INTRA Services is a hi-tech company with their primary goal to promote advanced repair & maintenance technologies for oil & gas, chemical, petrochemical, oil refining industries in Russia and in neighbour countries.

Process piping repair and maintenance standard for oil refining and petrochemical plants at pressures up to 10 MPa (100 kgf/cm²) authorised by Central Directorate of the Federal Service for Environmental, Engineering and Nuclear Supervision (FSETAN) of Russia (Rostekhnadzor).

Best service company in the industry according to World Refining Association.

Endorsement by Agency for Strategic Initiatives in ‘New Business’ category.

Leak sealing technology standard for in-house up-time maintenance of pipelines, vessels and pressure equipment developed by Company and approved by FSETAN.
INTRA Service Company is the only company in Russia that provides the full scope of online repair & maintenance services:

• online leak sealing;
• hot tapping and line stopping;
• composite repair.

Production of INTRA compounds Successful pilot testing at hazardous assets Manufacture certified as per ASME Endorsement by Industrial Development Fund (IDF) of innovative online repair and maintenance technology introduction project for oil&gas industry complex enterprises.

Pilot testing of IntraCase selfsealing clamps.

Project team establishment. Testing of item models in Ansys system.

Online repair equipment manufacture launched in Miass.

2014

2015

2016

2017

100% SUBSTITUTION IMPORT
INTERUPTION COSTS

OVER 150 MLN USD SAVED
Any incidents at a hazardous asset result in:

- extra costs associated with maintenance and recovery of equipment;
- disruption of annual production schedule (profit loss).

Unscheduled maintenance results in disrupted profit schedule (medium efficiency plant):

1. Any incidents at a hazardous asset result in:
   - extra costs associated with maintenance and recovery of equipment;
   - disruption of annual production schedule (profit loss).

2. Unscheduled maintenance results in disrupted profit schedule (medium efficiency plant):
   - **Refinery**: \(2000 - 3000\) K USD/DAY
   - **Petrochemical**: \(600 - 1400\) K USD/DAY
   - **Chemical Production**: \(130 - 160\) K USD/DAY

   (Reduction of ammonia production by 2 tons per day)

3. Estimated loss per a single leak:
   - **Steam, water**:
     - low pressure: \(500 - 700\) USD/DAY
     - high pressure: \(1500 - 2500\) USD/DAY
   - **Hydrocarbons (natural gas)**:
     - low pressure: \(2000 - 5000\) USD/DAY
     - high pressure: \(3000 - 10000\) USD/DAY
DATA IN FIGURES

63 HAZARDOUS ASSETS FACILITIES

129 LEAKS REPAIRED IN 30 DAYS AT AN OIL REFINERY

2 DAYS TO REPAIR A LEAKING DN1400 FLANGE

1+ JOBS
4 HOURS TO MOBILISE PERSONNEL AND EQUIPMENT
from request to start of work.

18 HOURS TO COMPLETE THE TASK
To repair a leak of flammable medium under pressure (development of documentation, fabrication of a split ring clamp, arrival of technicians to the site).

2600 LEAKS REPAIRED IN THE LAST 3 YEARS

MORE THAN 400 JOBS PER YEAR

PROJECTS COMPLETED IN
28 LOCATIONS OF RUSSIA
4 NEIGHBOUR COUNTRIES

2016 2017
THE TECHNOLOGY

LEAK SEALING IS DONE IN A FEW SIMPLE STEPS:

1. **PREPARATION**
   - Preparation and reinforcement of the damaged pipeline area for further work (replacement of fasteners, installation of ring adapters, installation of a clamp to strengthen the flange joint)

2. **LEAK AREA CONTAINMENT**
   - Based on the medium pressure and the leak size various containment methods can be used to ensure the service is uninterrupted

**PRESSURE > 40 ATM**
- Installation of a split ring clamp
- Installation of a peripheral clamp
- Installation of a sectoral clamp
- Installation of an enclosure clamp

**PRESSURE < 40 ATM**
- Installation of impres packing and band
- Installation of sealant along the perimeter of a damaged pipeline area
- Installation of a ring clamp

Online leak sealing is an advanced method of equipment maintenance without interruption of service.
Installation of injection adapters in the leak area for subsequent compound injection.

Compound injection (resin based filler with properties based on the media parameters) with an injection gun.

As the compound has cured a band or a clamp with injected sealant becomes a part of the pipeline, the leak has been sealed.

THE CORE IDEA

Application of band and unique compounds (synthetic resin fillers with varying properties based on leak temperature, medium, pressure, type and equipment design). A special clamp is installed in the leak area creating a seal. A special hydraulic tool is used to generate a higher pressure than in the system followed by injection of a compound into the void. The higher pressure and the cured compound form a new sealing structure. Leak sealing is performed on a working pipeline or pressure vessel without interruption of service and provides a 100% seal.

