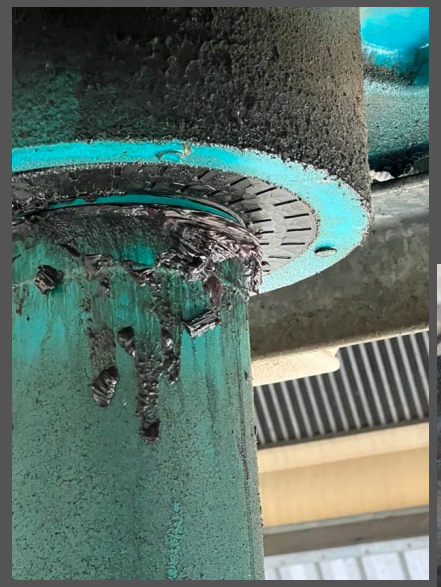
ACC Gearbox Retrofit

ACCUG 2025
Granbury, TX

Common Problems with Gearboxes

Common Problems:

- Oil Leaks (Output and input shaft)
- Gear Tooth Wear/Breakage
- Bearing Failures
- Oil Pump Failures



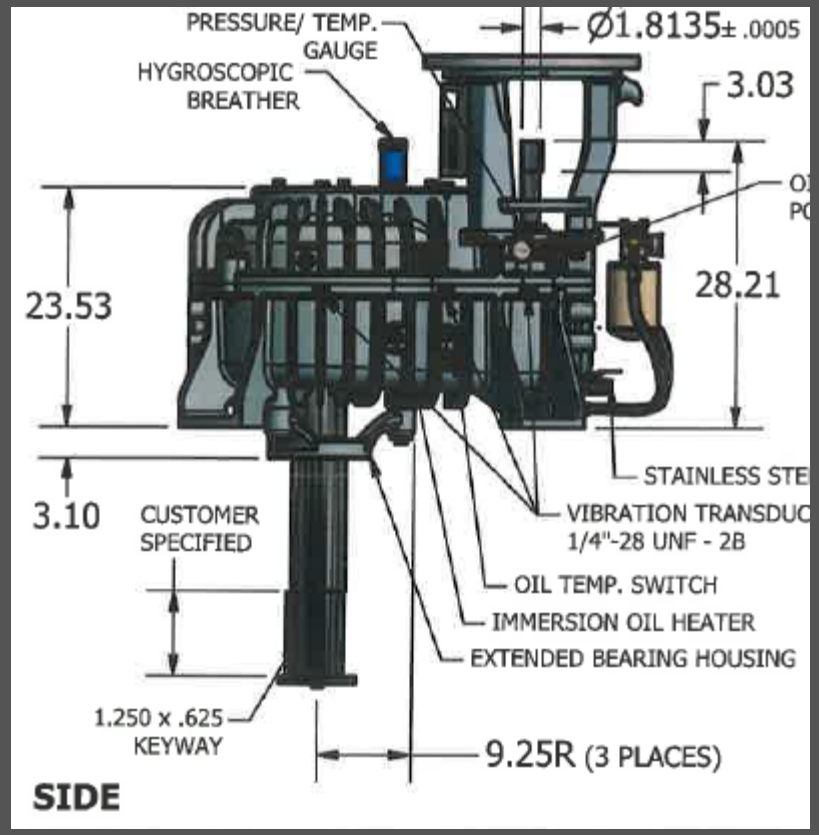
Oil/Grease Leaks

Most manufacturers' dry well has wear seals

- Requires oil seals which are prone to failure
- Bearings require grease for lubrication

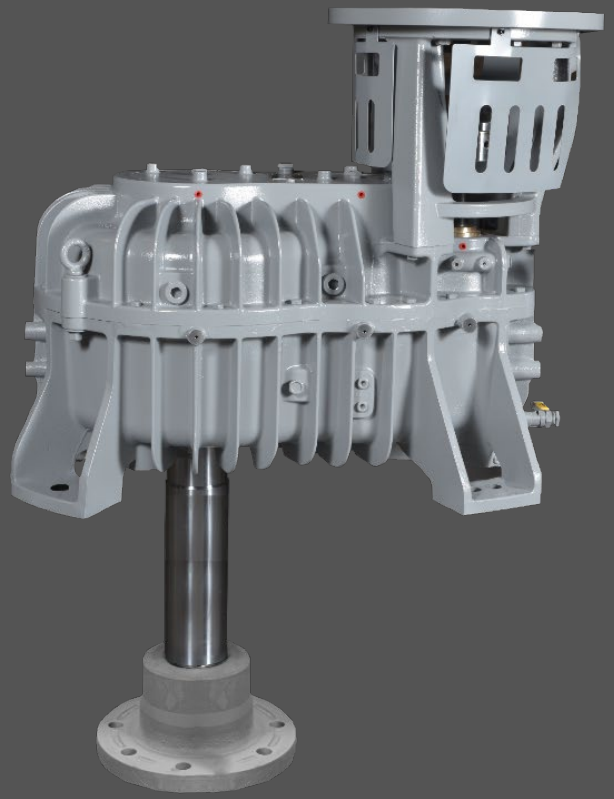
Q500 remedy

- No oil seals
  - No replacements
- Output shaft bearings located in oil sump
  - No grease or re-greasing required
- Input shaft has no lip seals
  - Non-contact bearing isolator
  - No maintenance



