

# INTEGRITY-PRO

## Flange Management Joint Integrity Software

**INTEGRITY-PRO** Joint Monitoring software is a bespoke database system specifically developed to plan, monitor, control and provide traceability of flanged joints and connections. The database calculation engine uses the Baseline Standard ASME PCC-1 2013 Appendix O Section O-4.1 and Appendix H Table H-1 to define the residual bolt load/stress, and is compared with tabled values in the SHELL ES/090 Rev 2 Specification. INTEGRITY-PRO runs on the standard Windows operating system and can be used as stand alone or networked. It has been adopted by major plant operators as an essential management system due to its simplicity and comprehensive covering of the plant and related maintenance.

Offering data gathered from years of industry experience, Integrity-Pro can provide bolt tightening data including bolting patterns, torque and tensioning figures, procedures, techniques and recommended controlled bolting equipment. Based on the information entered, the Integrity-Pro software will analyze all of the data and produce a complete calculation sheet along with the required torque or tension figures to ensure an accurate and correctly bolted joint is achieved.

Integrity-Pro can also create a specific tightening procedure for each bolted joint, which can include specific information such as any special remarks all of which can be easily entered into the software by the user. It also includes basic information for standard flanges, wafer check valves, spade and spacers, and swivel flange assemblies.

Integrity-Pro joint integrity database management system is used to support bolted joint inspection and maintenance and/or leak testing activities raising safety levels across the industry in which it applies.



MADE IN THE UK

# INTEGRITY-PRO

## Flange Management Joint Integrity Software

### FUNCTIONALITY

Full traceability and control of all activities associated with the joint/connection including:

- Joint disassembly/breakout
- Machining/re-facing
- Joint assembly
- Bolt tightening
- Testing (Hydrostatic, Pneumatic, Nitrogen or Helium)
- Leak history and incidents

Integrity-Pro Flange Management Joint Integrity Controlled Bolting software provides bolting calculations and data for :

- BS1560/ANSI B16.5 standard flanges
- MSS SP44 standard flanges
- API 6A and 17D standard flanges
- Clamp type connectors (Techlok, Grayloc, Galperti and Destec)
- Non-standard joints, i.e. pressure vessels, heat exchangers, compact flanges, etc..

- Project control and review by visual status display of each joint.
- Performs as a central source for documentation and records associated with each activity or task.
- Provides joint tightening procedures and methods.
- Generates tooling lists.
- Provides and maintains historical data for each joint.
- Search engine to find and display specific flanges/records.
- Embedded equipment database providing access to service records, tool calibration, etc.
- Embedded personnel database providing access to individual training, competence, qualifications, etc..
- Completed joint databases can be viewed and interrogated by a freeware viewer which can be freely distributed throughout the organization.

Integrity-Pro Edit Flange

Use Metric: No, Size: 2 1/4, A/F: 3 1/2, Qty: 28, Bolt Material: A193-B7

Type: SWG, Material: Stainless

**TENSIONER any Brand**

Advanced

Calculation Options

- AquaJack Tensioner
- BS3 Tensioner
- BT Standard 1500 bar
- BT Subsea
- Advanced
- BT TSR Tensioner
- BT Xtra
- HF SBT Tensioner
- HF Sub Sea Tensioner
- HF Topside Tensioner
- HL Tensioner
- HTF Tensioner
- LEVERLOK Tensioner
- MRT Tensioner
- PS Tensioner
- SRT Tensioner**
- SSI Tensioner
- SSIII Tensioner
- SST Tensioner
- SVR Tensioner
- System 15 Tensioner

Additional Information

Client Project Ref

SAP Order Order

Custom 3

Custom 4

Custom 5

Work Instructions

Comments

Tension Outputs

Residual Stress: 45000 lbf/in<sup>2</sup> (310 N/mm<sup>2</sup>)

Residual Load: 155250 lbf (691 kN)

% of Yield (Residual): 42.9

Pressure A: 15447 psi (1065.1 bar)

Pressure B: 12358 psi (852 bar)

Min To Seal: 35475 lbf/in<sup>2</sup> (245 N/mm<sup>2</sup>)

Pass 1..N

1: 15447 psi (1065.1 bar)

2: 14417 psi (994 bar)

