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FFPM 2023 FORUM FASILITAS PRODUKSI MIGAS

29-31 AGUSTUS 2023
YOGYAKARTA

"Managing Vulnerability in Operations Excellence"

GTC-A OVERHAUL AND SERIES OPERATION FOR KEPODANG FIELD SUSTAINABILITY PRODUCTION

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SPEAKER PROFILE

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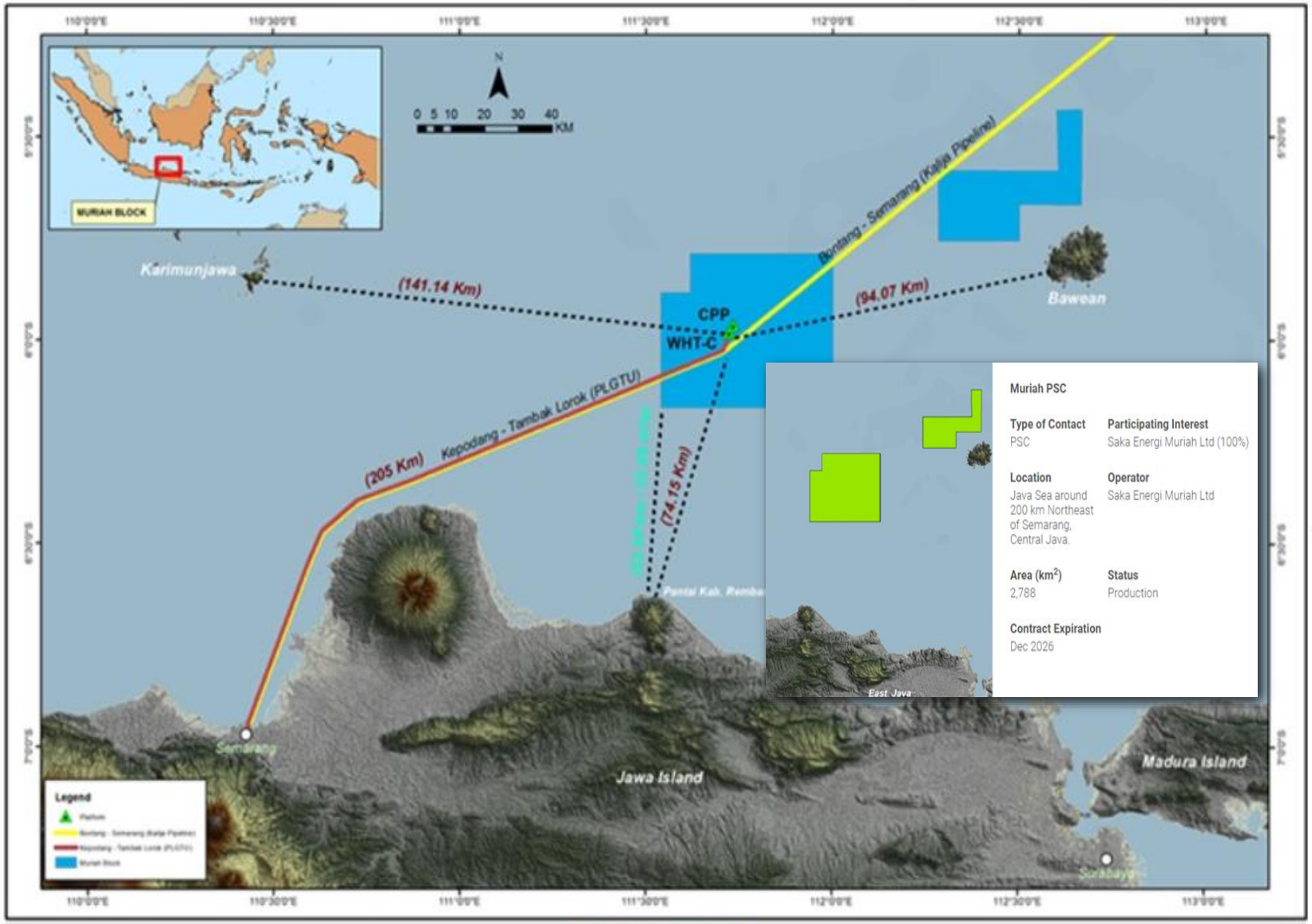
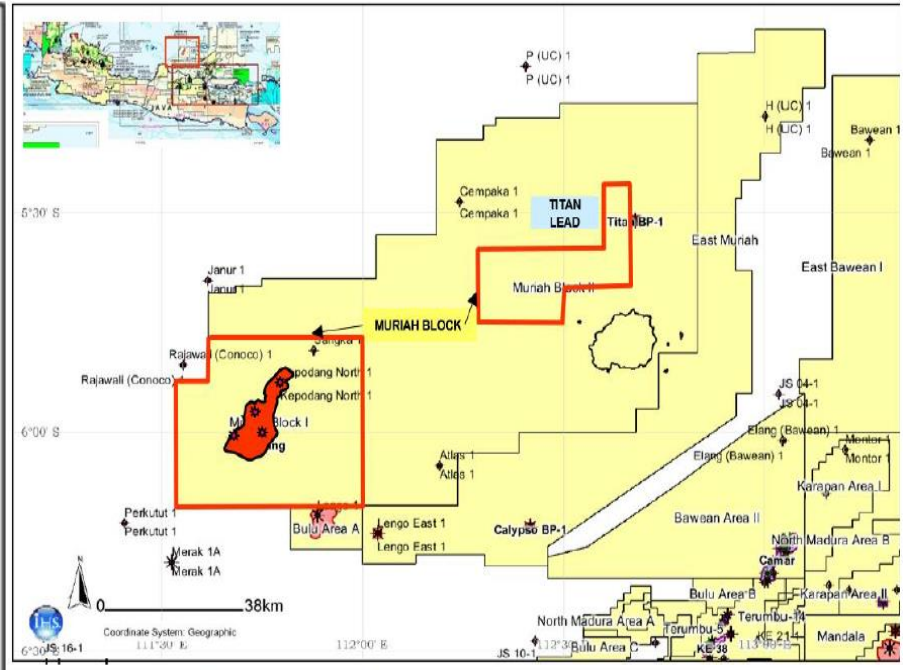
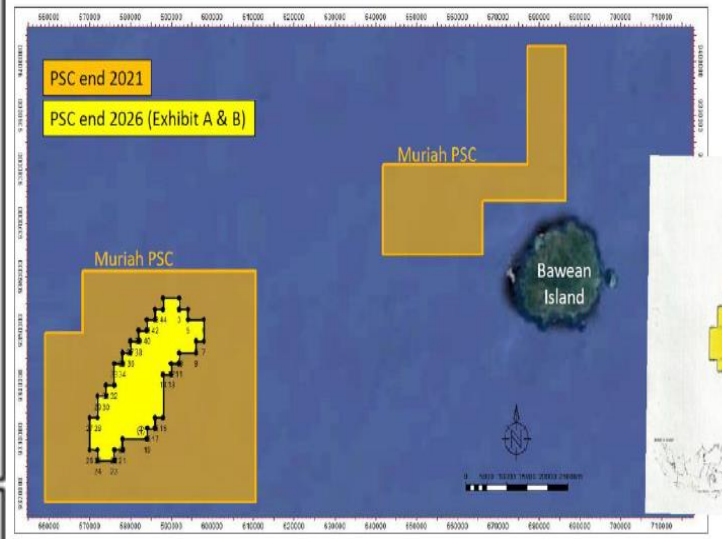
Overview WK Muriah







*Based on PSC Amendment signed in July 12, 2013. Effective Date May 20, 2021 to December 31, 2026.

