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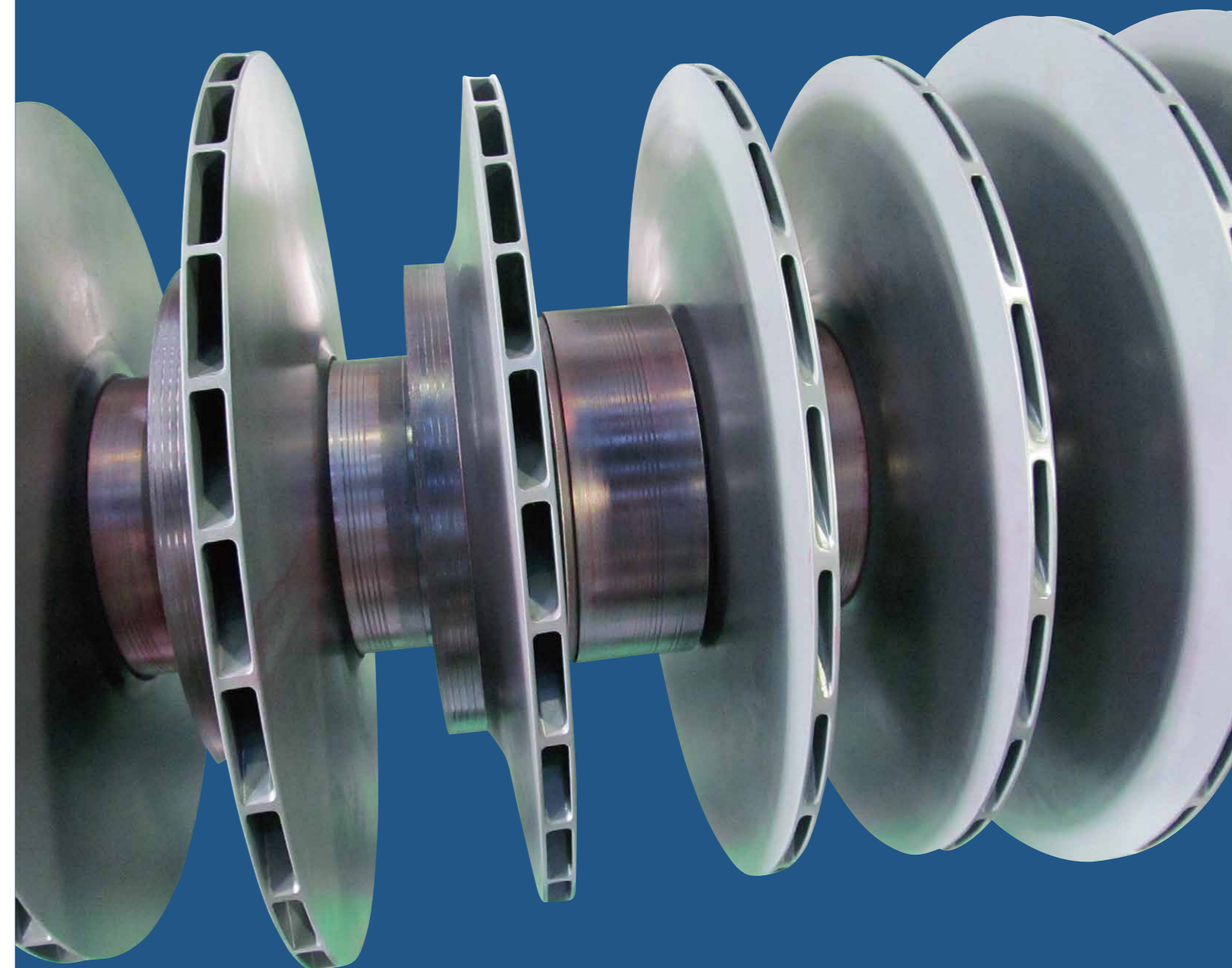
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## Kawasaki Centrifugal Compressor

# After-Service for Predictive/

# Proactive Maintenance



# Predictive/Proactive Maintenance

As is widely acknowledged, there are two types of maintenance strategies.

(Reactive/Breakdown Maintenance)

- Bigger unplanned expenditures.
- Poor reliability and availability.
- Risk of catastrophic failure.

(Predictive/Proactive Maintenance)

- Smaller unplanned expenditures.
- High reliability and availability.
- Less risk of catastrophic failure.

To achieve a Predictive/Proactive Maintenance strategy, the following factors are required.

- > Scheduled maintenance at regular intervals.
- > Specific maintenance based on each operating parameter.
- > Sufficient, well controlled spare parts.
- > Knowledgeable, highly skilled personnel.

## 01. Spare Parts

- » Importance of OEM Genuine Spare Parts
  - Insurance Spare Parts
  - Intermediate Spare Parts
  - Consumable Spare Parts



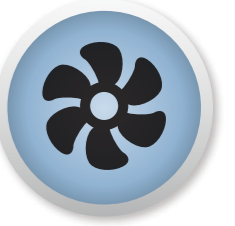
## 02. Overhaul

- » Overhaul at Regular Intervals
- » Technical Advisory Service by OEM Field Service Representative



## 03. Refurbishment

- » Refurbishment for Important Components
- » Solutions only OEM can offer
  - Ex1: High Speed Balancing Test
  - Ex2: SermaLon® Coating
  - Ex3: HVOF Coating



## 04. Health Check

- » What is "Health Check"?
- » Advantages of "Health Check"



## 05. Training

- » Compressor Training Course



## 06. Long Term Service Agreement

- » Contractual Support for Predictive/Proactive Maintenance



## 07. Revamp/Reaero

- » Offering Enhanced Efficiency and Greater Flexibility



## 08. Dry Gas Seal Retrofit

- » Cost-effective and Eco-friendly Solution for Seal System



## 02. Overhaul

### — Overhaul at Regular Intervals

Periodical Overhaul is an important factor for operating the compressor in a safe and stable condition, and reducing the risk of operation failure.



