

The Power to Perform

Reconstruction Calculation Methodology for NSPS (JJJJ)



Gas Compressor Association Expo – April, 2014

Discussion Points

- Regulatory Issues / Reconstruction Basics
- The “Facility”
- GCA Guidance Document
- Example Calculation
- Summary

“Reconstructed” Units are subject to 40 CFR 60 Subpart JJJ

- “Reconstruction” is defined in 40 CFR 60.15
- Section 60.15 of the New Source Performance Standards (NSPS) specifies that reconstruction occurs if the fixed capital cost of the new components exceeds 50% of the fixed capital cost of a comparable entirely new facility
- The December 16, 1975 preamble to the reconstruction regulations defines fixed capital cost as the capital needed to provide all the depreciable components, including the costs of engineering, purchase and installation of major process equipment, contractor fees, instrumentation, auxiliary facilities, building and structures

Facility is Reconstructed if...

$$\frac{\text{Cost of New Components (overhaul \$'s)}}{\text{Cost of Comparable Entirely New Facility}} > 50\%$$

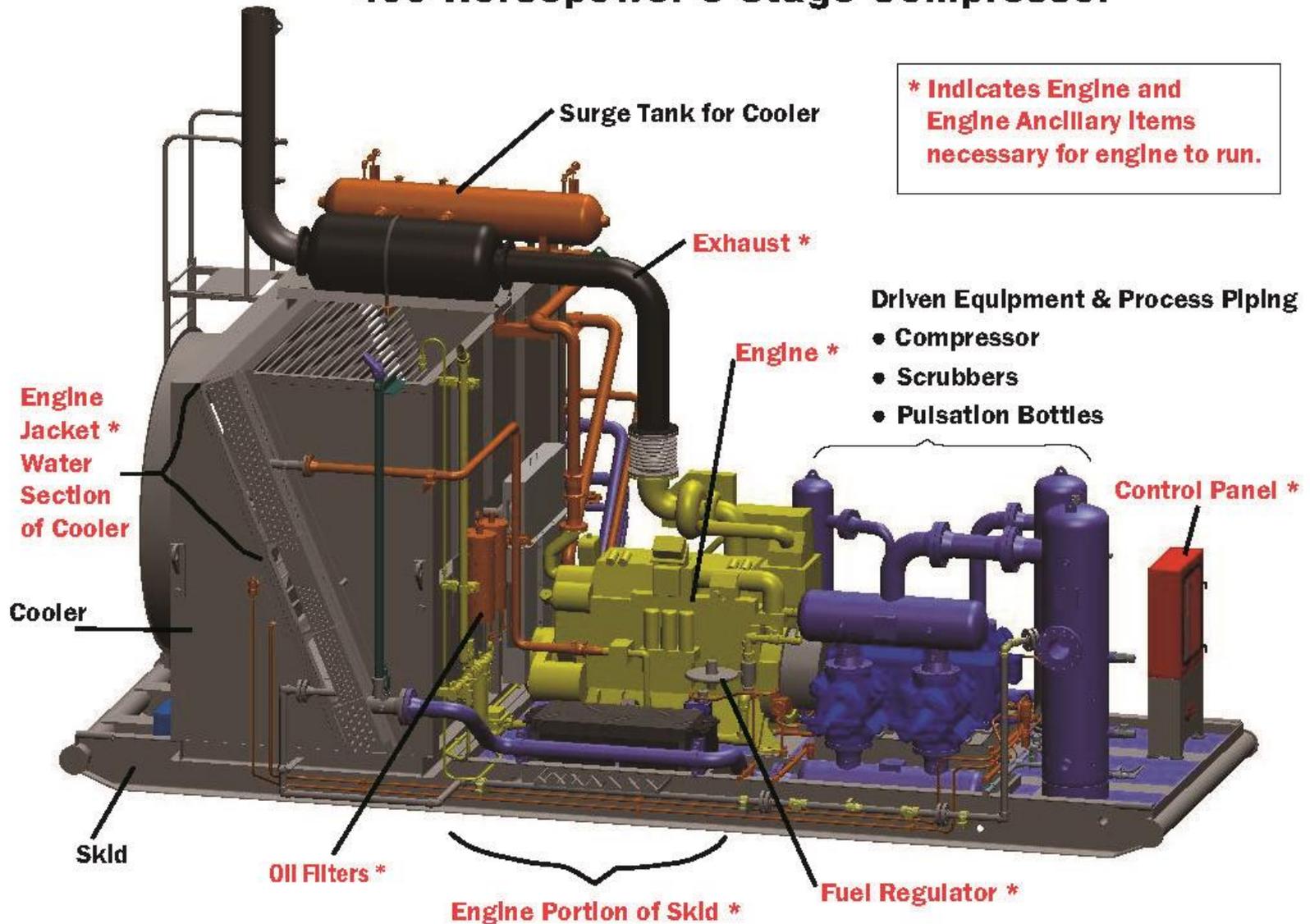
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Sounds easy enough...just add up the overhaul cost and divide by the cost of the Comparable Entirely New Facility

What is the Facility???