SAKA ENERGI INDONESIA

FACILITIES MURIAH BLOCK

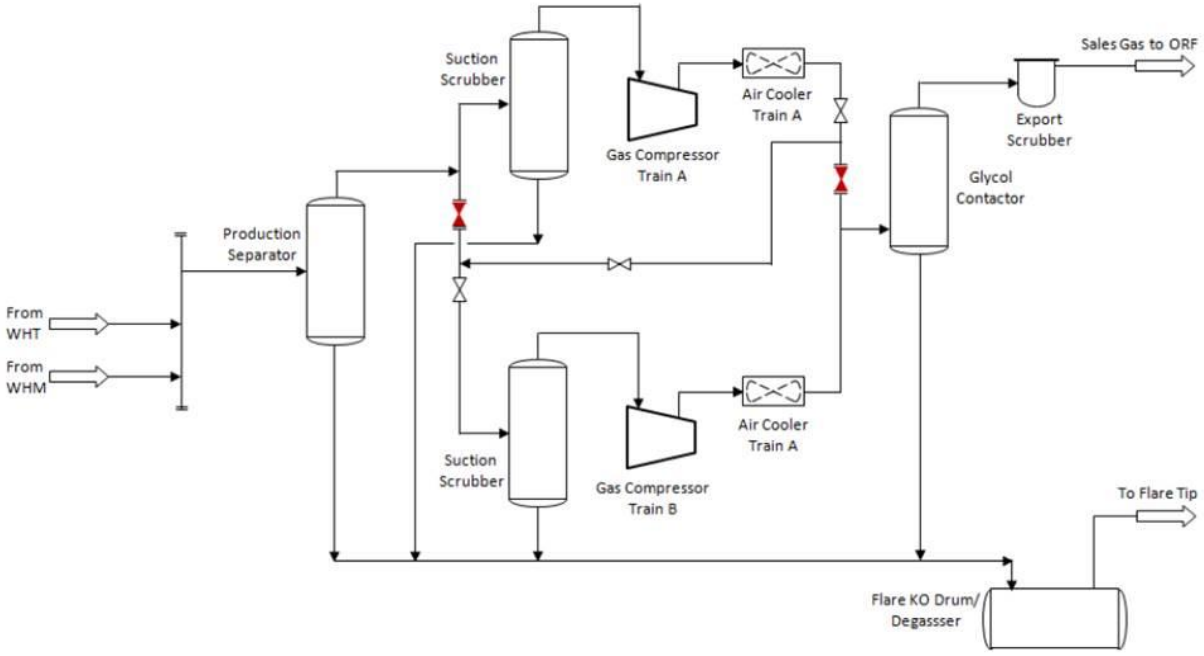
Production Optimization

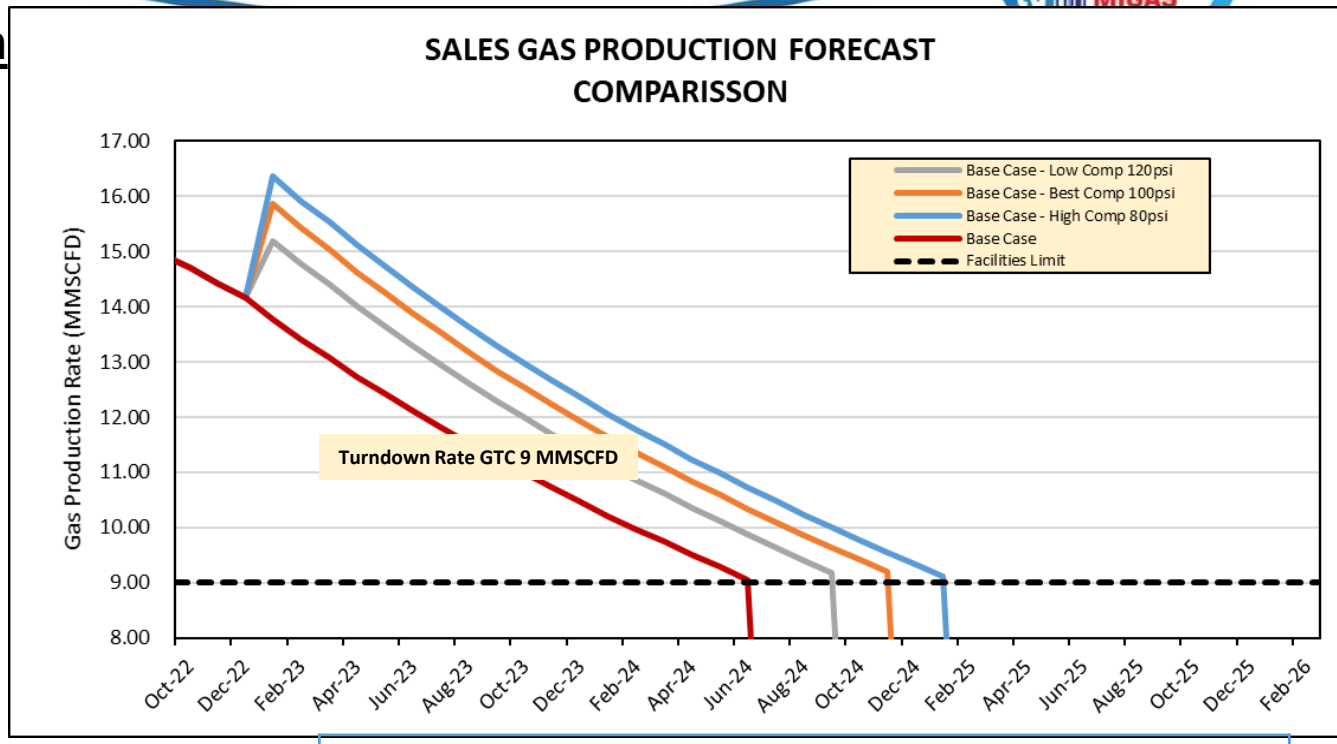
Kepodang GTC(LP/HP Compressor) Series Operation

Refer to previous series compressor operation data:

LP Suction: 6 Barg	HP Suction: 18 Barg
LP Discharge: 18 Barg	HP Discharge: 43 Barg
Flowrate: 20 MMScfd	Flowrate: 20 MMScfd
Cpsr Speed: 88%	Cpsr Speed: 84%

The process schematic during series mode is as follows:





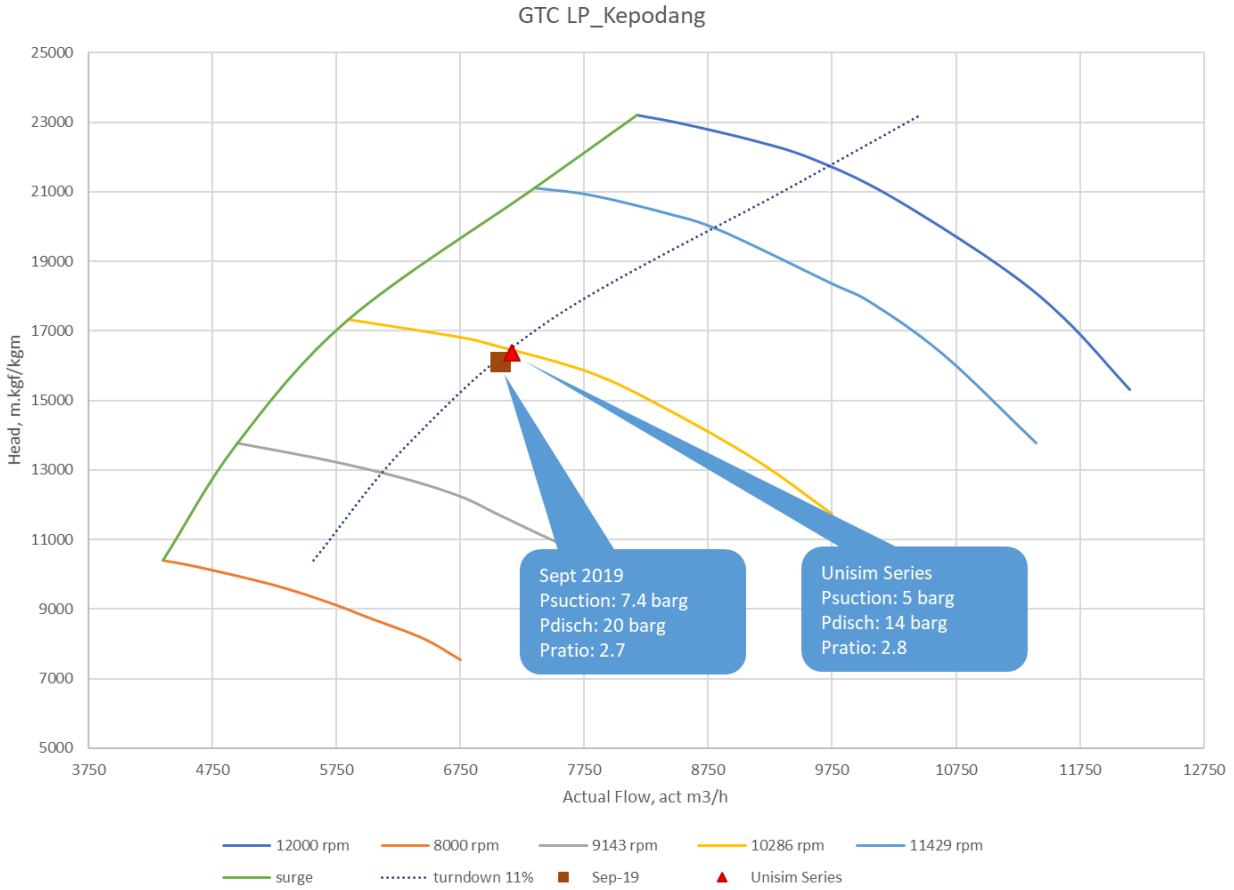
Incremental Series Comp @ Jan 2023			
Parameter	**Low**	**Best**	**High**
WHP min.	120	100	80
Raw Gas Inc.	1.82	2.48	2.97
Fuel	from 1.12 to 1.90		
Sales Gas Inc.	1.04	1.70	2.19
End of Life	Oct-24	Dec-24	Feb-25