3: 13388 psi (923 bar)

Integrity-Pro Edit Flange

Use Metric: No, Size: 2 1/4, A/F: 3 1/2, Qty: 28, Bolt Material: A193-B7

Type: SWG, Material: Stainless

**TORQUE WRENCH any Brand**

Advanced

Calculation Options

Tightening Method:  Tension  Torque

Advanced

Use User Stress

- Atlas Copco
- ATW**
- EnerPac
- HiForce
- Hydratight
- Hytorc
- Norwolf
- RAD
- SPX

Torque Details

Lubricant

COF

Supplier: ATW

Model: 8ATWH

Drive Type: Hex Drive

Pump Pressure: 5451 psi (375.9 bar)

Min Bolt Length: 17.630 in

Additional Information

Client Project Ref

SAP Order Order

Custom 3

Custom 4

Custom 5

Work Instructions

Comments

Torque Outputs

Residual Stress: 45000 lbf/in<sup>2</sup> (310 N/mm<sup>2</sup>)

Torque: 4133 lbf.ft (5604 Nm)

Bolt Load: 155250 lbf (691 kN)

Pump Pressure: 5451 psi (375.9 bar)

Min To Seal: 35475 lbf/in<sup>2</sup> (245 N/mm<sup>2</sup>)

Yield Stress: 105000 lbf/in<sup>2</sup> (724 N/mm<sup>2</sup>)

Allowable Stress: 89250 lbf/in<sup>2</sup> (616 N/mm<sup>2</sup>)

# 1. Key Feature – Rapid Flange Data Entry

- Import data from Excel (Data Migration) or Copy existing Flanges.
- Allows for Pre-Engineering project work to commence, saved as a .sdf file.

The screenshot displays the 'Edit Flange' window in the Integrity-Pro software. The window is organized into several data entry sections:

- Identification:** Joint ID (Flange 01-D), Customer ID (007), Temporary Tag (Flange 01-A), Workpack (Default Project Workpack), Installation (Kaombo FSPO), Description (ECITB MJI 10, 18 & 19 Course Rayong), Status (New).
- Function / Location:** System (01 - Produced Gas), Sub-System (01-01), Line No (Line 1), Module (Module 1), Area (Area A), Sub-Area (Loc 1).
- Flange Dimensions:** Imperial (inch) and Metric units, Bolts: 28, Clearance: 4.25. A technical drawing shows dimensions like 42.25, 38.00, 31.00, 29.00, 9.25, 2.13, 4.38, and 28.00.
- Joint Specification:** Type (ANSI 16.5/16.47 Series A), Model (Standard), Class (600 (PN 100)), Size (28 (DN 700)).
- Pipe Specification:** Pipe Spec (ASME), Working Pressure (1480.00 psi), Test Pressure (2220.00 psi), Operating Temperature (deg F).
- Bolt Specification:** Use Metric (No), Size (2), A/F (3 1/8), Qty (28), Bolt Material (A193-B7).
- Gasket Specification:** Type (Ring Type Joint), Material (Stainless Steels and Nickel-base Alloys), Description (316 SS INNER RING, 316 SS OUTER RING).

A 'Messages' box at the bottom right states: "Please contact Technical Support. You are reaching the upper recommended rating for this tool. Please consider using a bigger model."

# 2. Key Feature – Completion & Work Instruction Certificate

- Once all drawings are in the system and all specifications are added, Work Instructions can be generated to support the field work.
- Completion certificates can be created as part of any documentation handover.