400 Horsepower 3 Stage Compressor



Definition of Facility

- The individual components to be included in the calculation are restricted to those depreciable components that are part of the affected facility as defined in the relevant subpart (JJJJ in our case).
- Subpart JJJJ does not define the affected facility!
- Assumption: the affected facility is limited to the engine itself and the ancillary components necessary for it to run

Definition of Facility (Cont'd)

Included in Facility

- Engine
- Ancillary Equipment necessary for engine to run
 - Cooling
 - Fuel/Start System
 - Oil System
 - Skid (foundation)
 - Controls (not emissions controls unless necessary for engine to run)

NOT included in Facility

- Driven Equipment (compressor)
- Process equipment not related to engine (gas piping, scrubbers, relief valves)
- Monitoring Equipment
- Buildings

Note: Some Components service both the engine and the driven equipment

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CA-150-2



Final Assembly

- Install ladders, tanks, catalyst elements, and exhaust system components
- Install separable coolers
- Commission Engine



GCA Guidance Document

- Define the Facility
- Pro-rating components that service both engine and driven equipment (cooler, skid)
- Define basis for pricing
- Factors to use for ancillary items and installation/start up/commissioning on a \$/horsepower basis.
- What to include for various types of overhauls

Table 3 – Summary of factors for estimating Ancillary Items and Installation, Start-up and Commissioning Cost

Horsepower Range	Ancillary Items (\$/HP) <ul style="list-style-type: none"> • Cooling system • Skid • Fuel/Start system • Controls (except emissions controls) • Labor to package • Oil system <p>Note: above pro-rated for engine related portion only</p>	Installation Costs (\$/HP) <ul style="list-style-type: none"> • Trucking • Cranes • Hookup Labor & Parts • Commissioning • Emissions testing • Connection of Fuel and start gas <p>Note: above pro-rated for engine portion only</p>
Under 100 HP	\$231 per horsepower	\$48 per horsepower
100 to 199 HP	\$169 per horsepower	\$43 per horsepower
200 to 499 HP	\$117 per horsepower	\$21 per horsepower
500 to 999 HP	\$114 per horsepower	\$15 per horsepower
1000 to 1750 HP	\$78 per horsepower	\$11 per horsepower

Reconstruction analysis using GCA Method

GCA Engine Reconstruction Analysis

Current Date 1/25/2010

Unit # or Project # 1234

Date of Overhaul 1/23/2009

Engine & Package Information: 3 Stage reciprocating compressor package driven by a ACME 400 HP natural gas RICE. Old S/N = 5432, new S/N 2288.

Horsepower @ RPM 400 HP @ 1800 RPM
 Type of Overhaul Engine replacement Choose from Menu

Cost Calculation: Existing versus New
 Engine Overhaul Cost
 Comparable Entirely New Facility

Where:
 Numerator = engine repair, trucking, crane & startup labor costs included.
 Denominator = New Engine + Ancillary + Site Installation & Startup

Actual Cost Calculation: Overhaul versus New
 \$58,975 / \$140,200 = 42.1%

Result: Engine is below reconstruction criteria

Numerator = Engine Overhaul Costs	Cost
Engine Repair parts & labor	\$55,100
Trucking & Lifting Services	\$675
Commissioning & Startup Labor	\$3,200
Other	\$0
Total Numerator	\$58,975

Denominator = Comparable New Facility		
Notes:		
Component	Method Used	Cost
New OEM Engine Cost at time of overhaul:	Quote - Identical engine	\$85,000
Ancillary Items (use either method 1 or 2)		
1: Generic Factors -->	Generic Factors	\$46,800
2: Model Specific -->		\$0
Installation, start-up and commissioning (use either method 1 or 2)		
1: Generic Factors -->	Generic Factors	\$8,400
2: Case Specific -->		\$0
Sub-total Ancillary and Installation adders prior to PPI adjustment		\$55,200
PPI Adjustment on Ancillary and Installation adders		100%
Ancillary and Installation adders after PPI adjustment		\$55,200
Total Denominator (Engine cost plus PPI adjusted Ancillary/Install)		\$140,200

Optional: Model Specific Ancillary Item Estimate Worksheet (use 2009 dollars)

pro-rated for engine related portion only	Estimated New Cost	% Engine related	Engine Ancillary Adder Costs (New x CGA Pro-rated %)
Engine Ancillary System Adders:			
Skid	\$0	0%	\$0
Engine Cooler	\$0	0%	\$0
Control Panel & Wiring/Tubing	\$0	0.0%	\$0
Fuel, Starter, Exhaust & Oil Systems	\$0	0%	\$0
Packaging Labor	\$0	0%	\$0
Total Model specific Ancillary item estimate			\$0

Case Specific Installation, start-up and commissioning Estimate Worksheet (use 2009 dollars)

New Package Installation Adders:	Estimated New Cost	% Engine related	Engine Installation, start-up and commissioning Costs
Trucking	\$0	25%	\$0
Cranes	\$0	25%	\$0
Hookup Labor & Parts	\$0	25%	\$0
Commissioning Labor	\$0	100%	\$0
Fuel/Start gas Reconnection	\$0	100%	\$0
Emissions Testing	\$0	100%	\$0
Total case specific Installation, start-up and commissioning estimate			\$0

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Total Numerator

\$58,975

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$$\frac{\text{Cost of New Components (overhaul \$'s)}}{\text{Cost of Comparable Entirely New Facility}} > 50\%$$

And new date of manufacture if...

$$\frac{\text{Cost of New Components (overhaul \$'s)}}{\text{Cost of Comparable Entirely New Facility}} > 75\%$$

Summary

- Facility is more than just the engine
- Ancillary items and installation should be accounted for in the cost of the facility
- The Gas Compressors Association (GCA) has developed guidelines to assist in estimating the facility.
- 2011 Regulation requires a new date of manufacture if cost ratio exceeds 75%

References

- US EPA Applicability Determination Index
 - <http://cfpub.epa.gov/adi/>
 - Control # NB28 dated 11/25/86
 - Control # 0200048 dated 9/3/99
 - Control # 9800085 dated 5/11/98
 - Control # 9900057 dated 04/23/98
 - Control # 0800031 dated 2/28/08

Questions?

To obtain a copy of the GCA Calculation Methodology contact a member company of the GCA. A list of member companies can be found at www.gascompressor.org