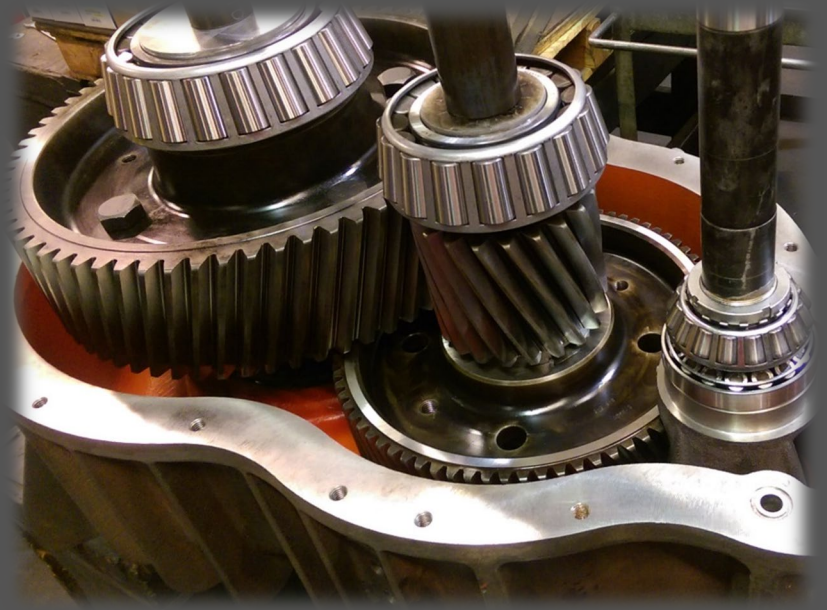
Amarillo Quantum Q500

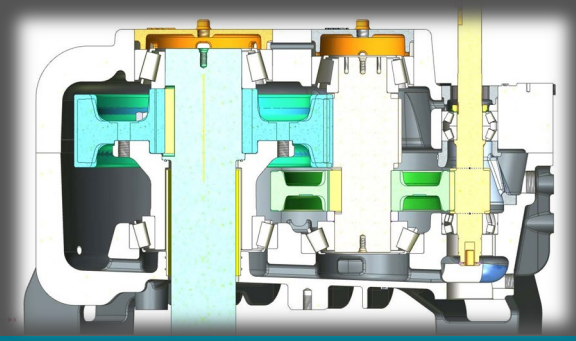
- Designed for the specific application of Air-Cooled Condenser



Inside the Quantum 500

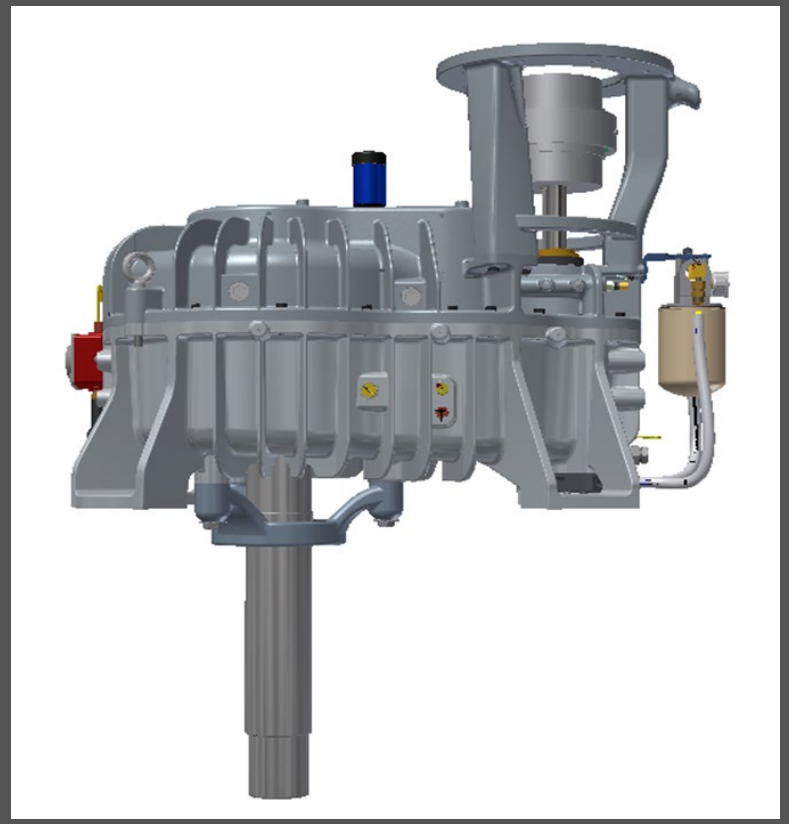
- Gear box design and manufacturing
- Gearing
- Bearings
- Lubrication and Containment
- Features and Options





