Written by Ray Thibault, CLS, OMA I, OMA II, MLT, MLT II, MLA II, MLA III Contributing Editor
Friday, 19 October 2012 09:17

Compressor trains represent some of a site's most complicated and costly equipment. Understanding their various lubrication-related quirks is key to keeping these moneymakers doing what they do best.

(Author's Note: Much of the information in this series is based on the practical knowledge of real-world lubrication professionals. Once such expert is Mark Kavanaugh, who has over 42 years of experience in large manufacturing operations, and is currently responsible for coordinating the lubrication of thousands of pieces of rotating equipment in a refinery. Mark is certified as a CLS, MTL I and MLA II.)

Let's start with a recap: Per the discussion in Part IV (A) of this article, " Lubrication of Positive Displacement Compressors ," a compressor's lot in life is to increase the pressure of a gas to the point where it can be used in an industrial facility. Rated by discharge pressure (psi) and capacity in cubic feet/minute (cfm), compressors fall into two major groups: positive displacement and dynamic (Fig. 1). The types of units in these two groups, along with the specific gases they compress (see Table I), call for differ-ent lube strategies. In this article installment, we'll review the dynamic side of the compressor family tree, specifically the centrifugal and axial branches.

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Fig. 1. Compressors types are classified into one of two major groups: positive displacement and dynamic.

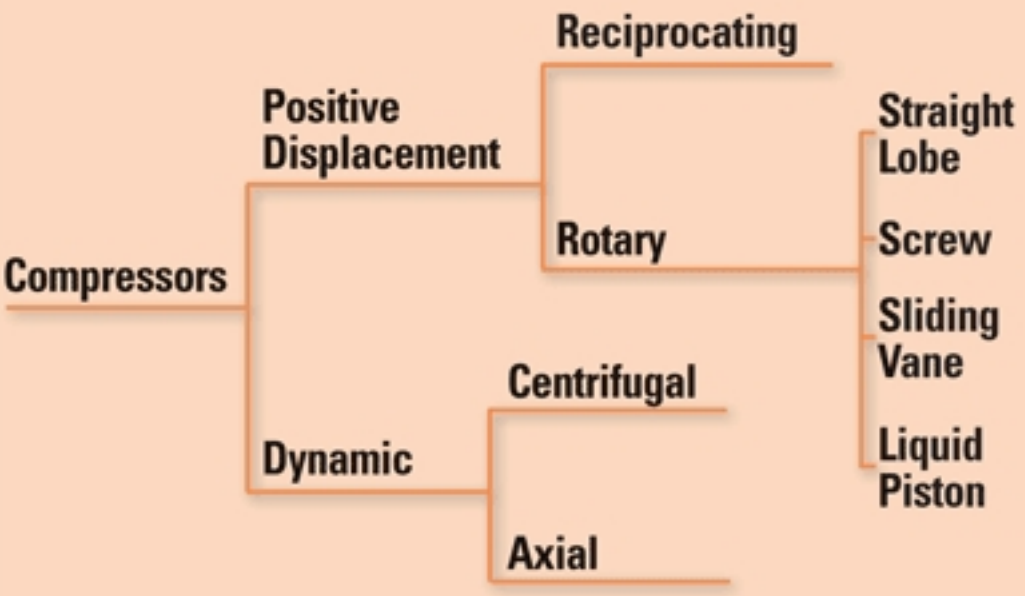

Table I. Classification of Compressed Gases

Inert	Hydrocarbon	Chemically Reactive
Nitrogen	Methane	Oxygen
Hydrogen	Ethane	Halogens
Helium	Propane	Hydrogen Chloride
Carbon Monoxide	Butane	Hydrogen Sulfide
Carbon Dioxide	Propylene	Nitrogen Oxide
Ammonia	Butylene	Sulfur Dioxide
Air	Natural Gas	Others

