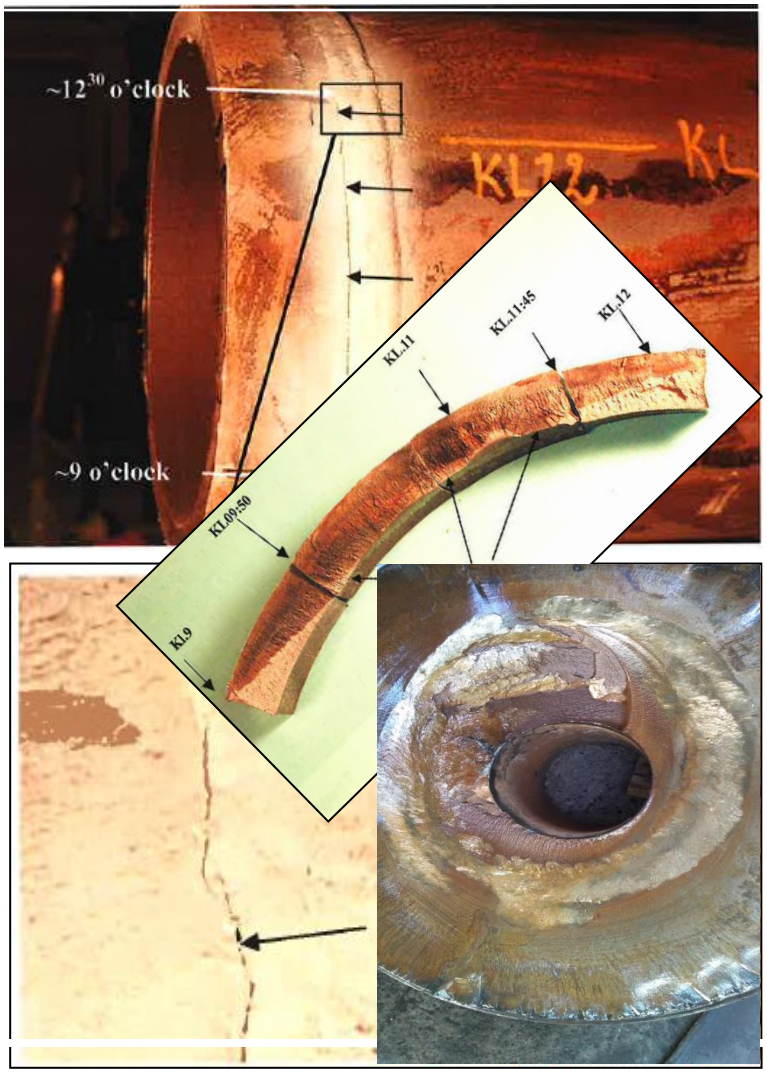
AVIS – CORROSION STUDIES



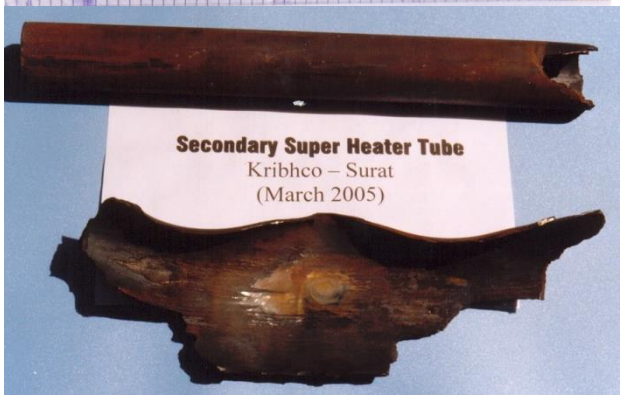
FAILURE STUDIES
&
ROOT CAUSE ANALYSIS

AVIS - FAILURE ANAYLSIS

Failure Analysis- Mechanical Failures, Metallurgical Failures, Corrosion Failures, Operational Failures, Root Cause Analysis