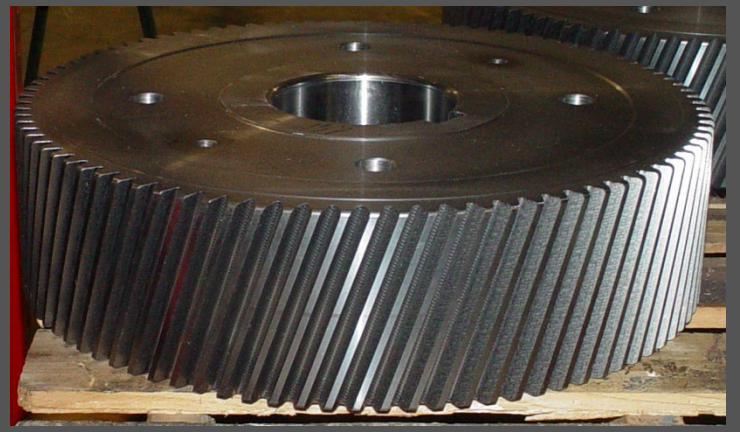
Gear Box Design and Manufacturing

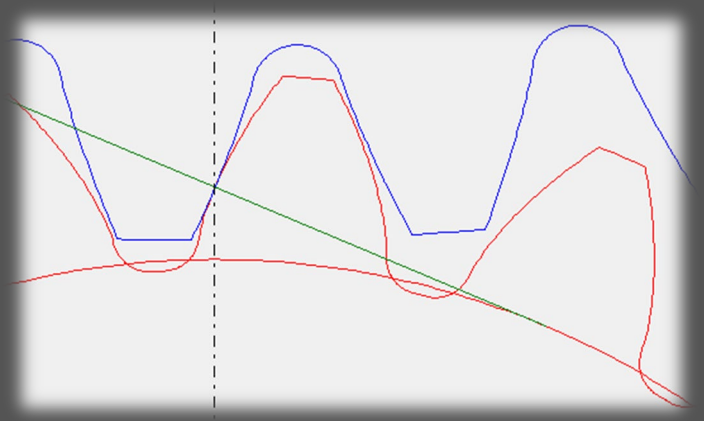
- Castings
  - Finned gear case for increased surface area and heat dissipation, gear case rigidity, and noise attenuation.
  - ASTM A48 Class 30 Gray Iron Castings are rigidly designed to minimize deflection
  - Protected with Carboline epoxy paint finish. Other options available.



Gearing – Advanced Gear Design

- Quiet, smooth performing gears with high torque capacity
  - AGMA design STD 6013-A06, Q-11 (min.)
  - In house case hardening to 58 – 64 Rc, then precision ground for low noise and long life.
  - A-Weighted Sound Power based at 1,750 rpm, 250 hp is 89 dBA



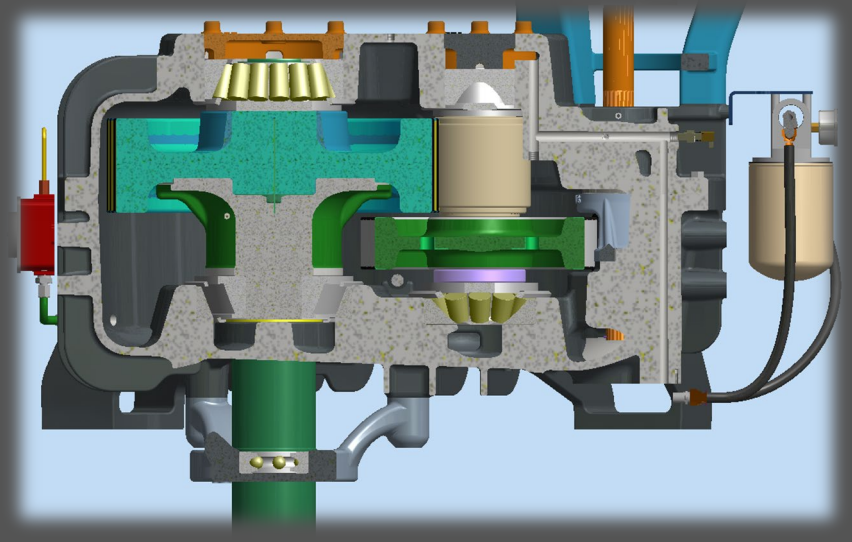


Bearings

- Tapered roller bearings
  - Supports axial and radial loading
  - Manufacturers standard offering
  - Metric Sizing
- Only Tier 1 Bearings are used
- Exceed CTI - STD 111
  - 100k life hours on all bearings achievable