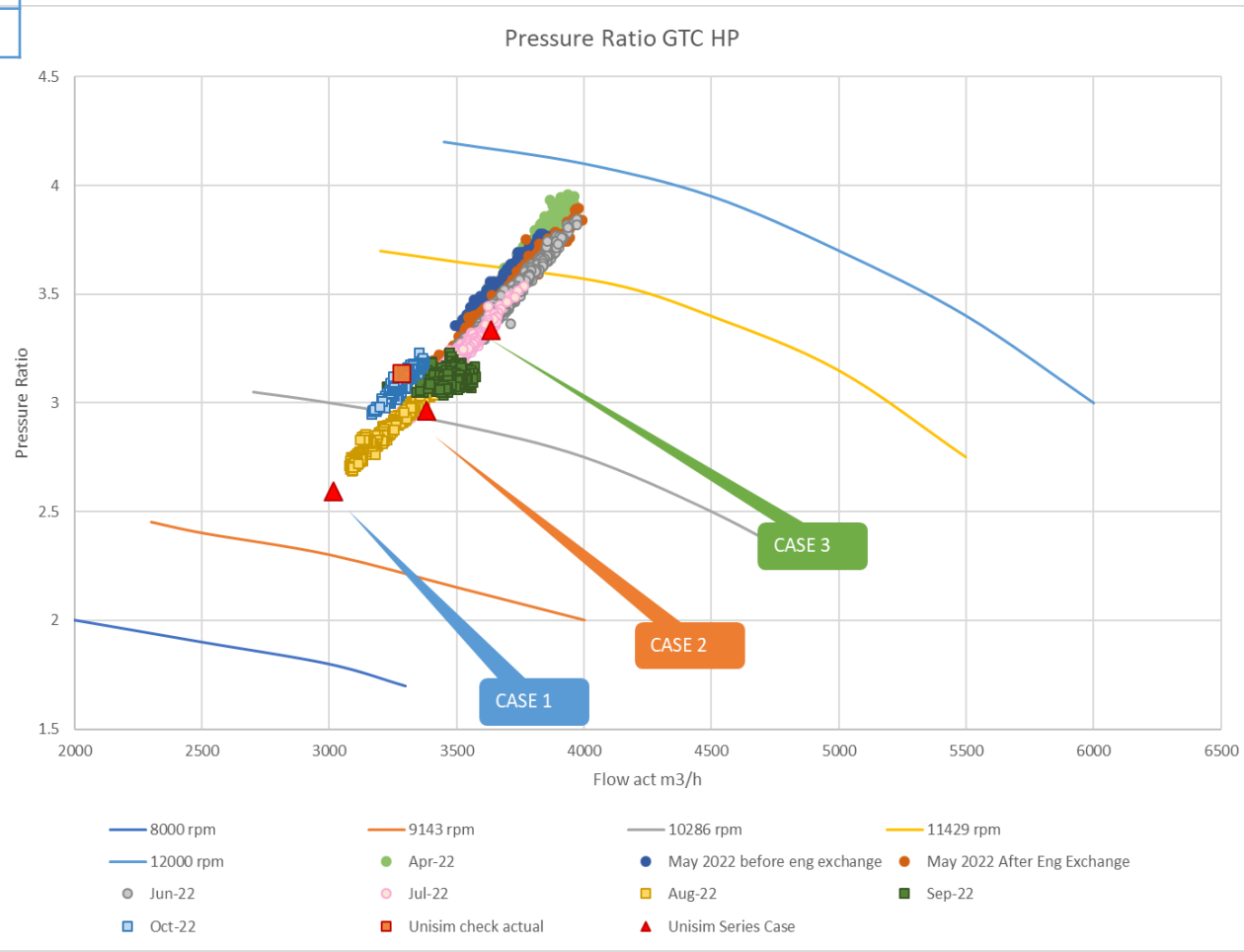
Assumption: ***No constrain on choke opening, water handling capacity, and sand production***

Series Simulation

Parameter	LPC	HPC #1	HPC #2	HPC #3	Unit
P suction	5	13.5	13.5	13.5	barg
P discharge	14	**35**	**40**	**45**	barg
T discharge	119	136	148	159	degC
Polytropic head	16380	16440	19070	21460	m
Act flow	7164	3015	3381	3635	act m3/h
Speed	10270	9525	10250	10850	rpm

