N&A

NAI EXPORT SALES & MARKETING COMPANY.
The mark of quality and growth

Pipeline Integrity Management Services

Gulf Cooperation Council Countries
(Bahrain, Kuwait, Oman, Qatar, Saudi Arabia & United Arab Emirates)

PURPOSE

The Purpose of the Pipeline Integrity Management Services to investigate and study the existing pipes in order to prevent a major breakdown or failure in the pipes system due to the existing physical conditions of the pipeline carrying liquid, gas, LNG, LPG and multi phase products.

Mission

Our Mission is to help associates achieve success in both their Professional and Personal lives through Development Opportunities, Technology and Training.

The well being of our associates and customers is our focus as we continuously pursue Innovation, Balanced Growth, Industry Leadership and Diversity.

Our culture which is focused on Quality Growth and Personal Success, enables our customers consistently receive the best value and services in the Industry.
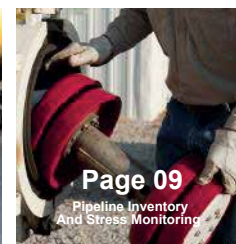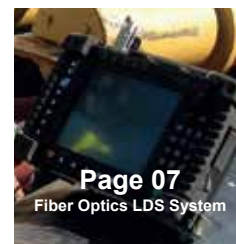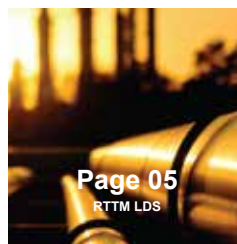
Our Core Values

Customer Service

Commitment

Teamwork

Trust & Integrity

Pipeline Integrity Management Services

NAI Export Sales & Marketing Company is the industry partner with the most comprehensive integrity management capability for the maintenance and rehabilitation of oil and gas transmission, gathering and distribution pipelines as well as above ground hydrocarbon liquid storage tanks.

Negative Pressure Wave Acoustics Leak Detection System

Negative Pressure Wave (Acoustics) Leak Detection System

- ALDS is a negative pressure wave pattern-recognition, adaptive and hydraulic-based wave model leak detection and location system capable of rejecting noise by various hardware, firmware and software methods.
- The Acoustic Leak Detection System is designed to detect the occurrence and determine the location of leaks in gas, liquid, and multiphase flow pipelines.
- At the instant of a break in the pipe wall a transient acoustic wave is created.
- This acoustic wave travels at the speed of sound for that fluid guided by the walls of the pipe in both directions from the source of the break.
- The acoustic wave is detected by sensitive acoustic sensors and analyzed by Wave Alert Site Processors situated along the pipeline.
- After further analysis by the Master Comm, the location of the leak is determined from the arrival times of the expansion waves at the sensor locations.
- The ALDS system will continue to detect leak in case of communication fault or loss of communication. After resumption of communications, the leak event and detecting time from the local processors will be used for leak location calculation by the central processor.

Leak Computer HMI

- The Leak Computer (dedicated PC) acts as a central information and data handling unit. It communicates with the MasterCommTM VIII Node Processor and supports SCADA software which provides operator input/output, produces printed reports and messages.
- It provides the quickest leak detection, high sensitivity, precise leak location accuracy and low false alarm rate with minimum maintenance requirement.

Customer SCADA Interface

- The ALDS can be provided with an interface to an existing customer SCADA system. All local and remote operational and tuning parameters can be adjusted from the existing customer SCADA system. This interface can be provided through the MasterCommTM VIII Node Processor or through the ASI Leak Computer.

Negative Pressure Wave Acoustics Leak Detection System

SYSTEM PERFORMANCE

- Quickest leak detection - detect and locate leaks within 60 seconds, independent of leak size.
- Most accurate leak location - locate leaks with 25 to 35 meters (or less) very effective theft detection/deterring system.
- Most Reliable (Lowest false alarm rate) –– less than one false alarm per year (the only leak detection system used for automatic valve shut-in when leak is detected, field proven record to actually detect and shutoff valve, prevent disaster an casualty.).
- High sensitivity, detect leaks as small as 0.1% or less of liquid flow (0.1 inch or smaller) or 0.001% to 0.1% of gas flow depending on background noise and sensor span.
- Detects leak under ALL operations (pump start-up/shut-down, valve open/close, steady & unsteady flow, etc.).
- Detects leak with or without flow (shut-in or zero flowrate).
- Detects leak during lost of communication or communication faults (GPS).

Compliance with International Standards

ASI fits in the classification of API1130 leak detection methods.

However, our LDS Acoustic based incorporates further unique features which exceed the classification of API 1130 leak detection technologies due to built-in patented advanced features:

- Hydraulic modeling filters.
- Advanced signal processing algorithms.
- Adaptive algorithms for false-alarm rejection.