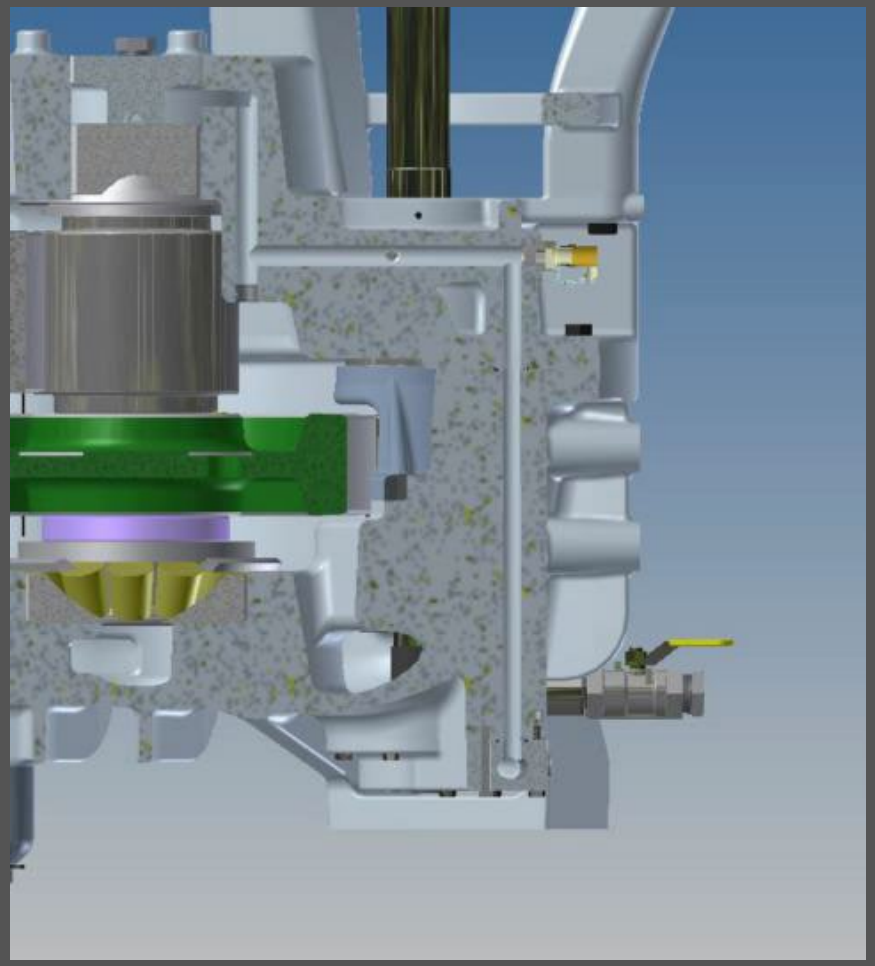
Lubrication

- All plumbing is internal
  - reduces potential leak points
- Oil pump
  - Ample oil flow to all rotating elements through *oversized internal oil passage ways*
  - *Improved design that is gerotor type and "keyed" to input shaft (no coupling)*
- Sloped floor design
- Sump magnets to capture ferrous particulates
- Mineral or synthetic oil



Lubrication

- Fill capacity is 10 gallons
- Optional Oil heater is low watt density with high surface area. Single integrated unit with thermostat built in.
- Oil sample port is an optional feature