## Joint Completion Certificate

Client	Workpack Number	Tag No
PRO FAB	WP-012345	TG_007
Project Number	Project Name	Location
JN 1176	Ichthys	Betam, Indonesia
		Client Tag No
		TG_007_ab
Workpack Details		
Line No	L-80-790_FW347-JF-002	C2SA Propane Tank
		C2SA-790_FW347-1GA3-K-N
Joint Details		
Joint Type	ANSI Standard	Gasket Type
		SWG
Joint Size	20	Gasket Material
		Stainless
Joint Class/Rating	300	Bolt Qty
		24
Flange Material	ANSI B16.5	Nut A/F
		2
Bolt Material	A320-L7	Grip Length
		5.13 in
Bolt Size/Length	1 1/4" / 8.46 in	Bolt Coating
		Black Oxide
Lubricant Name	MOLYKOTE 1000	Co-efficient of Friction (μ)
		0.11
Residual Bolt Stress	40000 lbf/in <sup>2</sup>	Bolt Load
		37760 lbf
Recommended Equipment		
Tension		Torque
Tool Recommended		3ATWS
Tool Cover	100% / 50% / 25%	Torque (Stages/Pass)
		30% 60% 100%
1st Pass Pressure		Torque Value
		177 lbf.ft 353 lbf.ft 589 lbf.ft
2nd Pass Pressure		Pump Pressure
		547 psi 1094 psi 1824 psi
Check Pass		
Customer Specified Values?		
Equipment Information		
Tool Used	3ATWS	Serial No
		W6005
Pump Type	RWP55-B5	Serial No
		G234577
Flange Checks		
Flange Face	Clean	X
	Aligned	X
Bolts	Correct Length	X
	Correct Material	X
Gasket	Correct Size	X
	Correct Material	X
Comments		
Passed 3,000psi integrity testing		
Assembled By	Johnny Prasitoye	Company
		PT Advent Prakarsa
Tightened By	John Smith	Company
		PT Advent Prakarsa
Date	06/02/2016	Date
		07/02/2016
PT ADVENT		
Print Name	JOHN SMITH – EGTB TECHNICIAN	Firman Wahyu Jatmiko
	CERT NO. 1988325	Mr Yama Kitahara
Signature	<i>J. Smith</i>	<i>F. Jatmiko</i>
		<i>Y. Kitahara</i>
Date	9 <sup>th</sup> FEBRUARY 2016	10 <sup>th</sup> FEBRUARY 2016
		12 <sup>th</sup> FEBRUARY 2016

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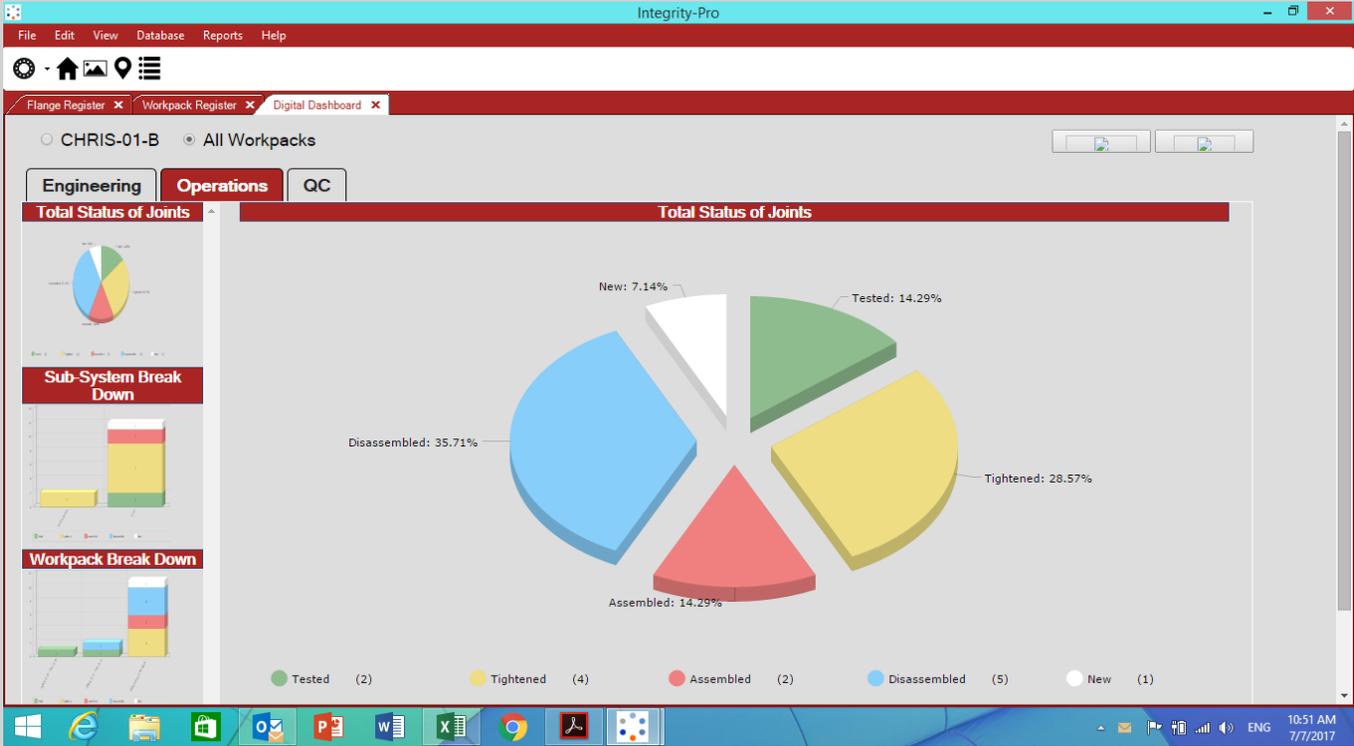
## Work Instruction