PREPARATION FOR COMPOUND INJECTION

Installation of injection adapters in the leak area for subsequent compound injection.

COMPOUND INJECTION

Compound injection (resin based filler with properties based on the media parameters) with an injection gun.
TECHNOLOGY APPLICATIONS

APPLICATION PARAMETERS

1200 °C

- Oil and oil products
- Natural gas
- Steam and water
- Chemically aggressive media
- Ammonia, acids and alkalies
- Associated gases
- Chemicals

-196 °C

- 350 ATM.

0.01 ATM.

DEFECT TYPES:

Defects in flange gaskets including pipeline fitting caps, welded joints and base metal defects in pipeline elements, equipment, vessels and tanks, gland valves, wellhead equipment elements and fittings at upstream facilities.
TECHNOLOGY BENEFITS

1. Lower costs associated with equipment downtime and service interruption

2. Emergency leak response ensures mitigation of incident/accident risks

3. Lower emissions and oil spills (environmental friendliness)

4. Safer operation in the uptime.

5. Extended service life of fixed assets, material saving.

6. Lower product loss and reduced power consumption.

AREA OF APPLICATION

- Flange joints: 68%
- Welded joints: 22%
- Gland valves: 10%
- Other: 3.58% (Chemical), 12.1% (Petrochemical), 15.1% (Oil Refining), 69.22% (Production and Transportation)
Work methods and tools are defined by a combination of factors:

- working and rated parameters of conveyed medium;
- design and operating indicators;
- expert review reports;
- defect progression modelling and current condition of the equipment

Clamps are engineered in the in-house engineering design department. The design engineers use ANSYS technologies to model innovative products.

Design of split clamp models as per existing standards:

- ASME PCC-2 Repair of pressure equipment.
- STO 82162778-004-2013 Corporate Standard. Guidelines to application of leak sealing technology during in-house uptime maintenance of piping, vessels and equipment under pressure.

Testing of mathematical and physical models of split clamps by finite element element method with Ansys Professional (excluding the field test phase).

- Standard design solution data base created.
- Engineering design departments classified as to their areas of expertise.
- Multi-level control system.
Inquiry prioritisation system developed:

- the least load level;
- the least dimensions;
- the least material consumption;
- shorter lead time and fewer phases.

State-of-the-art clamp manufacture equipment: MAZAK, five-coordinate robotic turning circular milling machining center.

Production of consumables: 80+ varieties of compounds.
CLAMP TYPES

- Low pressure (up to PN16);
- High pressure (up to PN100).

PHASE 1
DESIGN

Design and testing of split clamps with FEA Professional (ANSYS Professional):

- Testing of elements;
- Testing of fasteners;
- Calculation of fastener torques;
- Material analysis;
- Structure analysis

PHASE 2
TESTING

STRUCTURAL STRENGTH TEST

Testing at 1.5 x working pressure (maximum values) 10 mm through-wall defect
No visible leaking No visible damage

INTEGRITY TEST

Test at operation values during 12 hours. 10 mm through-wall defect No visible leaking
Assessment criteria: maximum allowable pressure drop as per class “A”
Test at operation values during 12 hours. Full pipe collapse simulation
No visible leaking

- Welded joints of pipe sections.
- Straight pipe sections
- Short-radius elbow, Tee, incut.

Applied on the following defects:
- Process
- Mechanical
- Corrosion and erosion
BEFORE

Pipeline element and valve type
FLANGED JOINT DN1200

Operating parameters:
64 ATM.
PRESSURE
420°C
TEMPERATURE

AFTER

Engineered items:

Transported medium:
HYDROCARBON GASES
Pipeline element and valve type

**FLANGED JOINT DN1200**

Operating parameters:

- **38 ATM.**
- **PRESSURE**
- **250°C**
- **TEMPERATURE**

**BEFORE**

**After**

Engineered items:

Transported medium:

STEAM
Pipeline element and valve type

**WELDED JOINT (TIE-IN)**

**DN50/250**

Operating parameters:

**17 ATM.**

**PRESSURE**

**85 C°**

**TEMPERATURE**

**BEFORE**

Engineered items:

**AFTER**

Transferred medium:

NATURAL GAS
**Before**

Pipeline element and valve type

**WELDED JOINT**
(KNUCKLE BEND)
**DN100**

Operating parameters:

- **20 ATM.**
- **PRESSURE**
- **100°C**
- **TEMPERATURE**

**After**

Engineered items:

Transported medium:

**HYDROGEN-CONTAINING GAS**
**BEFORE**

Pipeline element and valve type

**FLANGED JOINT**

**DN80**

Operating parameters:

- **63 ATM.** Pressure
- **102°C** Temperature

**AFTER**

Engineered items:

Transported medium:

**FEED WATER**
Pipeline element and valve type

WELDED JOINT
(CONCENTRIC REDUCTION)
DN450

Operating parameters:

46 ATM.
PRESSURE

350° C
TEMPERATURE

Engineered items:

HYDROGEN-CONTAINING GAS, GAS-OIL
Before

Pipeline element and valve type

WELDED JOINT
(T-JOINT)
DN50

Operating parameters:

25.7 ATM.
PRESSURE

200 C°
TEMPERATURE

AFTER

Engineered items:

Transported medium:

HYDROGEN, WATER, CARBON OXIDES
Operating parameters:

25.7 ATM.
PRESSURE

200°C
TEMPERATURE

Pipeline element and valve type

FLANGED JOINT
DN400

Engineered items:

Transported medium:

HYDROGEN SULPHIDE GAS
B E F E R E

Pipeline element and valve type
WELDED JOINT (TIE-IN)
DN20/1000

Operating parameters:
80 ATM. PRESSURE
50 C° TEMPERATURE

A F T E R

Engineered items:

Transported medium:
SULFUR DIOXIDE
Pipeline element and valve type

WELDED JOINT
(KNUCKLE BEND)
DN150

Operating parameters:

37 ATM.
PRESSURE

247 C°
TEMPERATURE

BEFORE

Engineered items:

TRANSPORTED MEDIUM:

CONDENSATE

AFTER
BEFORE

Pipeline element and valve type
FLANGED JOINT DN15

Operating parameters:
37 ATM.
PRESSURE
960°C
TEMPERATURE

AFTER

Engineered items:

Transported medium:
METHANE
Pipeline element and valve type
FLANGE WELDED JOINT DN25

Operating parameters:
16 ATM. PRESSURE
850 °C TEMPERATURE

Engineered items:

Transported medium:
HYDROGEN, POTASSIUM CARBONATE
Pipeline element and valve type

FLANGED JOINT DN50

Operating parameters:

42 ATM.
PRESSURE

-70 C°
TEMPERATURE

Engineered items:

Transported medium:

CRACKING GAS
Pipeline element and valve type

WELDED JOINT OF BEND DN300

Operating parameters:

18 ATM.
PRESSURE

12 C°
TEMPERATURE

BEFORE

Engineered items:

Transported medium:

AMMONIA (LIQUID)
BEFORE

Pipeline element and valve type

FLANGED JOINT
DN150

Operating parameters:

120 ATM. PRESSURE

110°C TEMPERATURE

AFTER

Engineered items:

Transported medium:

FEED WATER
Pipeline element and valve type
FLANGED JOINT DN40

Operating parameters:
10.5 ATM.
PRESSURE
50°C
TEMPERATURE

Before

Engineered items:

Transferred medium:
FLUORHYDRIC ACID

After
Pipeline element and valve type

WELDED JOINT
(T-JOINT)
DN25

Operating parameters:
140 ATM.
PRESSURE
150 C°
TEMPERATURE

AFTER

Engineered items:

Transported medium:

FEED WATER
BEFORE

Pipeline element and valve type

WELDED JOINT (T-JOINT)
DN600

Operating parameters:

0.7 ATM.
PRESSURE

40°C
TEMPERATURE

AFTER

Engineered items:

Transported medium:

FLARE GAS
Pipeline element and valve type

**PIPELINE VALVES DN400**

Operating parameters:

- **24 ATM. PRESSURE**
- **174°C TEMPERATURE**

**BEFORE**

**AFTER**

Engineered items:

Transported medium:

**HYDROGEN-CONTAINING GAS, METHANE, CARBON OXIDES**
INTRA SERVICE COMPANY: BUSINESS AREAS

**ONLINE REPAIR**
- Hot tapping and line stopping
- Leak sealing
- Composite repair
- Recovery of equipment operation
- Inspection control and leak detection
- Testing of safety valves

**INDUSTRIAL SERVICES**
- Corrosion under insulation
- Thermal spray metal coating
- Chemical cleaning of pipelines and equipment
- Cleaning of tanks and reservoirs
- Cleaning of heat exchangers

**MANUFACTURE**
- Manufacture of hot tapping and line stopping equipment and fittings
- Manufacture of leak sealing clamps and compounds
- Miscellaneous online maintenance equipment and consumables

**REPAIR TECHNOLOGIES**
- Flange facing
- Stud extraction
- Cutting of pipes, end cutting
- Maintenance of heat exchangers
- Tube bundle extraction
- Turn-key maintenance
- Welding, repair of welded joints

**INTELLIGENT SERVICES**
- Intrasoft Reliability Management System
- Supervising of fixed asset construction
- Supervising of turnaround maintenance
- Bolting
- Technical University

MORE THAN 10 YEARS IN THE MARKET

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