### — Technical Advisory Service by OEM Field Service Representative

Kawasaki recommends carrying out overhaul with an OEM Field Service Representatives (FSRs). The FSRs will provide technical advice based on plentiful knowledge and experience which will reduce overhaul duration and improve overhaul quality. Once the overhaul is completed, a maintenance plan based on the professional OEM point of view will be provided. (NOTE: There are some countries to which FSRs cannot be dispatched due to Kawasaki regulations based on the guidelines of the Ministry of Foreign Affairs of the Japanese Government.)

## 03. Refurbishment

### — Refurbishment for Important Components

Inspection shall be carried out at the Kawasaki workshop. For any damages or defects, the workshop can propose the optimal solution with regard to saving costs and time.

### — Solutions only OEM can offer

If any special treatment is required in accordance with the operating condition of the compressor, the optional solution will be provided.

### (Ex1: High Speed Balancing Test)

The High Speed Balancing Facility at OEM enables rotor balancing tests at actual operating speed, which can ensure higher-quality refurbishment and lead to safe and stable operation.

### (Ex2: SermaLon® Coating)

SermaLon® Coating can establish a smooth surface finish. It can contribute to aerodynamic perfor-

mance recovery and reduce fouling deposits, which may cause vibration problems. Highly corrosion-resistant SermaLon® Coating will lead to safe and stable operation, and extend machine life.

### (Ex3: HVOF Coating)

If any damages are found in the bearing area or seal area of the rotor, HVOF (High-Velocity-Oxygen-Fuel) Coating is recommended so as to avoid replacing the whole shaft. HVOF Coating can accomplish high adhesion and it will lead to high resistance to wear..



## 04. Health Check



### — What is "Health Check"?

Specialists, specializing not only in compressors but in process design as a whole, can be dispatched to the site to confirm and analyze the performance of the entire compressor package/compression module. Through this confirmation and analysis, OEM will discover hidden risks and provide the optimal solution for safe and stable operation.

### — Advantages of "Health Check"

Health Checks can be carried out while the compressor is operating, meaning that compressor shutdown is not required. With detailed comparisons between design data and current operating data, analysis to achieve the optimal performance is carried out and the best solution provided.

## 01. Spare Parts

### — Importance of OEM Genuine Spare Parts

All supplied compressors and their spare parts are tailor-made. Therefore, genuine spare parts supplied from OEM (Kawasaki) are one of the most important key factors for safe and stable operation of the compressor.

### (Insurance Spare Parts)

As a certain lead time for manufacturing Insurance Spare Parts such as rotors,

aerodynamic assemblies, bearings and so on is required, it is recommended to possess such spares and have them always available for emergencies.

### (Intermediate Spare Parts)

Reduction of efficiency or risk of failure may occur due to the condition of not only Insurance Spare Parts such as rotors and aerodynamic assemblies but also Intermediate Spare Parts such as labyrinths. If the condition of the gas which comes into the

compressor is not purely clean, it is recommended to replace such Intermediate Spare Parts during every overhaul.

### (Consumable Spare Parts)

Consumable Spare Parts such as O-rings and gaskets are to be mandatorily replaced during every overhaul and available at all times. If such consumables are re-used, there is a possibility of gas leakage which might cause a catastrophic accident at the site.



## 08. Dry Gas Seal Retrofit

### — Cost-effective and Eco-friendly Solution for Seal System

Dry Gas Seal (DGS) is a system which prevents leakage with buffer gas taken from compressor discharge. With no need for seal oil, eco-friendly operation and reduction of maintenance cost can be accomplished with higher reliability. Furthermore, the seal oil system (ex. pump/motor/tank) can be removed, which increases available space in the compressor area.

## 07. Revamp/Reaero

### — Offering Enhanced Efficiency and Greater Flexibility

To adjust the compressor to changed operating conditions (ex. gas property, molecular weight, pressure, demand), a newly designed rotor and bundle based on the latest technology with upgraded efficiency will be supplied, without requiring the replacement or upgrades of other items (ex. pressure vessel, driver, gearbox).

## 06. Long Term Service Agreement

### — Contractual Support for Predictive/Proactive Maintenance

Kawasaki's Long Term Service Agreement (LTSA) can make a large contribution to customers' existing Predictive/Proactive Maintenance supported by OEM's appropriate after-service in the long term. Kawasaki's LTSA covers important services such as major spare parts, field service representatives, refurbishments and so on, enabling customers to make maintenance plans more easily and to reduce the time of the purchasing/contracting process.



## 05. Training

### — Compressor Training Course

Training by compressor specialists will support the enhancement of operators' knowledge of operation and maintenance. Such training can be carried out not only at the OEM workshop but also at the customer's site or anywhere by dispatching highly experienced engineers.