Acoustic Leak Detection is not based on flow measurements but instead on detecting unique acoustic signals produced by pipeline leaks.

No high-accuracy pressure measurements are required for leak detection.

No intensive maintenance

ASI is an ISO-9001 certified company, fully compliance for design and manufacturing processes

MasterComm Node Processor

Acoustic Sensor

System Recovery from Malfunctions

- Communication Failure: During communication outage the WaveAlert® Site Processor will automatically store up to 100 events (potential leaks) for 24 hours. Once communications are restored the GPS time tagged events are sent to the MasterComm for processing.
- Power Outage: All critical parameters are stored in nonvolatile memory.
- Loss of WaveAlert®: If one WaveAlert® Site Processor is offline, WaveAlerts on each side will continue to detect leaks.
- Loss of Sensor: For dual sensor WaveAlerts, if one sensor is lost the WaveAlert will still function with a single sensor.

Field Leak Test Kit

WaveAlert® Batch Tracker

The WaveAlert® Batch Tracker monitors multi product pipelines and calculates the location of products inside pipelines.
The WaveAlert® Batch Tracker is a function which be added to the WaveAlert® ALDS. It requires precise flow data inputs from the pipeline along with density or product information.

WaveAlert® Batch Tracker

- Allows for scalable configurations.
- Handles multiple equipment types (valves, pumps, tanks, flow meters, etc.).
- Provides real time information on product location.
- Calculates and monitors interface volume between batches.

The WaveAlert® Batch Tracker is fully configurable and works on simple topologies with a small number of pipelines to complex topologies.

WaveTrack® ASI Scraper Tracking System (ASTS)

WaveTrack® is a real-time Scraper Tracking System capable of accurately detecting scraper position and velocity. WaveTrack® consists of several hardware and software components: the self-contained acoustic module Acugen® a low powered device, which installs easily inside the cavity of a pipeline scraper; a WaveTrack® field processor or alternatively a WaveAlert® VIII-STS Integrated Leak Detection and Scraper Tracking processor. These local processors report to the WaveTrack Master® central processor as part of the stand-alone ASI Scraper Tracking System (ASTS) or to the integrated MasterComm® VIII-STS central processor to complete the powerful integrated system (ILDSTS). The ILDSTS is capable of delivering the proven ASI leak detection and location functions as well as detecting accurately the scraper speed and location.
WaveTrack® is comprised of five compact modules: the self-recharged battery module, the control module, the Acugen® module, the Self-Release® system, and the suction/release nozzle. All WaveTrack elements come in a practical frame to ensure easy and quick installation inside any commercial pipeline scraper.

RTTM LDS Virtuoso®

Production, pipeline & asset management systems

Wood Group provides robust, real-time online and offline software
systems for the efficient management of oil and gas operations.

Virtuoso® is a field proven suite of software products, with more
than 20 years' successful track record of performance in the field.

Our technology supports engineering studies, operator training and
simulation wells, pipelines and processing facility operations onshore
and offshore.

For example, Virtuoso is used to help manage some of the world's
key gas resources, supporting 10% of the global consumption of this
vital commodity.

Our software products provide essential operational and commercial
functionalities based on the unique challenges specific to each
customer project. We address the most complex single and
multiphase gathering, productions, transportation and processing
issues with our technology solutions.
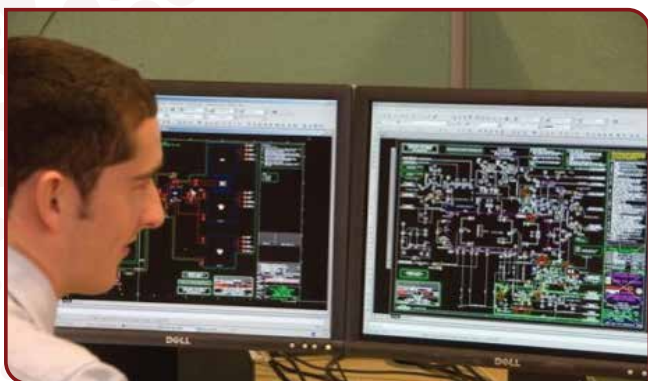
RTTM LDS Virtuoso®

The Virtuoso software suite includes offline packages such as:

- Virtuoso/ES - Engineering simulator
- Virtuoso/OTS - Operator training system
  The online packages include:
- Virtuoso/Monitor - Operations monitoring
- Virtuoso/Advise - Operations advisory
- Virtuoso/LDS - Leak detection system
- Virtuoso/Control - Operations control
- Virtuoso/Optimize - Operations optimization and planning
- Virtuoso/VMS - Virtual metering system®
- Virtuoso/Analytics - Data analysis and processing

Pipeline Management System Online Applications

Virtuoso/Monitor is an online, real-time, dynamic system for monitoring oil and gas production operations, from subsea wells to topsides equipment, in one integrated model.
Monitor's functionalities can include:

- Liquids inventory.
- Management.
- Line pack monitoring.
- Composition and chemical tracking.
- Hydrate warnings.
- Leak detection.
- Restriction detection module (RDM).
- Pig tracking.
- Instrument and equipment surveillance.
- Performance monitoring.