Client	Workpack Number	Tag No
BP	WP-012345	TG_007
Project Number	Location	Client Tag No
JN 1176	Ulsan, South Korea	TG_007_ab
Workpack Details		
System	C2SA-790_FW347-1GA3-K-N	Sub-System
		N/A
Line No	L-80-790_FW347-JF-002	
Instruction		
(xvii) Flange make up method shall be followed as per below for hydrocarbon / hydraulic oil / water injection systems:		
For all line classes below 1500# flange joints, manual wrench shall be used for bolt up to 1" dia. For over 1" to 1 1/2" bolt dia., manual torque wrench shall be used. For bolt over 1 1/4" to 2" bolt dia., hydraulic bolt torque shall be used. For over 2" bolt dia., bolt tensioning should be applied.		
For all line classes 1500# & above, manual torque wrench shall be used for bolts up to 1" bolt dia. For over 1" to 2" bolt dia., hydraulic bolt torque shall be applied. For over 2" bolt dia., bolt tensioning should be applied.		
Joint Details		
Joint Type	ANSI Standard	Gasket Type
		SWG
Joint Size	20	Gasket Material
		Stainless
Joint Class/Rating	300	Bolt Qty
		24
Flange Material	ANSI B16.5	Nut A/F
		2
Bolt Material	A320-L7	Grip Length
		5.13 in
Bolt Size/Length	1 1/4" / 8.46 in	Bolt Coating
		Black Oxide
Lubricant Name	MOLYKOTE 1000	Co-efficient of Friction (μ)
		0.11
Residual Bolt Stress	40000 lbf/in <sup>2</sup>	Bolt Load
		37760 lbf
Recommended Equipment		
Tension		Torque
Tool Recommended		HTL-DS3
Tool Cover	100% / 50% / 25%	Torque (Stages/Pass)
		30% 60% 100%
1st Pass Pressure		Torque Value
		177 lbf.ft 353 lbf.ft 589 lbf.ft
2nd Pass Pressure		Pump Pressure
		547 psi 1094 psi 1824 psi
Check Pass		
Equipment Information		
Tool Used	3ATW	Serial No
		W6005
Pump Type	LAPP5	Serial No
		123456
Flange Checks		
Flange Face	Clean	X
	Aligned	X
Bolts	Correct Length	X
	Correct Material	X
Gasket	Correct Size	X
	Correct Material	X
Comments		
All good in good condition		
Print Name		
Supervisor	JOHN SMITH	<i>J. Smith</i>
		7 <sup>th</sup> OCTOBER 2015
Client Acceptance	SEAN KIM	<i>보낸사람</i>
		7 <sup>th</sup> OCTOBER 2015