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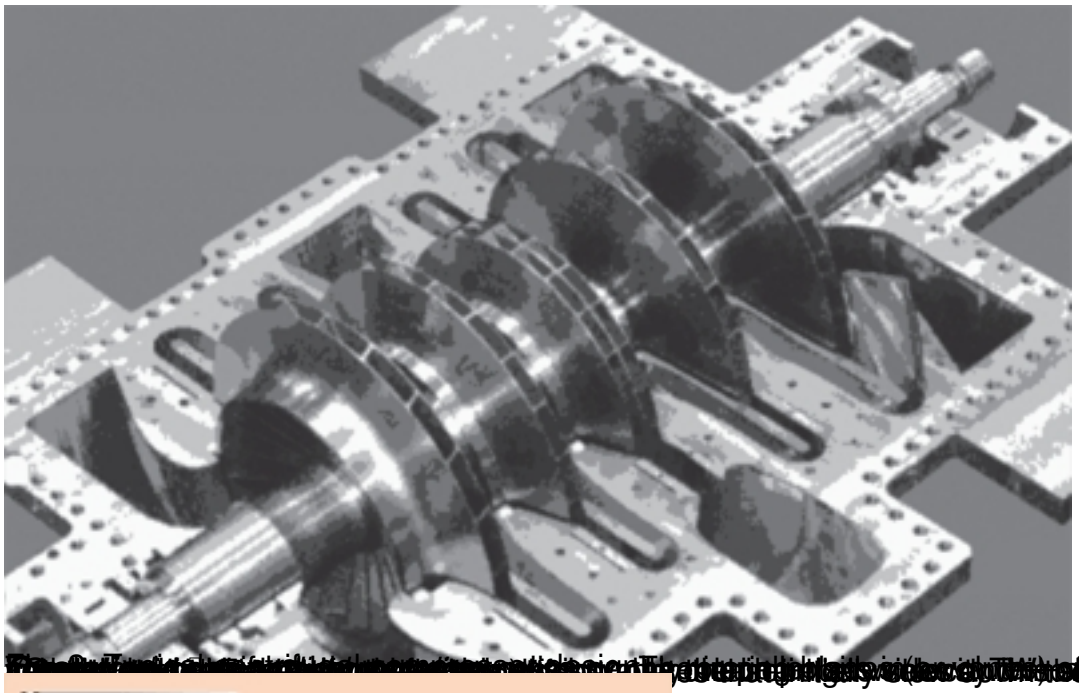