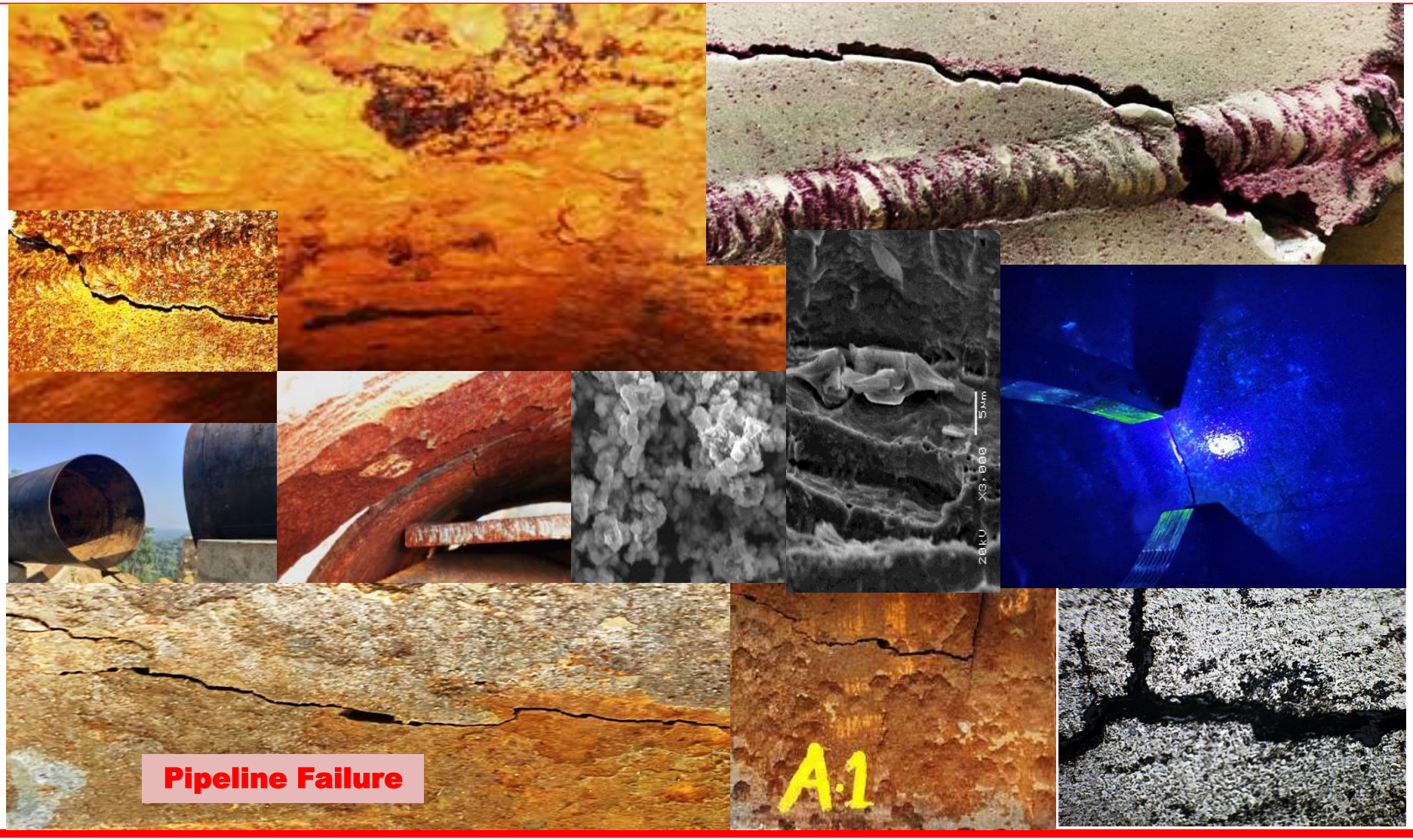


AVIS - FAILURE CASE STUDIES



Safer, Smarter & Sustainable

AVIS - FAILURE CASE STUDIES



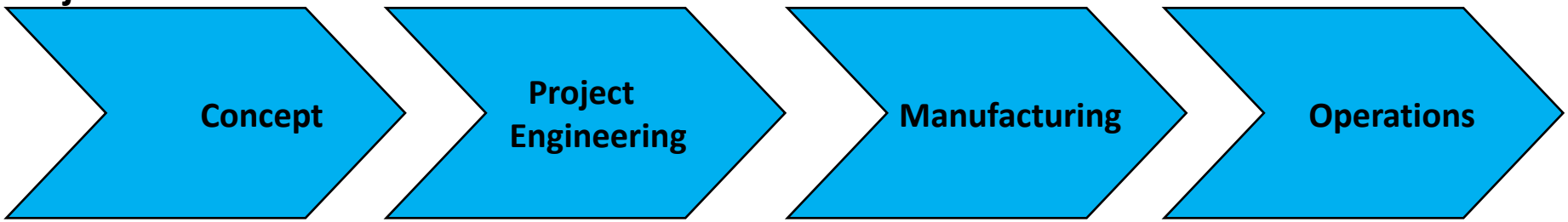
PROJECTS ADVISORY
&
CONSULTANCY SERVICES