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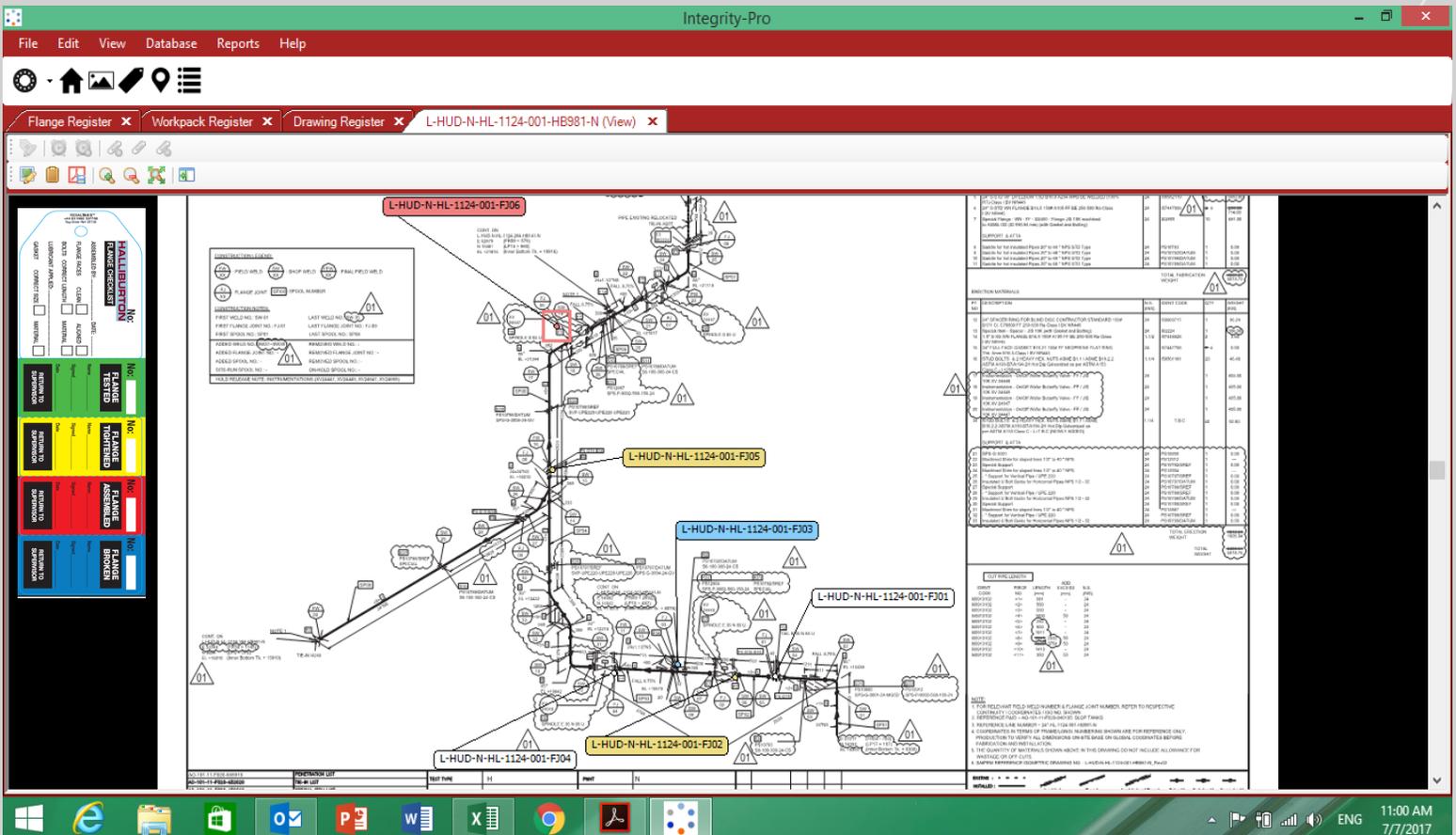
# 3. Key Feature – Digital Dashboard

- Dashboard for Engineering, QC and Operations.



# 4. Key Feature – Drawing Overlay & Mark-up

- Drawing overlay feature allows Flange Management tags and visual status to be layered on top of leak test mark-up route.
- Mark-up drawings allow detailing information on valves within the test envelope.



## 5. Key Feature – AEGEX tablet

- Intrinsically safe Zone 1/21 & DIV. 1 AEGEX tablet running INTEGRITY-PRO (Flange Management) FM JIT software, and Windows 10 as standard.
- The AEGEX tablet can directly scan the Flange Tag Bar Code, thereby locating the Flange Joint ID immediately in the Flange Register where the Flange status can be updated in real time.



**FLANGE REGISTER**



**DRAWING OVERLAY MARK-UP**



**FLANGE TAG BAR CODE SCANNING**



**ADD FLANGE ACTIVITIES**



**Data upload to local server/cloud hosted DB**



**ADD WORK INSTRUCTION**