GTC Series Operation at Flow 15 MMSCFD – Using UNISIM Simulation

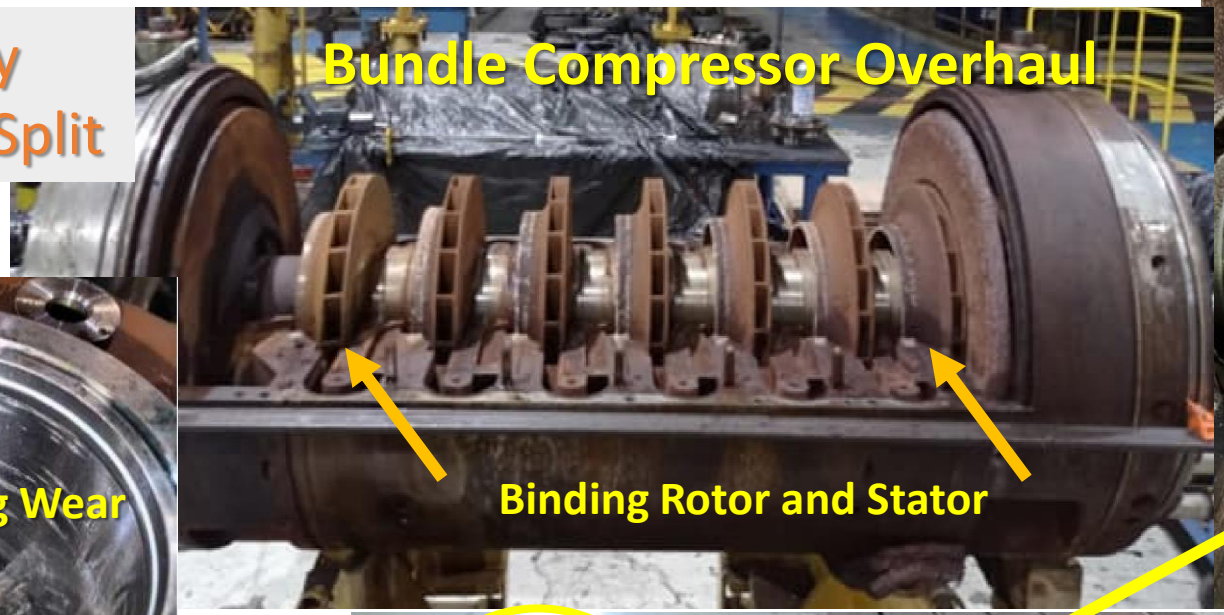


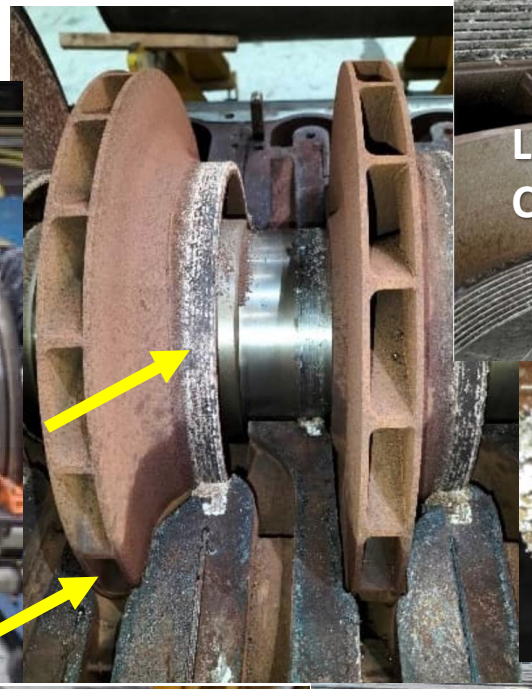


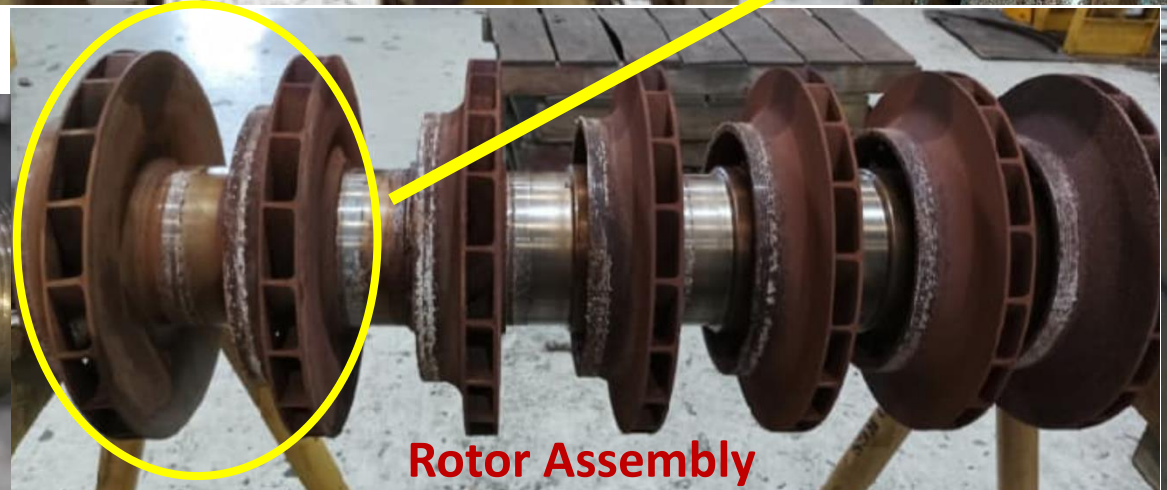
Equipment Failure

LP Compressor (GTC-A) Rotor Locked Up

Bundle Assy Horizontal Split

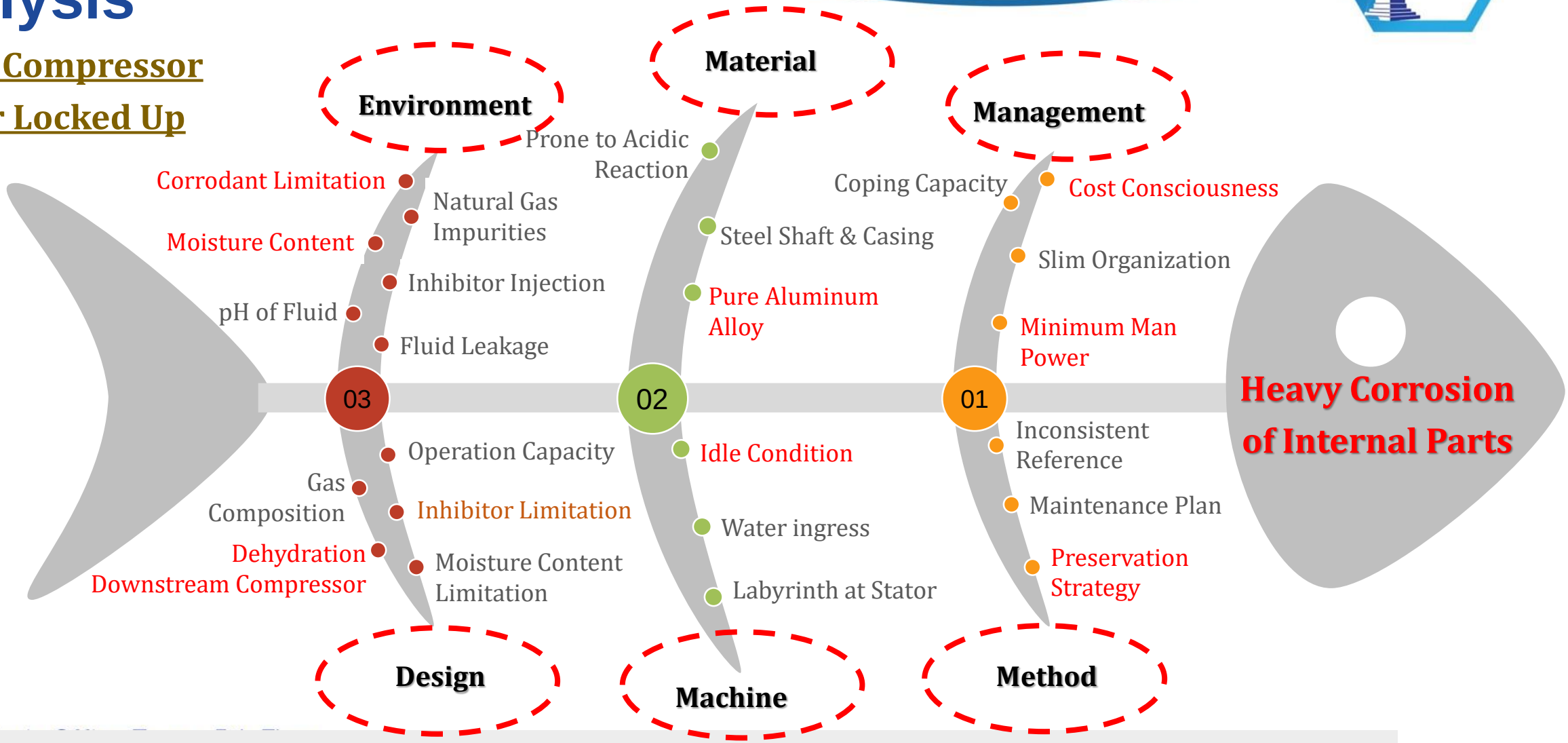






Equipment Failure Analysis

GTC-A Compressor Rotor Locked Up



Using Ishikawa diagram (fishbone diagram) as a tool for Root Cause Failure Analysis (RCFA)

Equipment Repair & Recondition

Compressor Bundle Cleaning

Rotor & Stator Parts Inspection

Repair Compressor Bundle

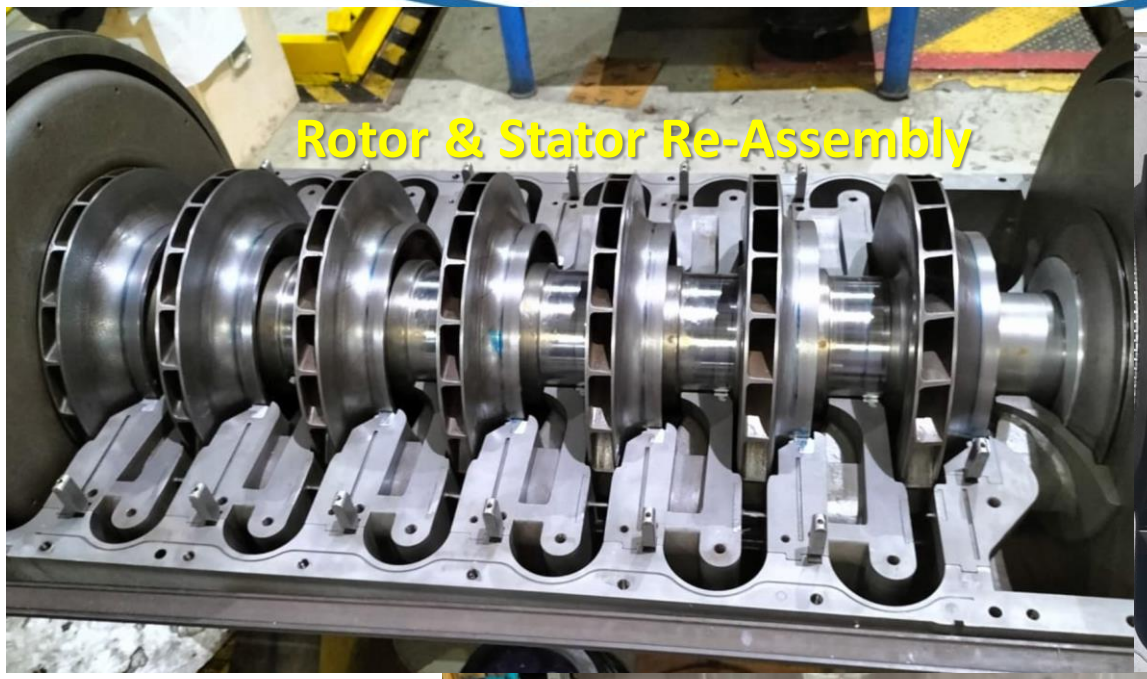
- Rotor Assy Repair
- Stator Assy Repair