AVIS ADVISORY & CONSULTANCY SERVICES

- FEA , CFD, ECA, CAD, Piping Stress Analysis, Design & Review
- Re-engineering & Reverse Engineering
- Troubleshoot Root-Cause Of Any Premature Failure Problems Or Performance Degradation, Damage Mechanism
- Remaining Life Assessment (RLA) And Condition Reliability & Integrity Assessment And Fitness For Service Assessment
- Selection of Appropriate Material & Equipment Sizing For Your Application
- Advice Whether Component Should Be Repaired/ Replaced /Rejected
- Expert /3rd Party Witness & Services on Metallurgy & Materials, Welding & NDT, Testing & Inspection
- Combustion Tuning, Emission Assessment & Efficiency Improvement
- Power Plant Operation & Maintenance Training

AVIS PROJECTS ADVISORY SERVICES

Project lifetime



Material Selection
Risk Assessment

- Design code requirements
- Corrosion protection philosophy
- Material availability
- Strength level
- Mechanical requirement
- Materials

Design Verification
FE Analysis
ECA

- Material data
- MDR
- Manufacturing Book

Equipment fabrication
Line Pipe & Pipe line
Fitness for service

- Material standards
- Welding standards
- Inspection standards
- Fabrication requirements
- Heat treatment
- Inspection documents

Condition Management
Failure Analysis
Corrosion Assessments

- Metallurgical failure modes, e.g.
- Material failure
- Welding Failure
- Corrosion,
- Fatigue,
- Brittle behaviour

AVIS- RECENT PROJECTS COMPLETED

AVIS

Risk Prevention and Corrosion Management

REPORT

CONDITION ASSESSMENT FOR FITNESS FOR SERVICE OF XYLENE STORAGE UNDERGROUND TANK

to

ADMARK POLYCOATS PVT. LTD.

UMS Doc. No. 2018-0818 / Report No.- 2018-0820 / 18AMP-1
Date of Issue: 2018-08-20, Revision: Rev.0

Submitted by

AEQUITAS VERITAS INDUSTRIAL SERVICES

AVIS

Risk Prevention and Risk Management

PRELIMINARY REPORT

Remaining Life Assessment
of HRSG Boiler

Submitted To
Oil & Gas Natural Corporation (ONGC), Gandhar
By
Well Known Remnant Life Assessment Consultant
AEQUITAS VERITAS INDUSTRIAL SERVICES

High Temperature Damage Mechanism & Risk Management

AVIS

Piping Stress Analysis & Risk Management

REPORT

Remaining Life Assessment -
Piping Stress Analysis of Boiler & FEA Studies
-Wanakbori Thermal Power Station,
3x210 MW Unit # 5

to

IRC Engineering Services

AVIS Doc. No. 2019-0215 / Report No.- 2019-006 / IRC.2018-19.001
Date of Issue: 2019-02-15, Revision: Rev.0

Submitted by

AEQUITAS VERITAS INDUSTRIAL SERVICES

AVIS- RECENT PROJECTS COMPLETED

AVIS

Risk Prevention and Risk Management

REPORT

CORROSION UNDER INSULATION FOR BAG FILTER -PROCESS BOILER

to

HUNTSMAN

Enriching lives through innovation

AVIS Doc. No. 2018-0318 / Report No.- 2018-0415 / 18HM-1
Date of Issue: 2018-04-15, Revision: Rev.0