Monitor's breadth and depth of functionalities makes it an essential
tool for monitoring production and processing facilities.

Pipeline Management System Online Applications

Virtuoso/ES (Engineering simulator) is a dynamic simulation package that performs fast transient single and multiphase simulations of integrated subsea, topsides and onshore facilities.

ES includes a rich graphical user interface with integrated plotting to eliminate complex files and spreadsheet-based analysis.

With control emulation function and built-in capability to start from real-time process measurements, ES is a world-leading package for analyzing integrated pipeline networks and processing facilities.

Virtuoso/OTS (Operator training system) features are coupled with the ES for realistic, comprehensive operator training.

OTS can interface directly with offline distributed control systems (DCS), supervisory control and data acquisition (SCADA) systems, or emulate operator interfaces. OTS is an effective tool to quickly familiarize new operators with production systems, the overall production system, prepare operators for normal and unusual operating scenarios, and document competency levels.

OTS functionalities include instructor/student workstations, user-configuration of training scenarios, automatic recording and documenting of training sessions and objective scoring of operator performance.

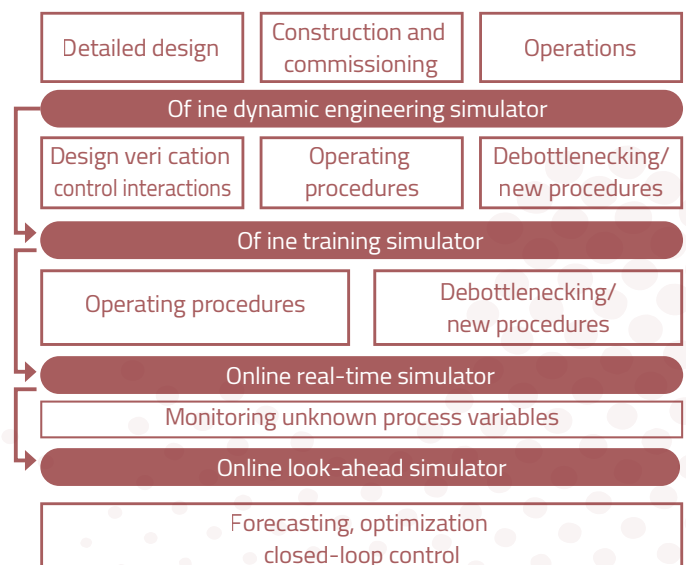## RTTM LDS Virtuoso/LDS (Leak detection system)

Virtuoso/LDS (Leak detection system) uses robust field-proven simulation technology to quickly and accurately detect leaks in complex pipeline networks.

Our software supports single and multiphase operations, with rigorous mathematical modelling using both mass and pressure transient analysis in the pipeline. LDS also provides a comprehensive, statistical signal trend analysis with a proprietary method.

Sensitivity to leaks is maximized by a dynamic leak 'fingerprint' recognition algorithm. This reduces detection time while minimizing false alarms.

Key attributes of the software are:

- Built on Wood Group's Virtuoso modelling technology.
- Real time transient model (RTTM) with model compensated volume balance error signals and pattern-recognition algorithm.
- Leak detection probability with alarm notification.
- Detection details include location, rate and cumulative release amount.
- Operates in steady state, transient and pipeline shut-in conditions.
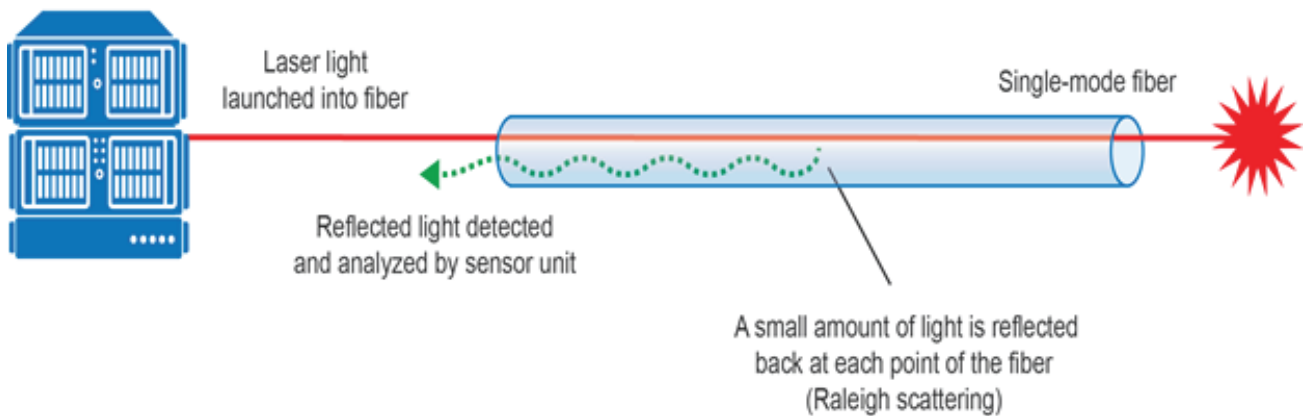
Stages of application