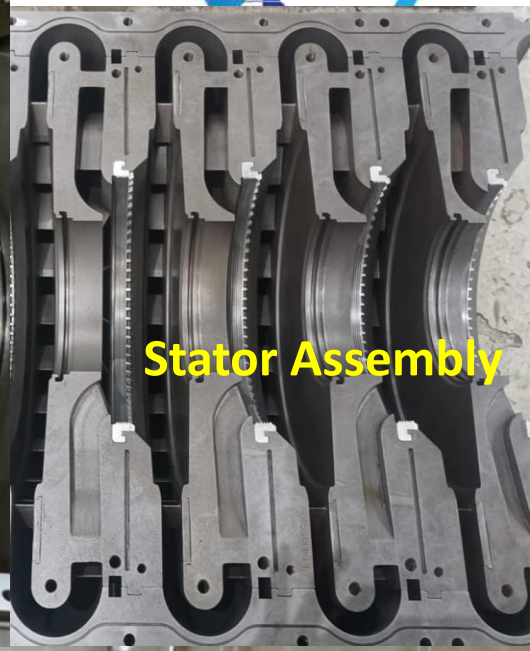
Reassembly Bundle Module

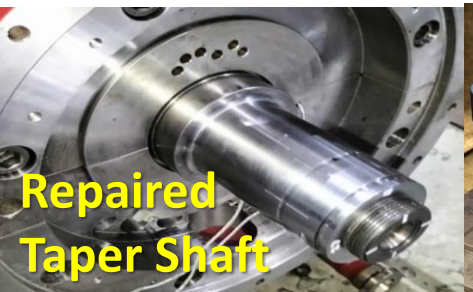
- Part Repair, Replace & Recondition
- Rotor Reassembly & Low Speed Balancing
- Bundle Reassembly

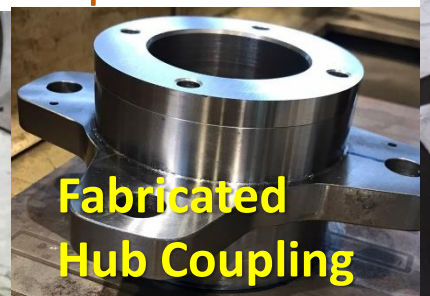
Bundle Module Delivery

- Preservation and Shipment



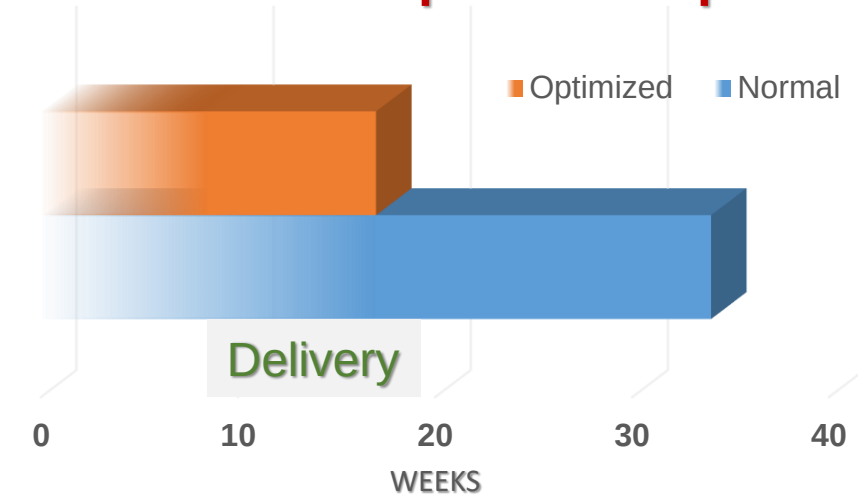




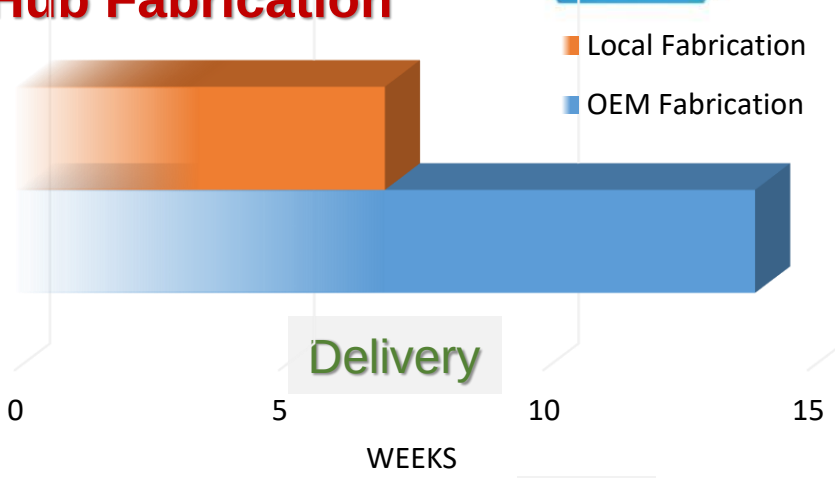


Project Optimization

Bundle Compressor Repair & Recondition

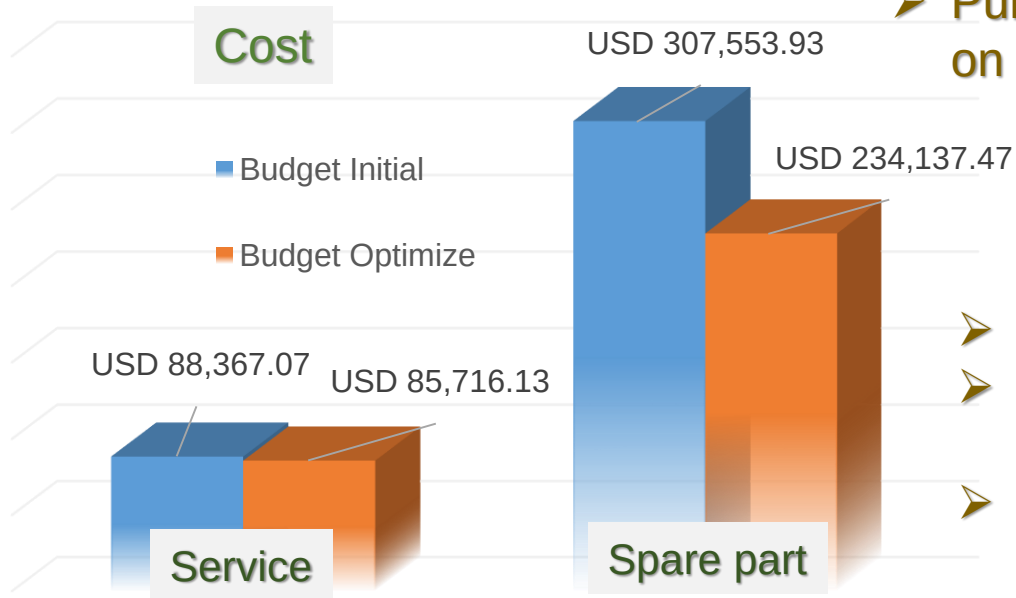


Coupling Hub Fabrication



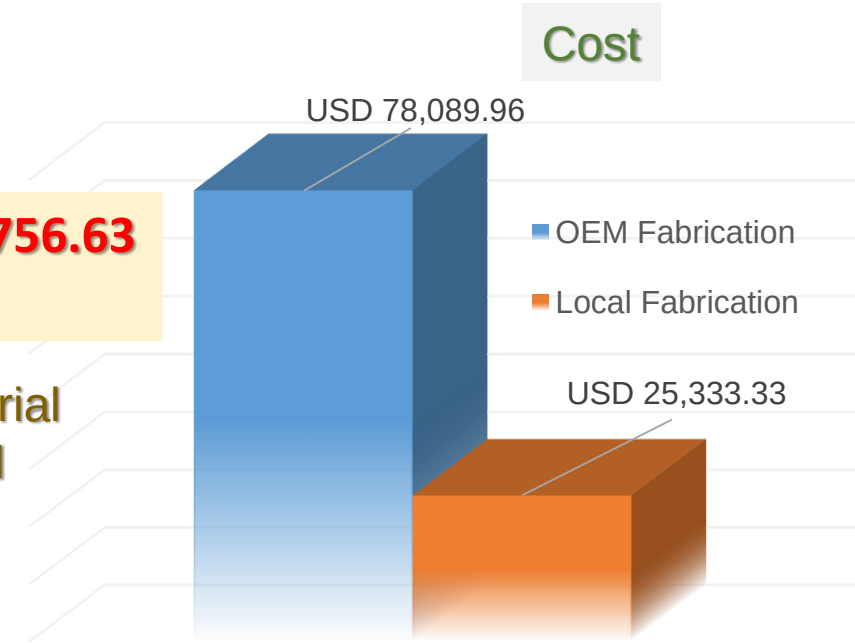
Achieved By:

- Optimized stock parts
- Fabricate locally instead of import new one
- Reuse parts by condition assessment
- Purchase selective parts based on requirement



Total Saving 76,067.40 + 52,756.63 = USD 128,824.03

- Utilize available equivalent material
- Local fabrication instead of OEM fabrication
- 100% made in country