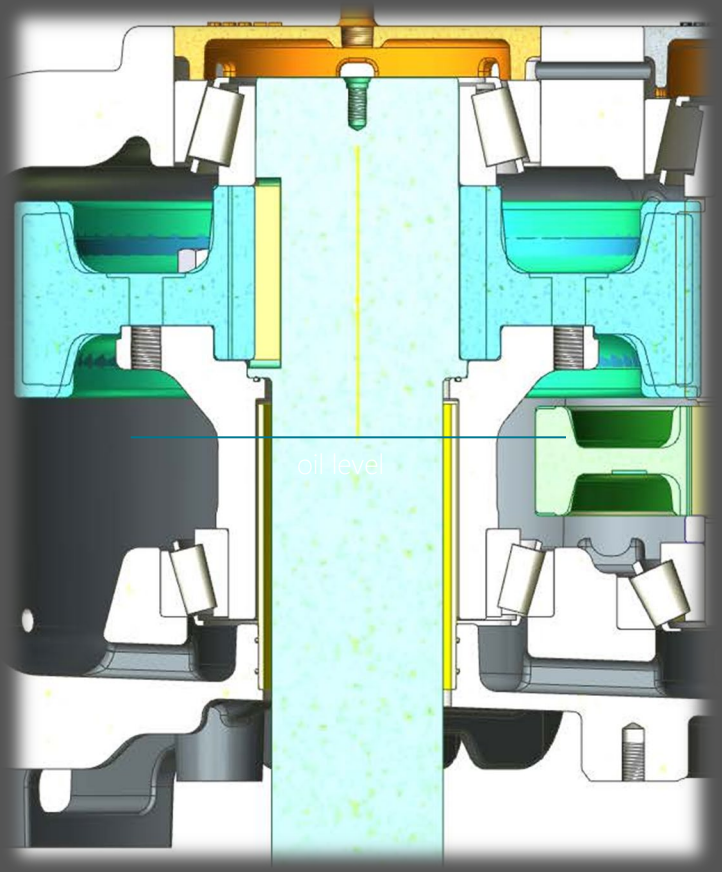


Leak – Free Design INPUT

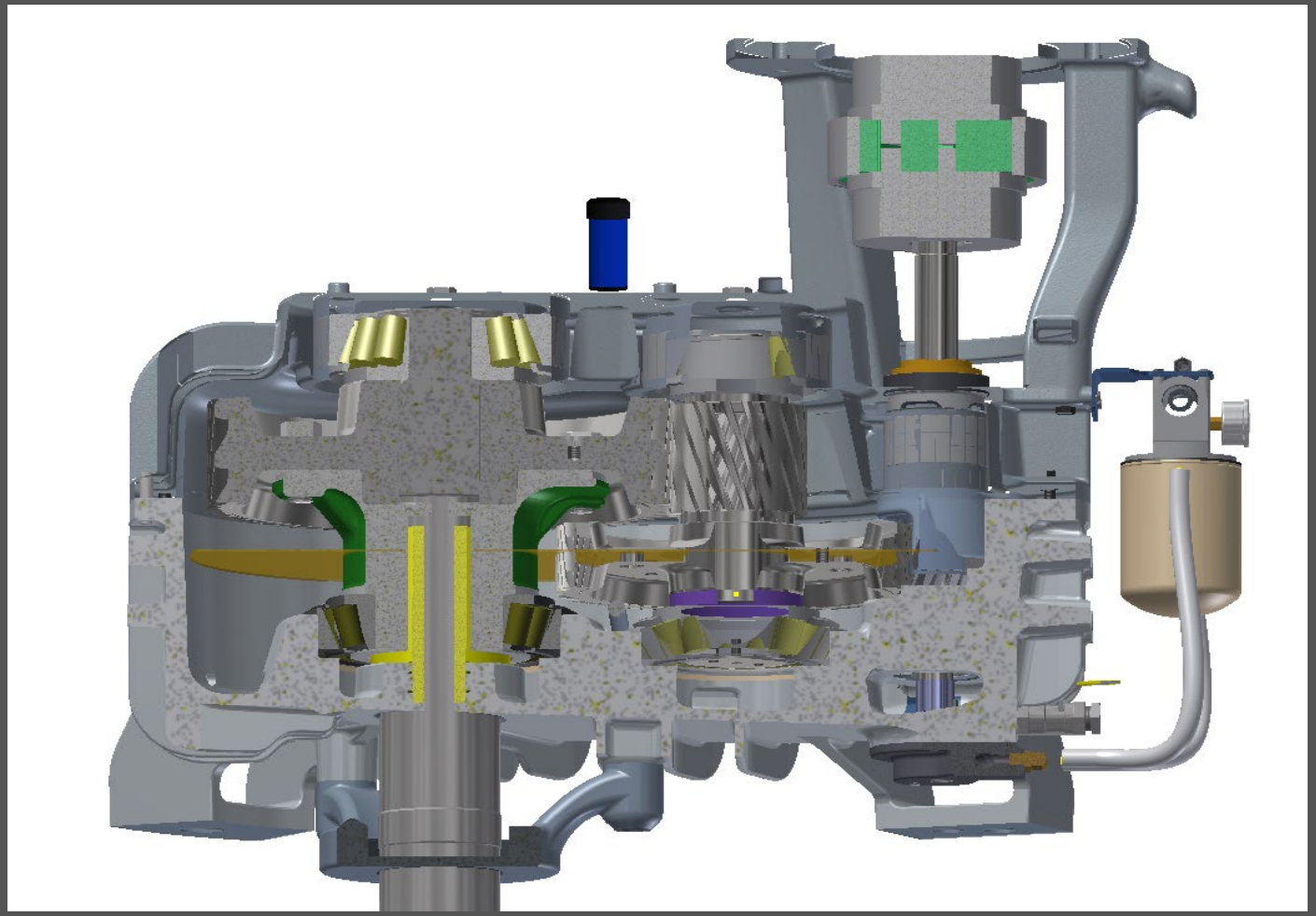
- No seal to wear out –
  - Non-contacting labyrinth bearing isolator
  - *Maintenance free*

Leak – Free Design OUTPUT

- Patented Drywell Design –
  - Fan thrust bearing does <u>not</u> require grease
  - *No seal to wear out*