Detailed design	Construction and commissioning	Operations

Of ine dynamic engineering simulator		
Design veri cation control interactions	Operating procedures	Debottlenecking/ new procedures

Of ine training simulator	
Operating procedures	Debottlenecking/ new procedures

Online real-time simulator
Monitoring unknown process variables

Online look-ahead simulator
Forecasting, optimization closed-loop control

Fiber Optic Pipeline Monitoring LDS
Preventing and detecting leaks in real time

Get more from a single system

Detect, locate and classify multiple threats in real time, along the full extent of your pipeline, with the Fiber Optic pipeline monitoring system

Laser light launched into fiber

Single-mode fiber

Reflected light detected and analyzed by sensor unit

A small amount of light is reflected back at each point of the fiber (Raleigh scattering)

Working Principle

Fiber Optic sensing system measures the time delay from the transmission of the laser light until the disturbance signal is received.

No signal return is required from the end of the optical fiber.

It emits a laser pulse down a fiber optic cable to measure vibration and temperature. It will also locate the position of the vibration and temperature being measured

Mitigate the risk of External pipeline threats

Pipelines are susceptible to various external threats that can result in significant damage, or worse, a rupture. However, a majority of these incidents can be prevented. In addition to leaks, the Fiber Optic pipeline monitoring system detects the external events that lead to pipeline damage, so you can respond to threats before incidents occur.

Mitigate the risk of External pipeline threats

Offering third party interference monitoring and right of way detection, our system alerts pipeline operators of potentially hazardous activity occurring within the pipeline corridor, such as digging, vehicle movement and other large machinery, before contact with the pipe is made. Utilizing the fiber optic network around remote facilities, the system can also detect threats and unwanted activity near above ground infrastructure, such as block valves, refineries and pumping/compressor stations.

Fiber Optic Pipeline Monitoring LDS
Preventing and detecting leaks in real time

Protect pipeline infrastructure

Sabotage and theft are another threat that can significantly impact pipeline integrity, as well as an operator's bottom line. Protecting pipelines in high-risk areas typically requires a separate leak detection and security monitoring program, but the Fiber Optic pipeline monitoring solution can do both. By integrating leak detection, security monitoring and theft prevention into a single system, the FO pipeline monitoring solution provides the sensitivity and reliability required to detect and locate suspicious activity, such as illegal hot taps and vandalism, up to 100km from a single location. With this knowledge, you not only improve incident reduction, you increase the effectiveness of response mechanisms, such as ground patrol and helicopter reconnaissance, by ensuring manual inspection is focused on areas of real activity.

Monitor seismic disturbances

Sizeable ground shift and rock fall events can also be detected with the ground movement monitoring application. By recording all activity in the vicinity of a pipeline before and after a large scale, widespread disturbance, such as earthquake, engineers can gain an understanding of resulting damages and whether asset integrity has been compromised.

Fiber Optic System LDS Advantages

Multi-threat detection

- Leaks
- Third-party and right of way interference
- Ground movement
- Condition monitoring
- Inline inspection tool tracking

Optimal performance

- Faster, more sensitive threat detection and classification.
- Rapid, more accurate threat location.
- Smarter, more reliable alarms.
- Consistent, more robust system performance.
- High quality data and reliable communications.

Flexibility

- Customize a system for your specific pipeline environment.

Advanced sensing

- Measures acoustics temperature, pressure, strain and orifice noise.
- Eliminates conversion and computational errors.
- Performs in transient, slack-line and multi-phase flow.
- Monitors longer distances using thousands of distributed sensors.
- Provides localization accuracy of ±10m.

Reduced installation costs

- Eliminates the need for redundant systems and hardwre.

Hydraulic Profile

■ Our Experience includes providing engineering and planning support for the maintenance, operation and capital improvements to natural gas transmission, distribution, gathering and under- ground storage systems.