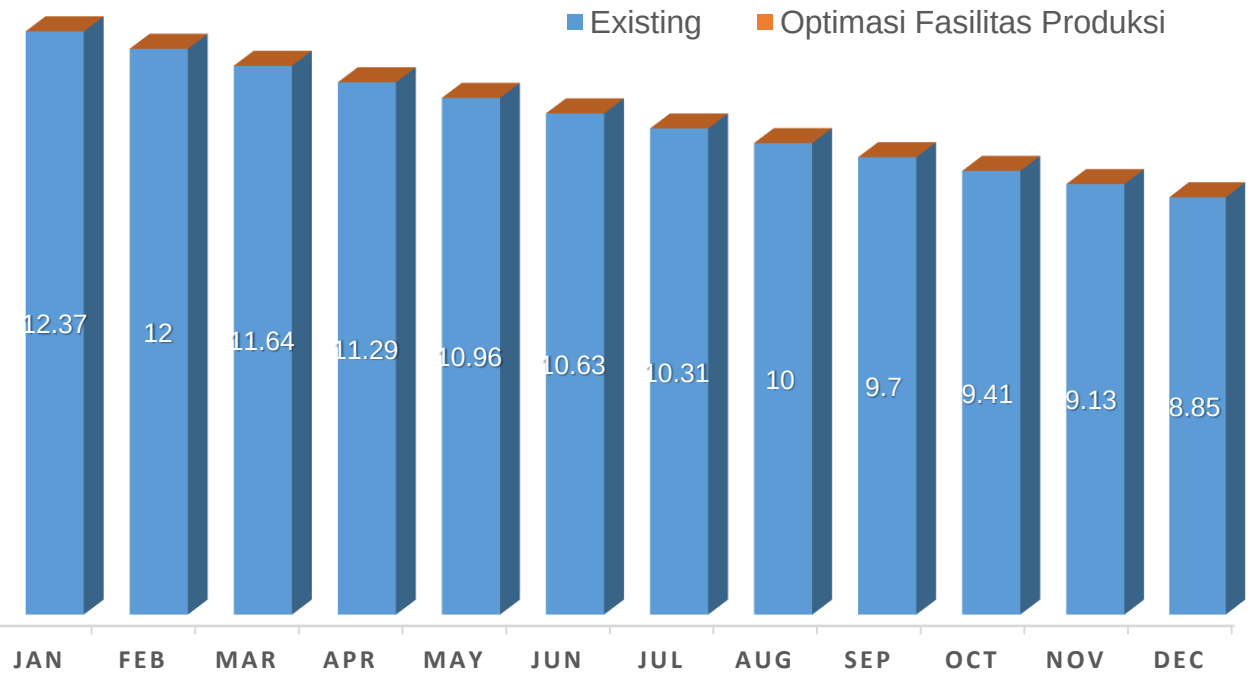


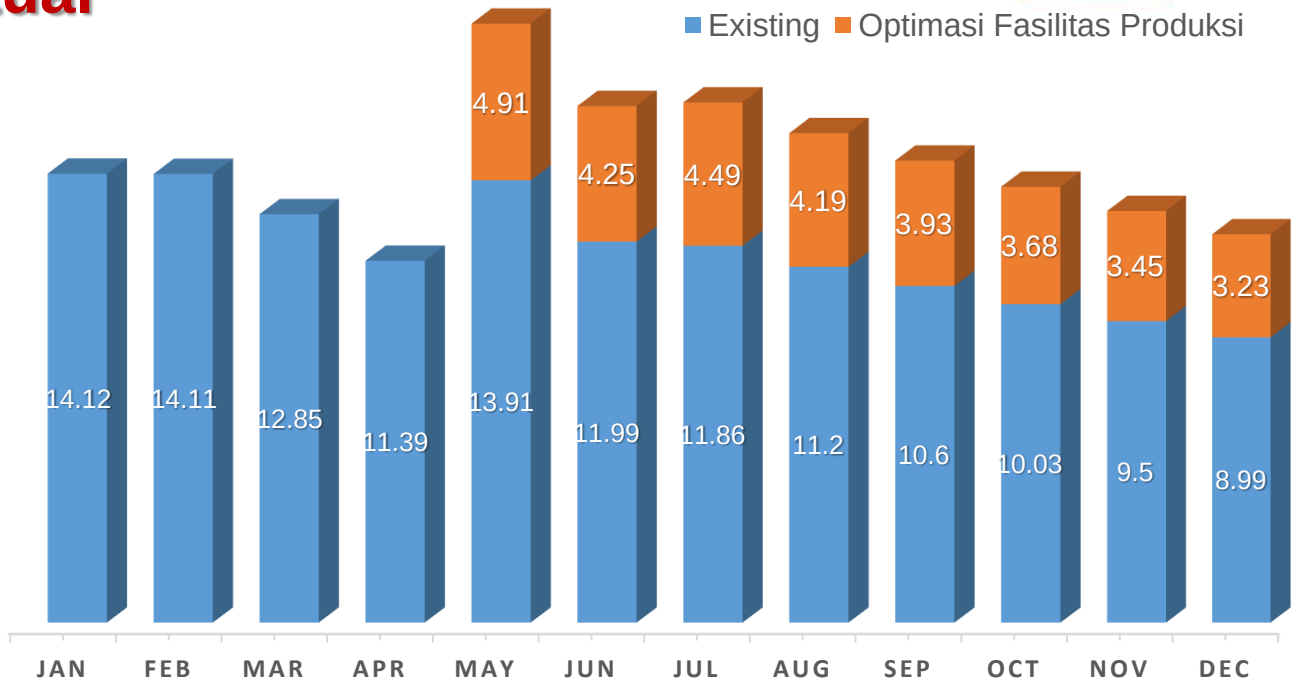
Optimization Result

Short Term Production Forecast vs Actual

Production forecast 2023 is not considering surface facility optimization. The optimization program initiative was raised at the mid of 2022.

Production Forecast 2023

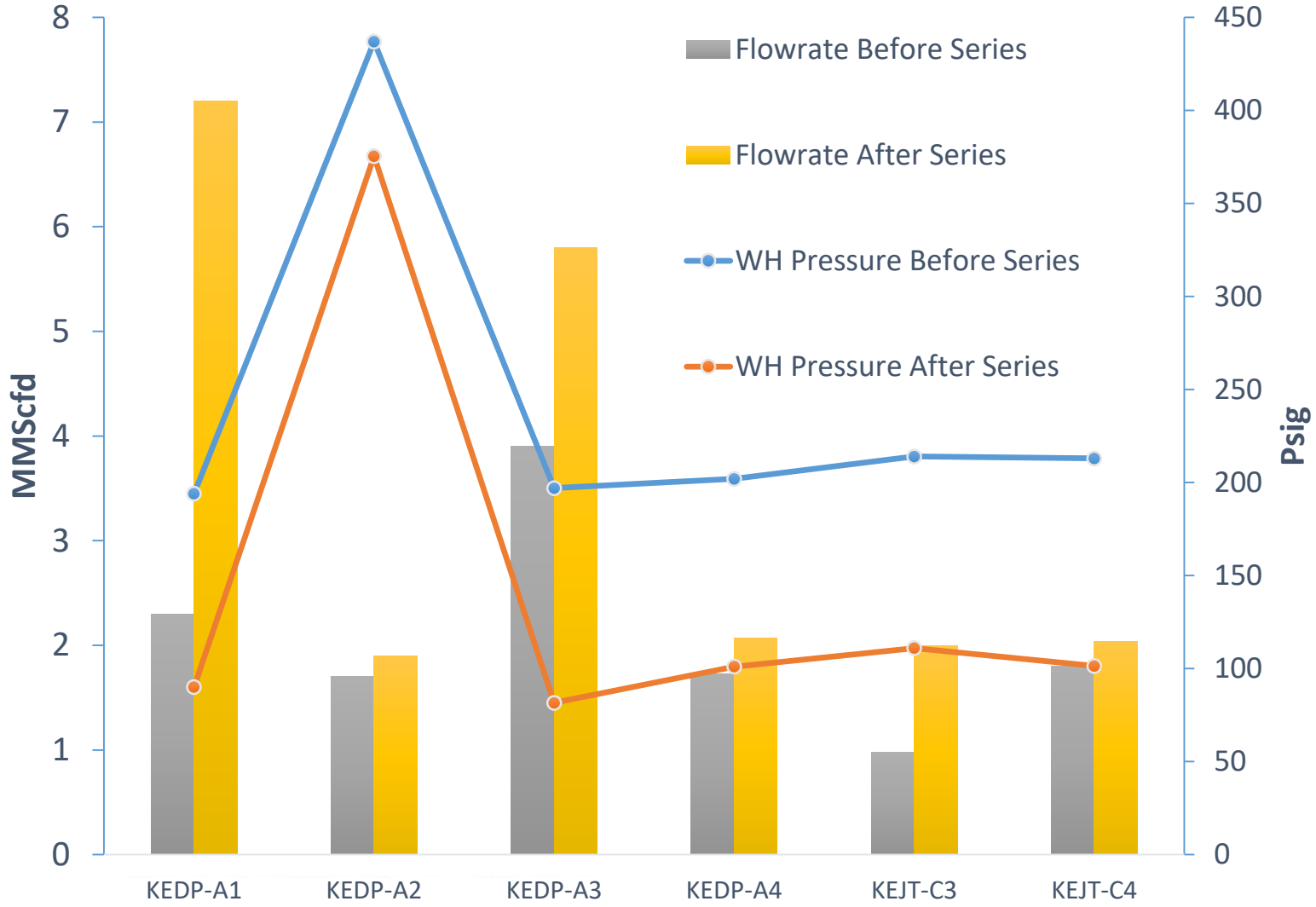




Production Actual/Outlook 2023

Total gas production increased above estimated with an average of 4 MMScfd; the initial simulation high case is 2.97 MMScfd..