Submitted by

AEQUITAS VERITAS INDUSTRIAL SERVICES

Corrosion Prevention and Management

AVIS

FAILURE ANALYSIS & RISK MANAGEMENT

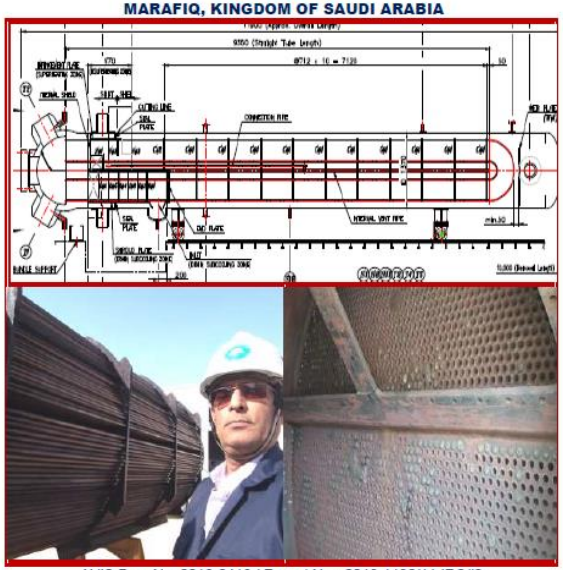
REPORT

Failure Analysis of Closed Feed Water Heater #6 (5NP-FW-HX-01/6NP-FW-HX-01)

Submitted To

MARAFIQ

MARAFIQ, KINGDOM OF SAUDI ARABIA



AVIS Doc. No. 2018-0418 / Report No.- 2018-1130/11 IRC#2
Date of Issue: 2018-11-30, Revision: Rev.0

Submitted by

AEQUITAS VERITAS INDUSTRIAL ERVICES

AVIS

LOSS PREVENTION AND RISK MANAGEMENT

REPORT

FAILURE INVESTIGATION OF ROLLER SHAFT OF CEMENT PLANT & ROOT CAUSE ANALYSIS (RCA)

To

RNC

RAEES NAPURA & CO.

Doc. No. 2018-1219 / Report No.- 2019-0215 / FI-1
Date of Issue: 2019-02-15, Revision: Rev.0

Submitted by

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Safer, Smarter & Sustainable

AVIS- RECENT PROJECTS COMPLETED

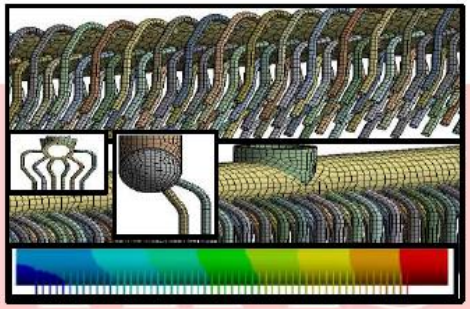
AVIS

Stress Analysis & Risk Management

Report

Remaining Life Assessment -
FEA (Finite Element Analysis) of Headers

WTPS - 3x210 Mw Unit # 2



To

WTPS-

AVIS Doc. No. 2018-0418 / Report No.- 2018-1130/11 IRC#2

Date of Issue: 2018-11-30, Revision: Rev.0

Submitted by

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AVIS

RISK PREVENTION AND RISK MANAGEMENT

REPORT

CHIMNEY STRENGTHENING & GA DRAWING
(Phase # 3 & 4)

to

HUNTSMAN

Doc. No. 2018-0210 / Report No.- 2019-1224 / 18HM-3
Date of Issue: 2019-02-15, Revision: Rev.0

Submitted by

AEQUITAS VERITAS INDUSTRIAL SERVICES

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RISK PREVENTION AND RISK MANAGEMENT

REPORT

CORROSION MAPPING & REMAINING LIFE ASSESSMENT OF BOILER CHIMNEY (Ph#1&2)

to

HUNTSMAN

Doc. No. 2018-1219 / Report No.- 2018-1206 / 18HM-2
Date of Issue: 2019-01-25, Revision: Rev.0

Submitted by

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AVIS- RECENT PROJECTS COMPLETED

Project Name: Failure Analysis of SS Tubes Welding
Report Title: Failure Analysis of Stainless Steel Piping, Tube and Welding