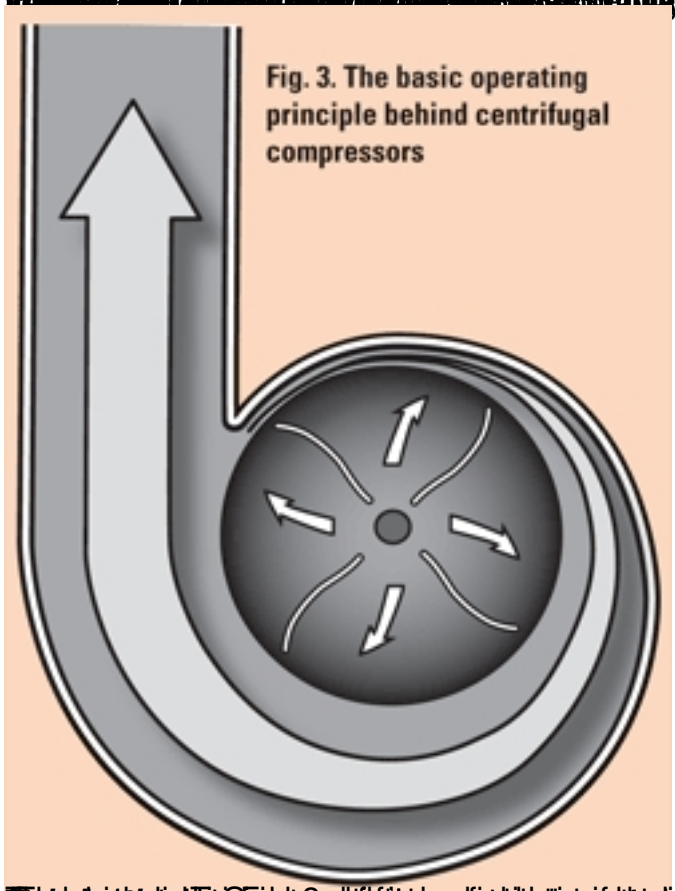

Fig. 3. The basic operating principle behind centrifugal compressors

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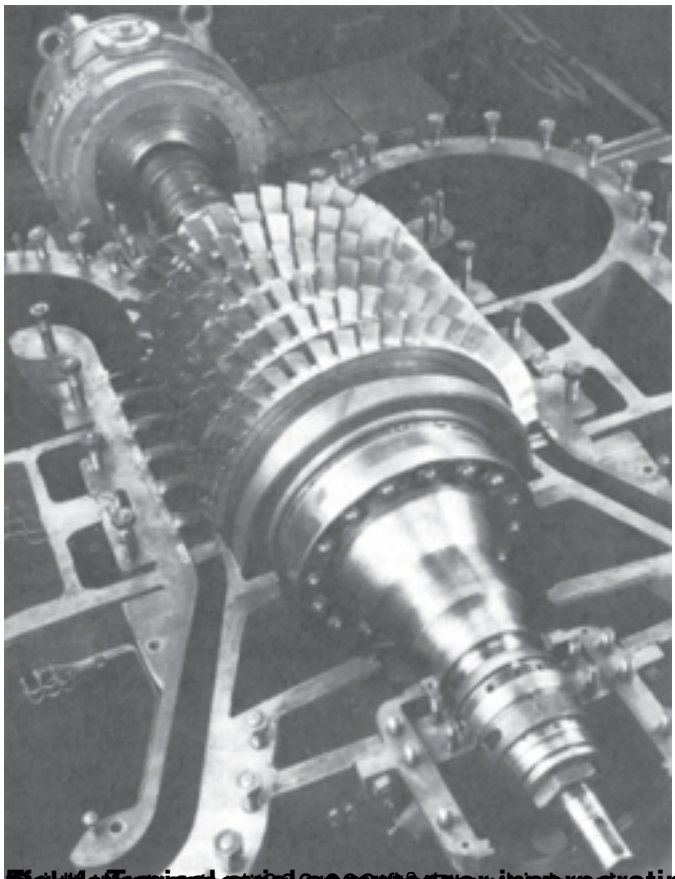

Fig. 1: Typical axial compressor impacting a series of rotating and stationary blades.

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Table II. Summary of Compressor Lubricants

Compressor Type	Lubricated Component	Lubricant
Reciprocating	Cylinder	Mineral Oil ISO 100-680 Diester ISO 100-150 PAG 100-320
	Frame Journal Bearings	Mineral Oil ISO 100-150
Rotary Screw Flooded*	Speed Gear Roller Radial & Thrust Bearings	Mineral ISO 32-68 PAO 32-68 PAG 68-150 PAG/Ester 32-68 Diester 32-68
Dry	Radial and Roller Thrust Bearings Timing Gear	Mineral Oil ISO 32-100
Sliding Vane	Rolling Element Bearings Sliding Vanes	Mineral Oil AW 32-150
Rotary Lobe	Rolling Element Bearings Timing Gear	Mineral Oil R&O or AW ISO 150-220
Liquid Piston	Rolling Element Bearings	Mineral Oil ISO 32-68
Centrifugal	Radial and Thrust Journal Bearings Radial and Thrust Rolling Element Bearings	Mineral Oil ISO 32-46 PAO ISO 32-46 PAG /Ester 32 (Air Compressor)
Axial	Radial and Thrust Journal Bearings Radial and Thrust Rolling Element Bearings	Mineral Oil ISO 32 PAO ISO 32

*The wide selection of lubricants for flooded screw compressors is based on the type of gas processed.

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