Production Gain



Major Gas Contribution from Wells:

- KEDP-A1 with increment 4.9 MMScfd
- KEDP-A3 with increment 1.9 MMScfd
- KEJT-C3 with increment 1.02 MMScfd

Almost All Well Pressure Are Lowered More Than to 100 Psig. Except KEDP-A2

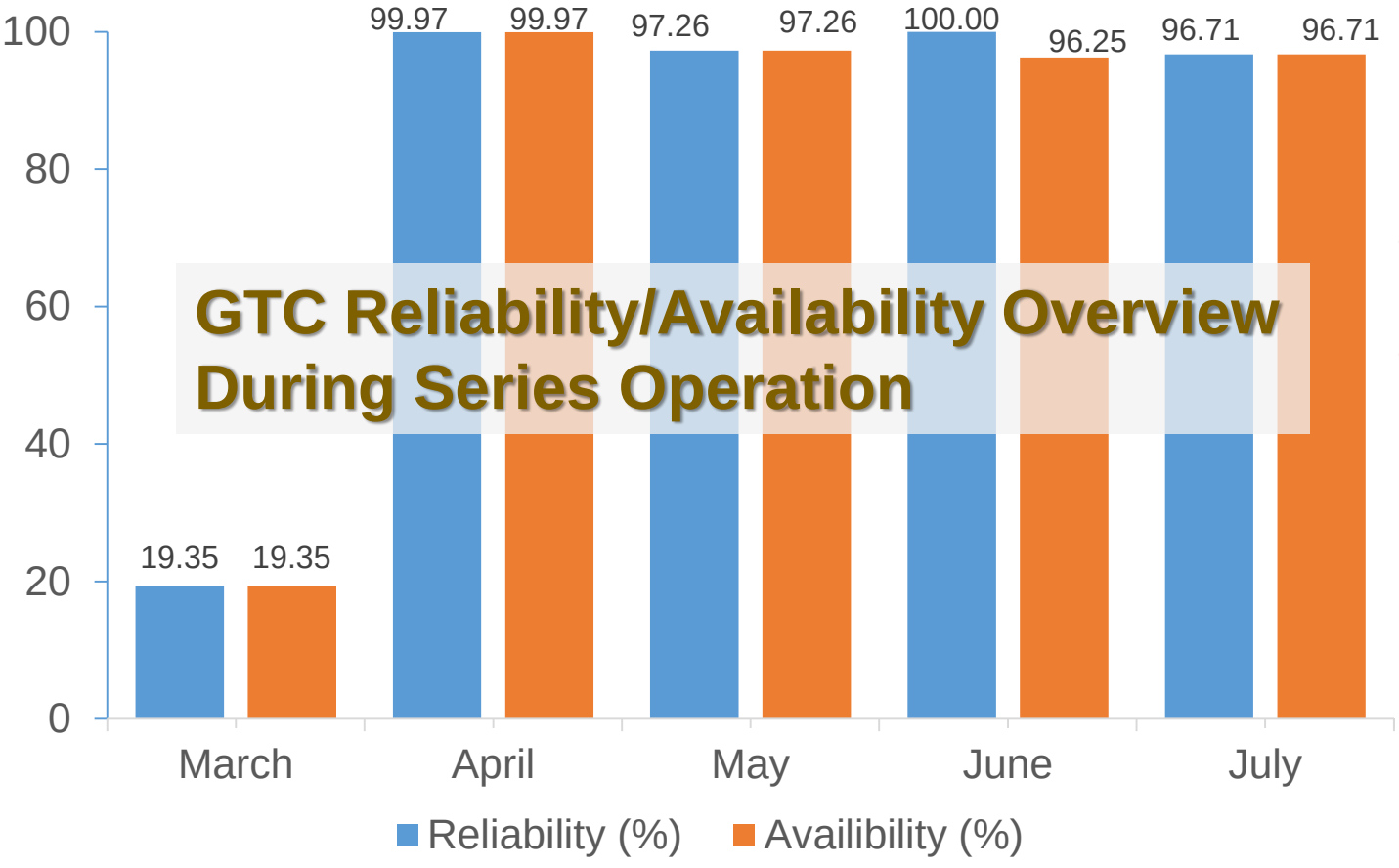
Equipment Evaluation

1x Trip due to compressor vibration

1x Trip due valve problem
3x Trip due to compressor vibration

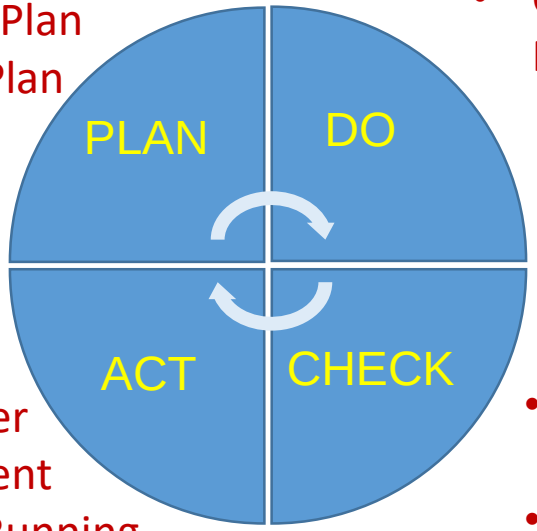
No Trip

3x Trip due to Instrumentation issue



GTC Reliability/Availability Overview During Series Operation

- Operation Procedure
- Operation Plan
- Overhaul Plan



- Compressor Series
- Operation Data Record

- Parameter Adjustment
- Update Running Strategy

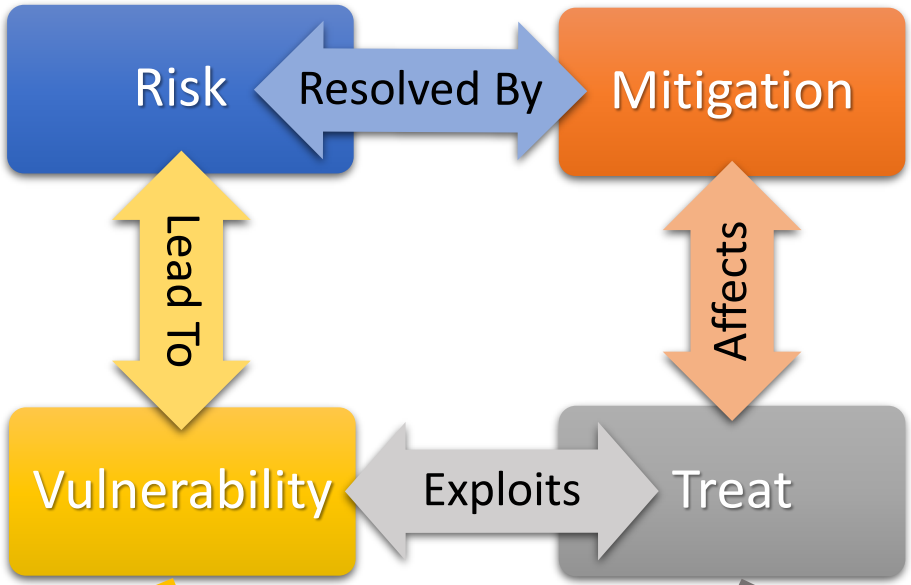
- Performance Evaluation
- Process Review
- Failure Analysis

The PDCA method is used to improve the operability of the process dynamics compression system to achieve production sustainability and subsequently Increase Equipment Reliability.