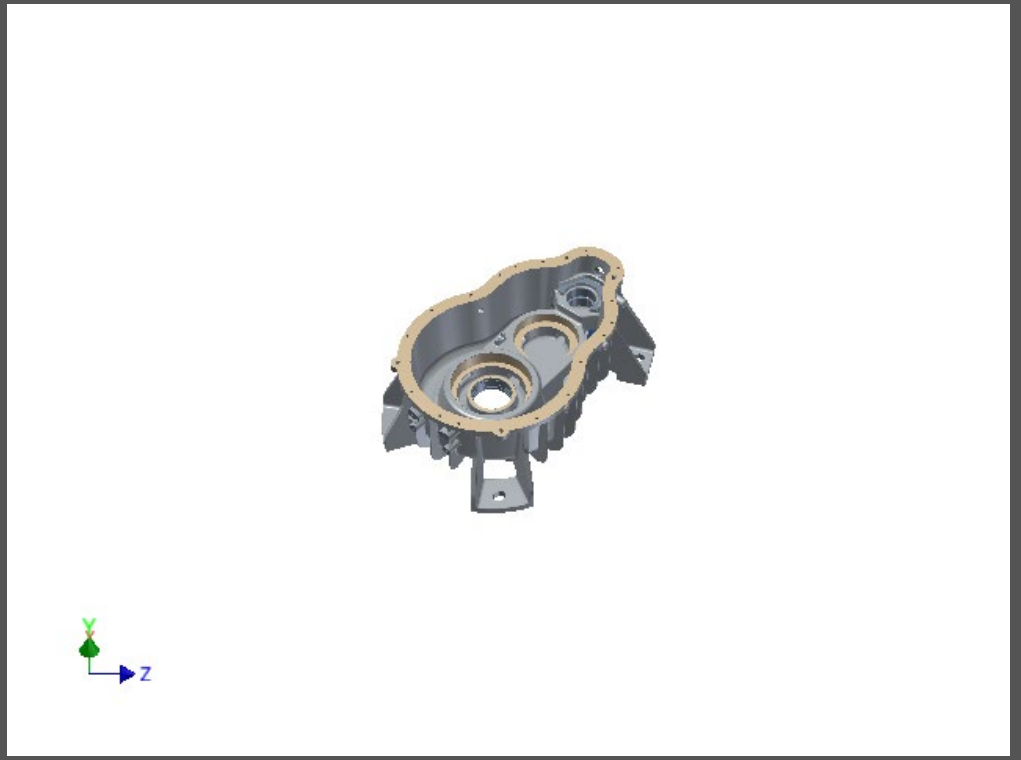


Quantum 500 Half View



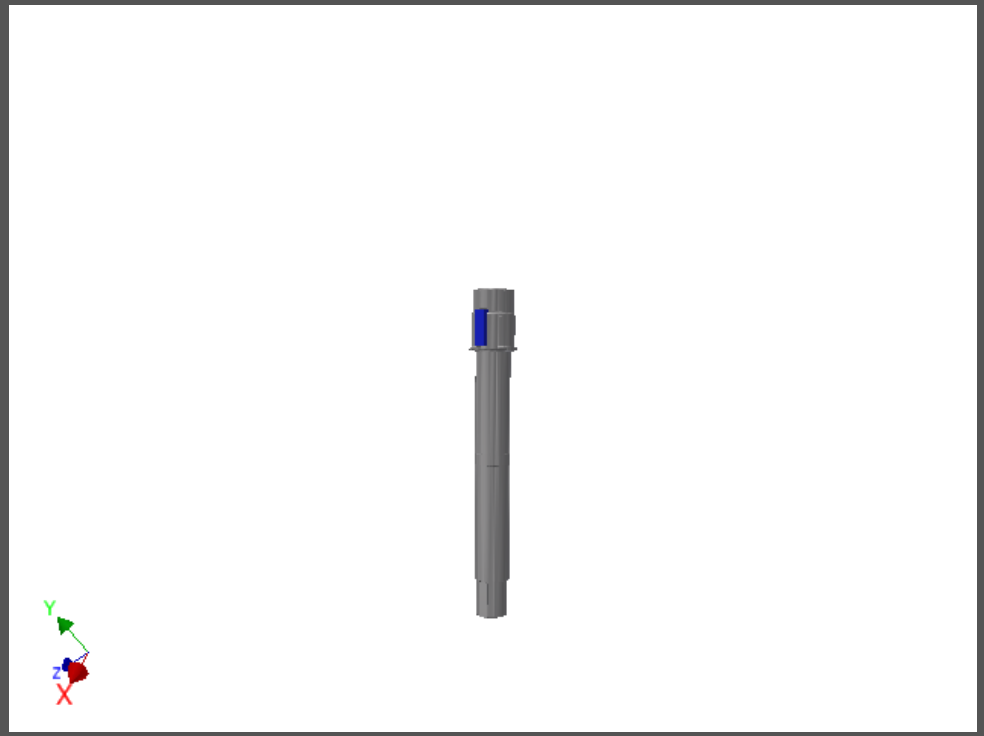
The Drywell

- Patented, *True Dry-well* for output shaft oil containment



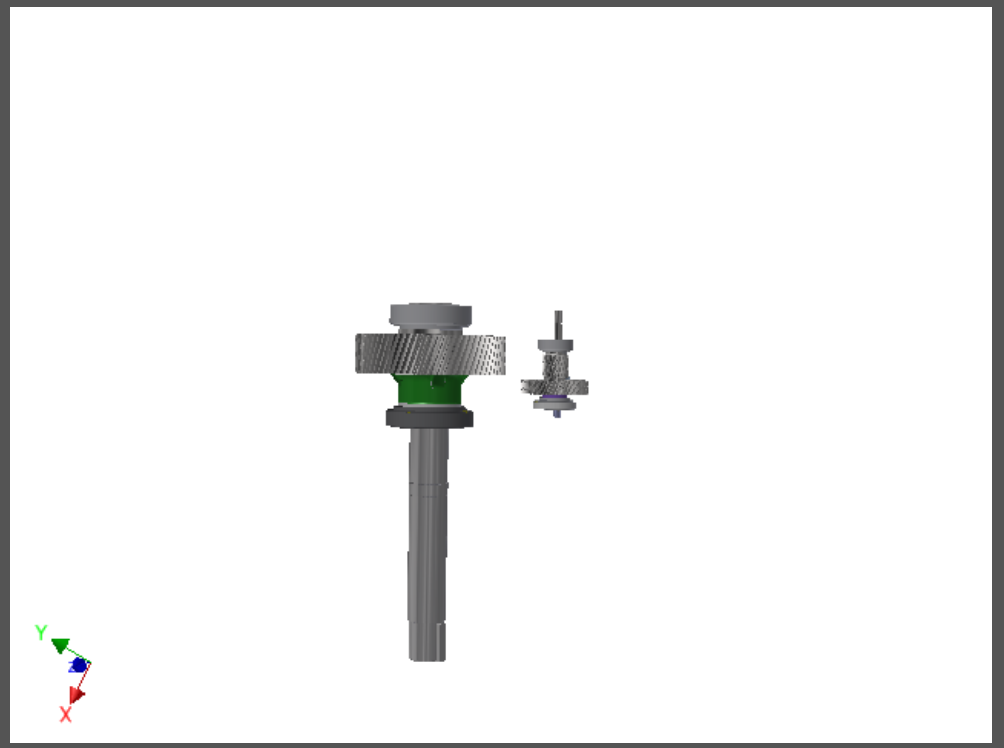
Output Shaft

- Designed and custom sized for rugged use in ACC's.
- Machined to insure proper installation of the helical gear, bearings, and lower bearing mount



Drive Train Assembly