AVIS

AVIS

FAILURE ANALYSIS & ROOT CAUSE ANALYSIS

REPORT

FAILURE ANALYSIS OF STAINLESS STEEL PIPING, TUBES AND WELDING AT APL PLANT, +EXTENSION OF WORK- REACTOR R302 LEAKAGES

Submittde To

APL

Serving Beyond Boundaries

Doc. No. 2020-FI03 / Report No.-2020-F&RA /APL03

Date of Issue: 2020-06-15, Revision: Rev.0

Submitted by

AEQUITAS VERITAS INDUSTRIAL SERVICES

Page 1 of 90

AVIS

FAILURE INVESTIGATION & ROOT CAUSE ANALYSIS

REPORT

FAILURE INVESTIGATION OF 316 STAINLESS STEEL PIPELINE ELBOW

Submittde To

HUNTSMAN

Doc. No. 2020-FI05 / Report No.-2020-FI & RA/HM-01

Date of Issue: 2020-06-20, Revision: Rev.0

Submitted by

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AVIS- RECENT PROJECTS COMPLETED

AVIS

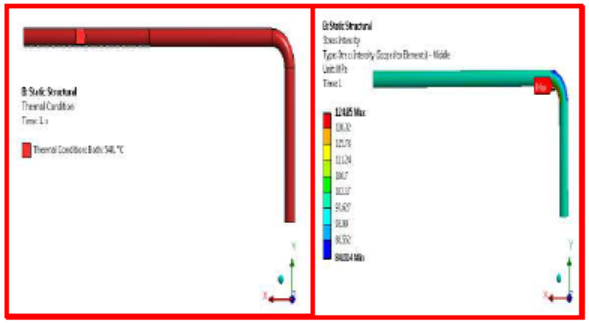
Stress Analysis & Risk Management

REPORT

Remaining Life Assessment -

FEA (Finite Element Analysis) of High Stress Point of MRH Piping Unit # 7

Wanakbori Thermal Power Station, 3x210 MW



To

Wanakbori Thermal Power Station

IRC Engineering Services

AVIS Doc. No. 2019-0315 / Report No.- 2019-0315/20 IRC#7
Date of Issue: 2019-03-30, Revision: Rev.0

Submitted by

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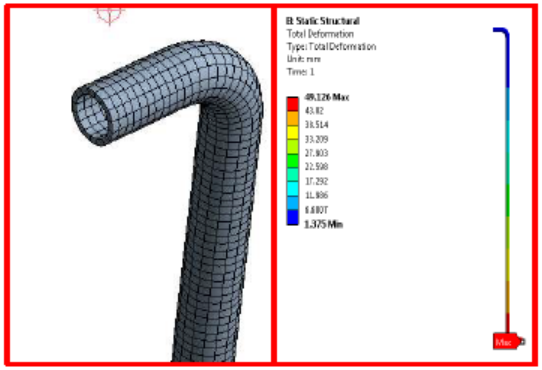
Stress Analysis & Risk Management

REPORT

Remaining Life Assessment -

FEA (Finite Element Analysis) of High Stress Point of BFDH Piping Unit # 7

Wanakbori Thermal Power Station, 3x210 MW



To

Wanakbori Thermal Power Station

IRC Engineering Services

AVIS Doc. No. 2019-0315 / Report No.- 2019-0315/17 IRC#7
Date of Issue: 2019-03-15, Revision: Rev.0

Submitted by

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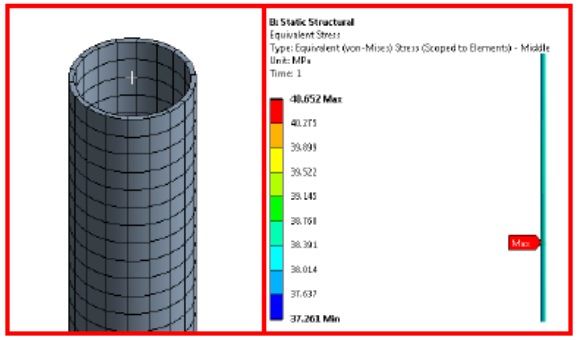
Stress Analysis & Risk Management

REPORT

Remaining Life Assessment -

FEA (Finite Element Analysis) of High Stress Point of CRH Piping Unit # 7

Wanakbori Thermal Power Station, 3x210 MW



To

Wanakbori Thermal Power Station

IRC Engineering Services

AVIS Doc. No. 2019-0315 / Report No.- 2019-0315/18IRC#7
Date of Issue: 2019-03-15, Revision: Rev.0

Submitted by

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AVIS- RECENT PROJECTS COMPLETED