■ Project management and engineering consultancy work performing hydraulic analysis and
detailed design of oil and gas pipelines and meter stations, locating compressor and pumping stations, reviewing process flow diagrams and piping & instrument designs

Pipeline Inventory Monitoring

■ During operation days a pipeline contains different amounts of products, which is caused by temperature and pressure variations. Inventor.' Monitor stores the quantities of all pipeline segments in the real-time database and compares each quantity to all threshold levels. The system determines the quantities for each pipeline segment and also for every product in multi product pipelines

Pipeline Stress Monitoring

■ Based on actual pressure values for monitoring pipeline segments which are stored continuously in the database, the Stress Monitor analyses permanently pressure trend curves, determine maximum and minimum possible thresholds and calculates the impacts of pressure changes.

Pipe Corrosion Monitoring & Tracking

■ Cathodic Protection Sys-tern, an impressed current type cathodic protection method that continuously guards underground pipelines against rust and corrosion in all kinds of soils and weather. This system forces a continual flow of electric current to pass from the embedded anode through the soil and into the pipeline, thus creating an electric field at the surface of the metal. The result is an invisible shield over the entire length of the pipeline to guard against all corrosive elements, at all times.

■ This extends the life of the pipeline and eliminates the need for replacement. In addition, the system is solar powered and runs on solar energy which is entirely free! This system also stores the energy provided by the solar photovoltaic cells in a battery bank This enables it to provide a continual source of energy, even in remote, un electrified areas. This makes running costs almost negligible. However, t also compares favorably on investment even when is worted on AC. mains. Complex and sensitive pipe handling requires afe, reliable and economical systems for the tracking and monitoring of each single pipe. Our product addresses the need for miscella-neous. and often very expensive, tracking, monitoring, and security measures by providing intelligent and tailored solutions from a single source.

Density & Temperature Tracking

- With the latest Global Warming cold and hot weather has effected various pipelines and it become necessary to monitor Density and temperature electronically in order to avoid an by cold weather increasing concern environments.

Batch Tracking

- Batch Tracking monitors the head and tail position of each product batch as it enters a pipeline, it calculates the Estimated Time of Arrival (ETA) of each batch at every deüvery point continuously, and provides a detailed account of batch volume in the line, delivered and to be delivered. BATCH Tracking also enables detailed interface analysis to assist the operators in cutting the batch interface carectly so that minimum product is downgraded and no product contamination occurs.

- Pipeline operators will be able to monitor and control the product batch or quality, easily with the help of Batch on-line Tracking. The batch summary report and Graphic User Interface including the pressure profile along the pipeline provide valuable management information for pipeline companies to audit and supervise daily operations

DRA Management of Pipeline

- DRA (Draw Reducing Agents) is used in reducing the pipelines carrying crude oil, refined products etc. The DRA use is a fast-dissolving, ultrahigh molecular weight copolymer that delivers a high level of pipeline friction reduction. This active polymer dissolves fully in the hydrocarbon fluid and does not coat the pipeline wall or adversely affect the hydrocarbon fluids being treated.

Pipeline Black Powder Monitoring

- Black Powder has become a more widely recognized hazard for safe and economic gas pipeline operation. Black powder is a generic name for small-particle ferrous corrosion by-product
- Much discussion has been going on as to the causes and sources of the problem, but in general the following roots of the problem can be discemed
- Sour gas services, Higher levels of hydrogen sulfide cause the formation of iron-sulfides in the pipeline
- Moisture. Water that remains from the hydro test phase or that is present as a result of wet gas. leads to formation of iron-hydroxides and iron oxides in the pipeline
- Mill scale deterioration. In older and uncoated pipelines, mil(scale may be of poor quality and in the process of pipe manufacturing disbandment may be initiated.

Pipeline Wall Roughness Monitoring

- Pipeline configuration, wall roughness and pipe friction factor are usually defined as standard values during the design stage. Any changes af these values will be compensated by the Reat- Time Transient Model tuning methods. Tuning factors which are calculated for each pipeline segment are also monitored against thresholds. lhe Wall Roughness Monitor triggers alarms to indicate new scraper runs

Pumps and Valves Operation Monitoring

- The reduction of pumping costs and energy consumption is a major objective for all pipeline operating companies. Optimal pumping is essential to keep the lifetime of pipelines. In order to obtain the required flow within a pipeline the Pump and Valve Optimization module utilizes the pressure and flow characteristics and pump effciency curves as well, Based on the Real–Time Transient Model and actual hydraulic conditions like line fill, the pipe friction factor, etc. the system determines the most effcient pump and valves operations and provides the results to the operator.
- Pipelines are equipped for safety reasons with special shutdown and controlling devices. Shutdown Monitor follows the same logic as for emergency control and shutdown, but permits the setup of different thresholds. lhe system triggers wamings before any action in the field is automatically started.