- Shafts are precision machined to insure proper installation of the gears, bearings, fan hub, and input coupling
- Gears are profile ground to AGMA Q11
- All bearings are roller type, and their spans are maximized for rigidity and bearing life

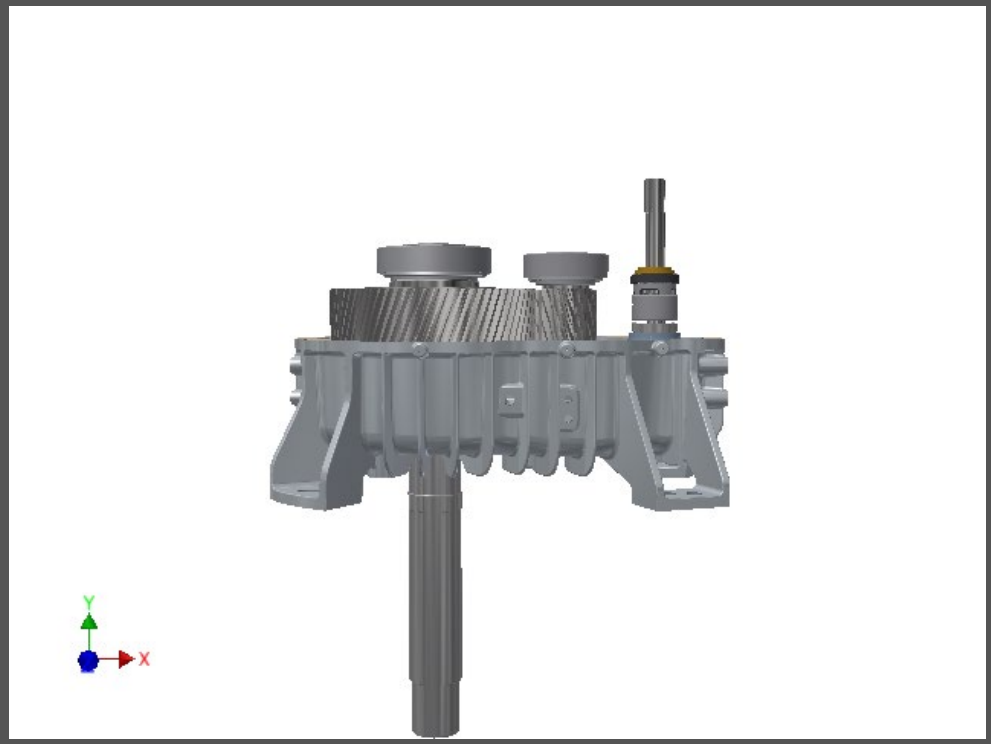


Input Assembly to Bottom Case

- Output shaft Assembly placed inside the drywell tubing
- Case bottom has a sloped floor that allows for circulation of oil and complete oil drainage