Risk Assessment

Equipment Risk Assessment During Idle Condition

- Rotor Locked Up
- Damage Parts
- Unavailable Unit
- Cost and LPO



- Weekly Running Test
- Inhibitor Injection
- Inert Gas Purge
- Dehydration Package Upstream Compressor
- Upgrade Material

- Galvanic Corrosion
- Inadvertent Operation

- Fluid Contamination
- Prolonged Idle
- Corrodant Element

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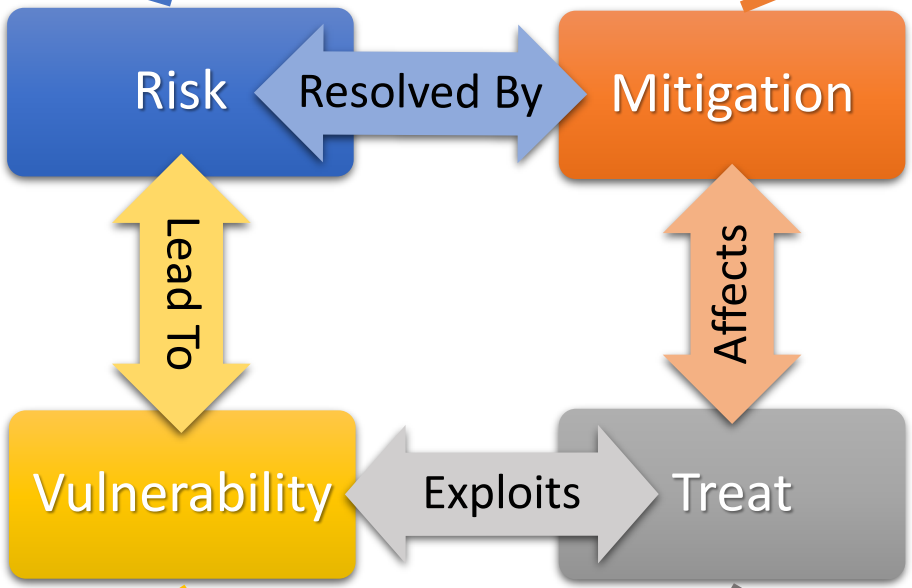
Risk Assessment

Equipment Risk Assessment During Operation In Series

- Damage Equipment
- Unavailable Unit
- Wells Degradation
- Cost and LPO



- Procedure In place
- External Communication
- Process Monitoring
- Tune LP Compressor
- Reinforce Coping

- High Vibration
- Unstable Flow/Head
- Erratic ASV Respon
- Backpressure

- Intermittent Gas Consumed
- High Pressure Pipeline
- Minimum Flow/High Head

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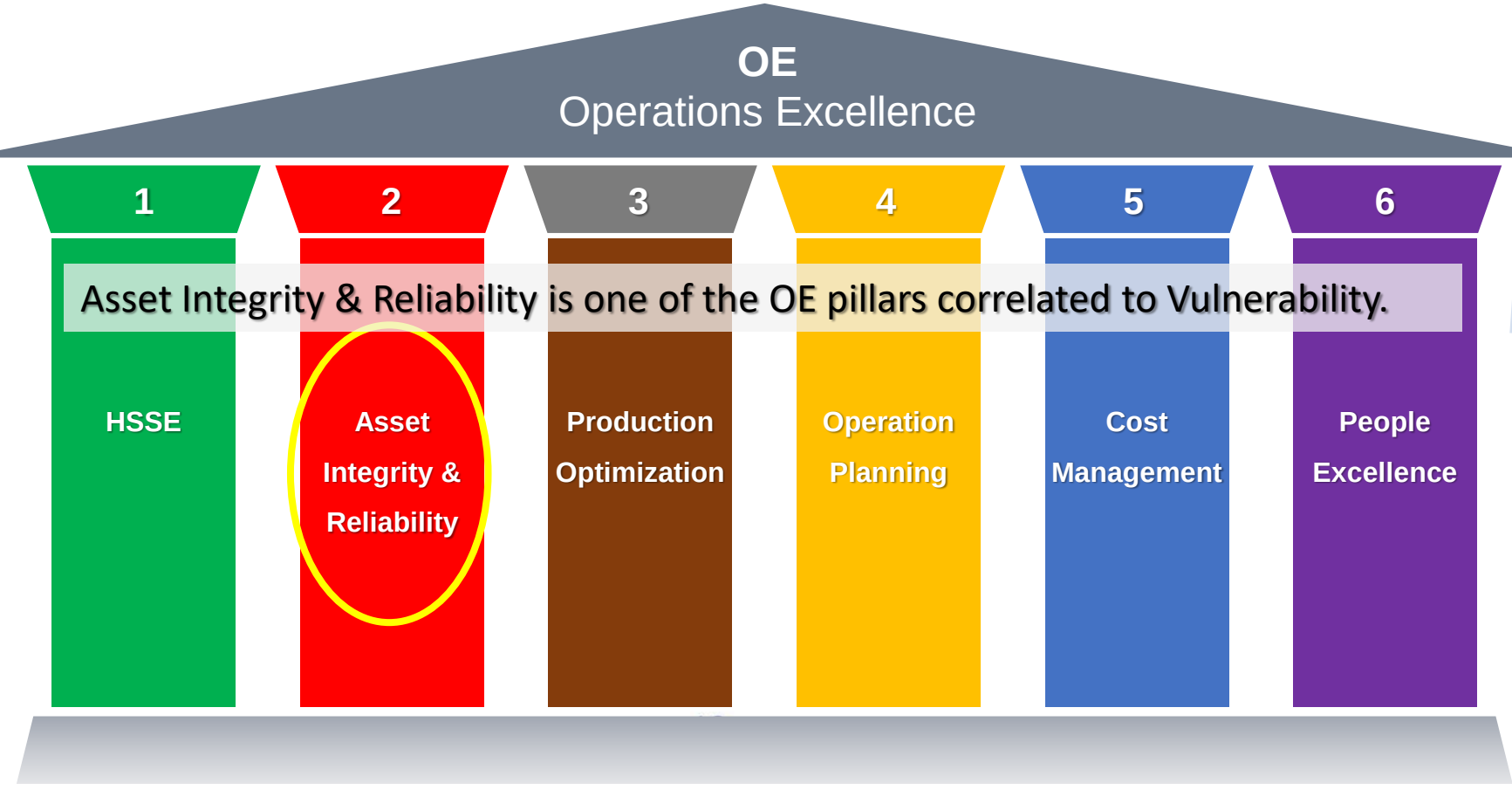
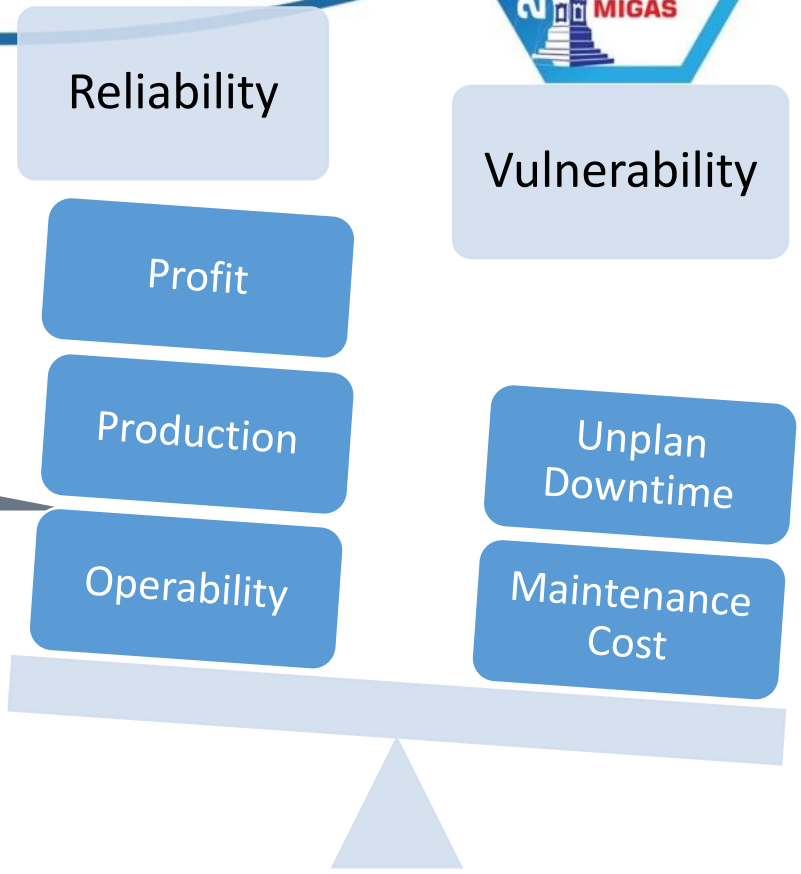
Vulnerability & Reliability

Reliability refers to the ability of a system to perform its intended function. Vulnerability, on the other hand, refers to the inability of a system to withstand strains and the effects of failures.



Asset Integrity & Reliability is one of the OE pillars correlated to Vulnerability.



Reliability focuses on the possibility of maintaining an equipment. Vulnerability focuses on the possibility of disrupting or degrading an equipment.

Thank you

Q & A Time

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