AVIS

Life Assessment & Risk Management

Final Report

REMAINING LIFE ASSESSMENT OF MAIN STEAM LINE FROM BOILER COMMON STEAM HEADER TO TURBINE -Nirma Bhavnagar Thermal Power Plant, 3x16.34 MW Unit # TG-1

to

NIRMA PLANT/ NDTech Consultants P. Ltd, New Delhi

AVIS Doc. No. 2019-0180 / Report No.- 2019-01 / NDTech.2018-19.01
Date of Issue: 2019-04-21, Revision: Rev.0

Submitted by

AEQUITAS VERITAS INDUSTRIAL SERVICES

AVIS

FFS & LIFE ASSESSMENT MANAGEMENT

Report

FITNESS FOR SERVICE

API 579-1,SECTION-11/ ASME FFS-1

Fire Damage Assessment

Part-A (Executive Summary)/Part-B (Technical Report)

EQUIPMENT: OSBL/D9501/Propane Feed Drum

Submitted To (22th May, 2019)

NATPET

Yanbu Petrochemical Plant, Kingdom of Saudi Arab

AVIS Doc. No. 2019-0210 / Report No.- 2019-04 / NDTCCS.201-20.05
Date of Issue: 2019-05-11, Revision: Rev.0

Submitted by

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AVIS- RECENT PROJECTS COMPLETED

HYDRO POWER PLANT INTEGRITY ASSESSMENT

REPORT

INTEGRITY ASSESSMENT OF SPIRAL CASING
KOPILI HYDRO POWER STATION UNIT# 1 (4x50 MW)

Submitted To

KOPILI HYDRO POWER STATION

NORTH EASTERN ELECTRIC POWER CORPORATION LIMITED

A GOVERNMENT OF INDIA ENTERPRISE

Doc.No.:AVIS/1021/CA&IA-25 & Report No.:2021/IA-NEEPCO/Kopili#1
Date of Issue: 2021-05-10, Revision: Rev.2

Submitted by

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RESIDUAL LIFE ASSESSMENT OF HYDRO POWER PLANT

REPORT

REMAINING LIFE ASSESSMENT OF HYDRO POWER PLANT
KOPILI UNIT # 4 (4x50 MW), NEEPCO

Submitted To

NORTH EASTERN ELECTRIC POWER CORPORATION LIMITED

A GOVERNMENT OF INDIA ENTERPRISE

Doc.No.:NEEPCO/0421/HPS & Report No.:2021/RLA-NEEPCO/KOP#4
Date of Issue: 2021-04-30, Rev.:0

Submitted by

AEQUITAS VERITAS INDUSTRIAL SERVICES

TRAINING / DEVELOPMENT
&
CUSTOMERISED COURSES

AVIS TRAINING & DEVELOPMENTS

Customaries Training Courses:

- Materials & Metallurgy / Failure Analysis
- Welding & NDT
- Remaining Life Assessment,
- Fitness for Service & Condition Assessment
- API / DNVGL/ ASME/ AWS courses / API 5L & DNV-OS-F101
- DNV-OS-F101: Submarine Pipeline System, Offshore Russia- TMK Corporate Office, Moscow.
- Offshore Pipeline& Structures- Welding Metallurgy, Dalmine Italy,
- Boiler & Turbine & Electricals
- Power Plant Performance and Energy Audits / Efficiency
- Wear, Erosion & Corrosion

Code & Standards

DNV OS-F101 Section ~~9~~ 10 Installati

- Requirements for vessel, equipment and installation procedures

The American Society of Mechanical Engineers

energy API

Fitness-For-Service
API 579-1/ASME FFS-1

ASME / AWS/ ISO

OFFSHORE STANDARD
DNV-OS-F101

Submarine Pipeline Systems

OCTOBER 2013

1. General
2. Safety & Risk

3-5. Design

6. Materials Engineering
7. Construction Line pipe
   [Table7.1-7.9 / 7.10-7.13/ Cl.C (CRA) / SFDUP]
8. Pipeline Assembly
9. Corrosion & protection
10. Offshore construction
11. Operation & Abundant
12. Documentation
13. Informative

SECTION 7
CONSTRUCTION – LINEPIPE

APPENDIX D
NON-DESTRUCTIVE TESTING (NDT)

APPENDIX C
WELDING

ASME
SETTING THE STANDARD

AVIS- ESTEEMD CLIENTS

Safer, Smarter & Sustainable

Thank You

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