Chemical Process In The Pipe

- Iron sulfide, and apparently many of its variations, can be quickly and effdently created in a gas pipeline from the chemicals naturally available in many systems. Hydrogen sulfide (H2S) easily reacts with the iron in piping to form iron sulfide as in the formula: H2S + Fe = Fes + H2
- lhe presence of a small percentage of water (approximately 3 ta 9 percent) aids this reaction. Under more oxidizing conditions, pyrite (FeS2) may form in accordance with the formula: 2H2S +Fe= FeS2 + 21-12
- In addition to hydrogen sulfide, sulfur can also react to form iron sulfides. Sulfur compounds are present in relative abundance in gas and oil wells. Older fields might have sulfate reducing bacteria that have grown in the formation or have used chemical injection to increase well production.

Microbiologically Influenced Corrosion (MIC)

- Microbiological"/ influenced corrosion (MIO is serious form of corrosion that can occur in pipelines and produces black powder or iron sulfide
- MIC is pitting of the pipe wall as a result of the activities of microbial communities in areas that provide their required habitat
- It can occur on either the inside or outside of the pipe.

Filtering

- The me most common and historical means of dealing with black powder is to filter it lust before it enters a compressor, station, or processing plant, Filters of various technologies and names are usually specified and supplied as a part of the compressor design package when the unit or piping is installed. Sometimes purchasers specify filter performance requirements in their bid request.
- Sometimes the design requirements given are accurate and sometimes they are hardly known, At other times the conditions change after the initial installation. The net result is that regardless of what is requested or promised, it is usually impossible to get field measurements to accurately detemine the performance of filters and separators at any one condition.
- It is well-known in technical circles, however, that sulfur, hydrogen sulfide, oxygen, and water vapor, some in parts per million, can be important in the formation of iron sulfide and other corrosion products. The presence of these components in very small quantities can provide: The constituents far chemical formation of iron sulfide
- lhe environment for growth of sulfate reducing bacteria and acid producing bacteria whose meta- bolic processes result: in the production of iron sulfide; and
- Direct corrosion of steel by oxygen, carbon dioxide, or combinations of the two. Therefore, it is important to test gas composition samples for these Lesser components, to monitor the likelihood of iron sulfide formation.

Corrosion Monitoring System(CMS)

- Better manage costs.
- Schedule maintenance to ensure system uptime.
- Ensure plant integrity with continuous tracking of material selection.
- Gain easy access to up-to-date reports and critical data.
- Optimize chemical delivery and operational efficiency.

Design, Installation, and Commissioning

Proper design, installation, and commissioning of corrosion monitoring and chemical injection systems and instrumentation is vital to the longevity and efficiency of plant operations, but particularly important for systems operating under high pressure.

Often purchased equipment sits in storage for months due to lack of knowledge or resources or even change in personnel. Let your investment start paying off by getting it online as quickly as possible. Inhibitor costs can be dramatically reduced, asset life lengthened, and hours of labor cut.

Nothing replaces experience when it comes to field service in hazardous environments. Our team of factory trained technicians validate installation and ensure proper configuration and commissioning.

Microbiological Monitoring and Data Collection

We Offer on-site microbiological services including, sessile/plank-tonic microbiological sampling, full plank-tonic audits, and Orbisphere surveys.

Advanced sampling and increased microbiological capabilities are also offered upon request. According to the NACE Standard Test Method for Detecting, Testing, and Evaluation of Microbiologically Influenced Corrosion in Internal Surfaces of Pipelines, MIC should be correlated with metal loss and pitting data from corrosion coupons and probes. With Our Care's combined coupon/probe retrieval and MIC data collection services, operators reduce manpower hours and benefit from industry experts.

Our technicians provide data and analysis for corrosion rate and microbiological data in a detailed report so proper action can be taken to reduce MIC corrosion issues.

Techinical Sales and Support

Dedicated Technical Sales and Support team has extensive knowledge on all mechanical, electronic, and integrated system equipment. Our comprehensive sales and support structure has you covered from the time of inquiry to post-delivery product and application support. Whether in the field or at your desk we can answer your questions. We have a global team, offering regional support so we can get you up and running again in no time. Our Support Structure :

- Technical Sales - Application, Design, and Project Management.
- Field Services - Installation, Commissioning, and Maintenance.
- Technical Support - Product/Application Support by e-mail or telephone.

Data Management & Reporting

Effective data management is essential to plant operations and is critical to reliable corrosion and erosion monitoring. Metal loss data can be tied to chemical injection rates and other process parameters for swift analysis to aid decision making. We know that interpretation and validation of data is extremely important and we're at hand to provide that support when it's required.

Data management can be provided in the form of daily, weekly or monthly report generated for each probe tag location across the site. When our technicians have completed a service campaign, a final report is issued with full coupon probe data analysis. The reports, as standard, include a graph and corrosion rate, with point-to-point measurement for average rate, and episodes of accelerated metal loss. The report will also give a life expectancy for the currently installed probe,

Data Management & Reporting

at the current rates of metal loss, to support planning for replacement and ensuring uptime of the monitoring system.

- Probe data analysis and reporting
- Preventative maintenance recommendations Easy access to historical probe and coupon data.
- Access to SAFR data
- Available online and reports in open formats
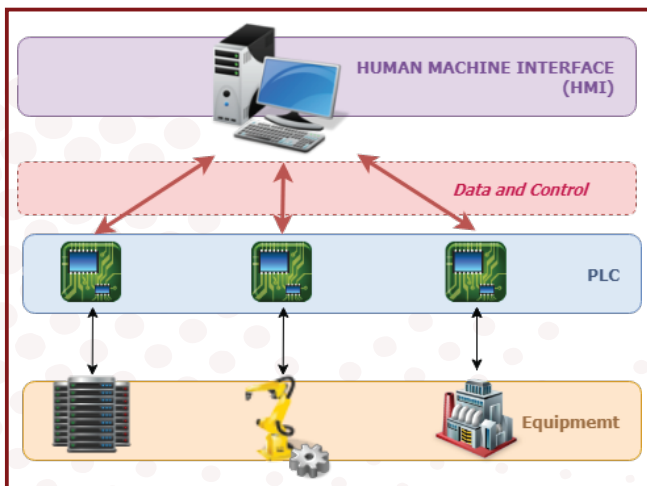
Communication and Connectivity

- Network Infrastructure.
- Security Systems. Consultancy.
- Trasnmission Solutions.
- Operations & Maintenance.

Communication and Connectivity

GSM/3G/4G
Tetra / Wifi / Fiber
IP Networks
Video Conferencing
Broadcasting and IPTV

Communication Department Products & Solutions

NAI has partnered with Transmission product manufacturers to deliver hitech and quality transmission networks in the kingdome.

NAI has done Communication projects successfully in conjuction with Acoustics & Real Time Transient Modelling Technique Leak Detection Systems and Intrusion Detection Systems.

- Microwave Solutions - Point to Point
  - Network Monitoring Solutions
  - SDH
  - PDH
- Point to Multipoint - Microwave Solutions
- Serial Point to Point Communications
- Ethernet Communications
- OTN (Serial & Ethernet) Communications

Clientele

LDS Project List

SL#	PROJECT#	PROJECT DESCRIPTION	COMMODITY	MAIN CONTRACTOR
1	BI-10-00194	EAST WEST TO RABIGH*	CRUDE OIL	SAIPEM
2	BI-10-03020	QATIF DOWNSTREAM*	SOUR GAS, SOUR CRUDE, MULTI-PHASE SOUR CRUDE	SRB
3	BI-10-03028	ABU SAFAH*	MULTI-PHASE SOUR CRUDE	SRB
4	BI-10-00038	HNRP TO SGP	NGL P/L	FMQ
5	BI-10-03184	SGP TO JGP	C2+NGL P/L	FMQ
6	BI-10-01106	JGP TO JUBAIL	ETHANE P/L	C. A. T
7	BI-24-05000	PETRO RABIGH DEVELOPMENT	ETHANE / BUTANE P/L	C. A. T
8	BI-10-03101	KHURAIS DOWNSTREAM	SOUR GAS P/L	METAL SERVICES
9	BI-10-00433	SRG2 PIPELINE	SALES GAS P/L	C. A. T
10	BI-10-00227	KRZTG-1 PIPELINE	SALES GAS P/L	B. Q. E
11	BI-10-00433	UBTG4 PIPELINE & BJBFG-3	SALES GAS P/L	SAIPEM
12	BI-10-03096	REHABILITATION PHASE-2*	11 CRUDE OIL, 2 SOUR GAS, 1 NGL LINES P/L'S	G.C.C
13	BI-10-08022	KHURSANIYA DOWNSTREAM	2 CRUDE OIL, NGL, SALES GAS, SOUR GAS P/L'S	SAUDI TECHINET
14	BI-100-7004	FUEL & FEEDSTOCK PIPELINE FOR JUBAIL-2 STAGE 1*	2 METHANE, ETHANE P/L	BEMCO
15	BI-10-00179	EAST WEST PIPELINE*	CRUDE OIL & GAS PIPELINE	CAT , AL FALAK
16	BI-10-0578	KGB-2 SALES GAS PIPELINE*	SALES GAS P/L	PETROFAC
17	BI-10-0295	SHY-1 PHASE 2 PIPELINE*	NGL P/L	SRB
18	BI-10-0454	MANIFA DOWNSTREAM PIPELINE*	CRUDE OIL, SOUR CONDENSATE PIPELINE	SRB
19	BI-10-1067	KRZTG-2 PIPELINE	SALES GAS P/L	GCC
20	BI-10-0168	SHABAB-1 NGL PIPELINE	NGL PIPELINE	RHM
21	BI-10-0421	EWRR-1 PIPELINE	CRUDE OIL PIPELINE	FMQ
22	BI-10-1066	UBTG-1 SALES GAS PIPELINE	SALES GAS PIPELINE	CAT
23	BI-10-0611	RAS TANURA – DHAHRAN PIPELINE-2*	CRUDE OIL	SAIPEM
24	BI-10-0789	DHAHRAN- RIYADH PIPELINE-2*	SOUR GAS, SOUR CRUDE, MULTI-PHASE SOUR CRUDE	SRB

LDS Project List

SL#	PROJECT#	PROJECT DESCRIPTION	COMMODITY	MAIN CONTRACTOR
25	BI-21-2025	QASSIM CRUDE OIL PIPELINE	MULTI-PHASE SOUR CRUDE	G.C.C
26	BI-21-0036	CRUDE OIL PIPELINE FROM RIYADH OIL REFINERY TO PP10	NGL P/L	EL-SEIF
27	BI-10-3155	RASTANURA REFINERY TO JUAYMAH GAS PLANT	C2+NGL P/L	SINOPEC
28	BI-10-879	CARBON DIOXIDE CAPTURE AND INJECTION FACILITIES	ETHANE P/L	SAMSUNG
29	BI-100-7014	FUEL & FEEDSTOCK PIPELINE FOR JUBAIL STAGE 2	ETHANE / BUTANE P/L	GULF RIYADAH
30	BI-10-00918	WASIT DOWNSTREAM PIPELINE	SOUR GAS P/L	G.C.C
31	BI-10-00617	LEAK DETECTION & CORROSION MONITORING SYSTEM PHASE-1	30 SOUR GAS P/L	MASCO
32	BI-10-07019	SAPD INTEGRATION PROJECT	SOUTHERN AREA LDS PIPELINE	NAJMATAL-DAMMAM
33	BI-10-01768	SRG-2 EAST WEST SALES GAS PIPELINE	SALES GAS P/L	G.C.C
34	BI-10-01282-0001	56" EWG-2 SECTION III SALES GAS PIPELINE (MGS PH-I) & 30" EWECG-1 SALES GAS PIPELINE	3 SALES GAS PIPELINE	DODSAL & COMPANY
35	BI-100-7022	JEDDAH REMOTE SURVEILLANCE PIPELINE MOMITORING	SNJBP-1SNJBP2 CRUDE OIL SALES GAS, SOUR GAS P/L'S	NAJMATAL DAMMAM
36	BI-10-001439	EXPAND SHAYBAH-ABQAIQ PIPELINE CAPACITY	2 METHANE, ETHANE P/L	C.A.T
37	BI-21-00077	SALES GAS DELIVERY SYSTEM FOR SEC-PP 13	SALES GAS	SEC/WORLEY PARSONS
38	BI-10-01215	COMPLETE SHEDGUM YANBU-1 PIPELINE LOOP-4 & LOOP-5	SALES GAS P/L	SAIPEM.CO
39	BI-10-0179 AY-1 CONVERSION	AY-1 & AY-1L LDS RE-CONFIGURATION & RE-COMMISSIONING FOR CONVERSION TO GAS SERVICE	CRUDE OIL & SALES GAS PIPELINE	NAJMATAL DAMMAM
40	BI-24-050-0221	MODIFICATION ON EXISTING YESRAF PIPELINE	CRUDE OIL, SOUR GAS, SALES GAS P/L	NSH
41	BI-25-00044	SAUDI BAHRAIN PIPELINE AB-4 PIPELINE	CRUDE OIL	AL-ROBAYA
42	BI-10-01221	NORTHERN AREA PIPELINES	SALES GAS & SOUR CONDENSATE PIPELINES	DENYS ARABIA
43	BI-10-01443	REROUTE RASTANURA PIPELINES	18 CRUDE OIL, NGL PIPELINES	CPPB
44	BI-100-7023	SALES GAS PIPELINE	SALES GAS PIPELINE	G.C.C
45	BI-10-0611 & BI-10-0789	VALIDATE & COMMISSION PIPELINE LDS	REFINED PRODUCT	NESIC
46	BI-21-00083	SALES GAS & AL-CRUDE PIPELINE TO YAMAMA NEW PLANT	SALES GAS & CRUDE OIL PIPELINE	GAS ARABIA
47	BI-10-01214	INCREASE EAST WEST PIPELINE CAPACITY	CRUDE OIL PIPELINES	PETROJET

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