Full Assembly

- Line boring assures permanent alignment of bearings and gears under load
- Built-in cooling fins on the exterior case for proper heat transfer and improved gear box rigidity
- 98% efficient under full load



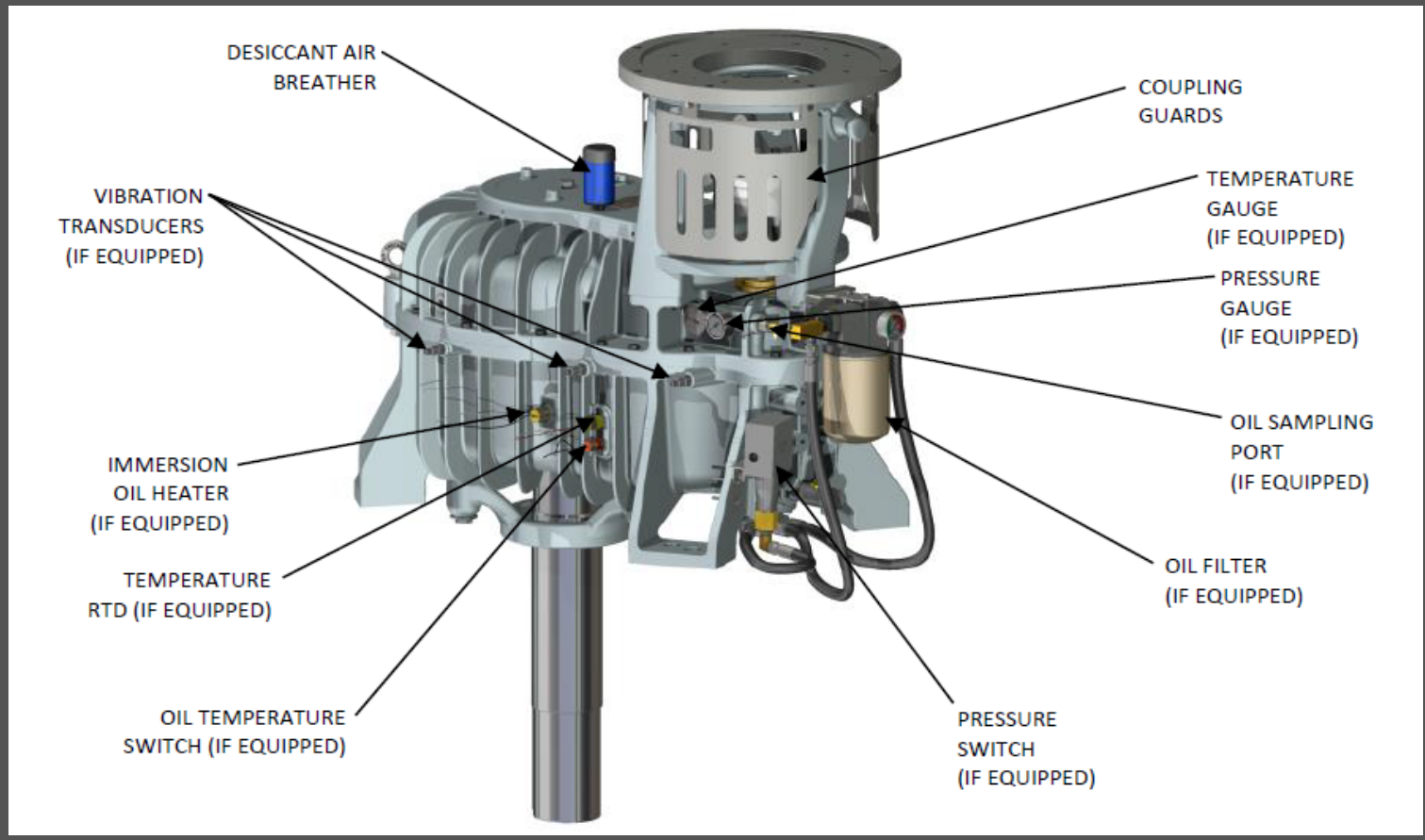
Standard and Options

Standard

- Oversized cooling fins – extend oil life
- Three (3) transducer ports
- Coupling guard with view ports

Options

- Oil flow switch
- Oil heater (for mineral oil)
- Oil filter
- Vibration transducers
- Non-reverse backstop



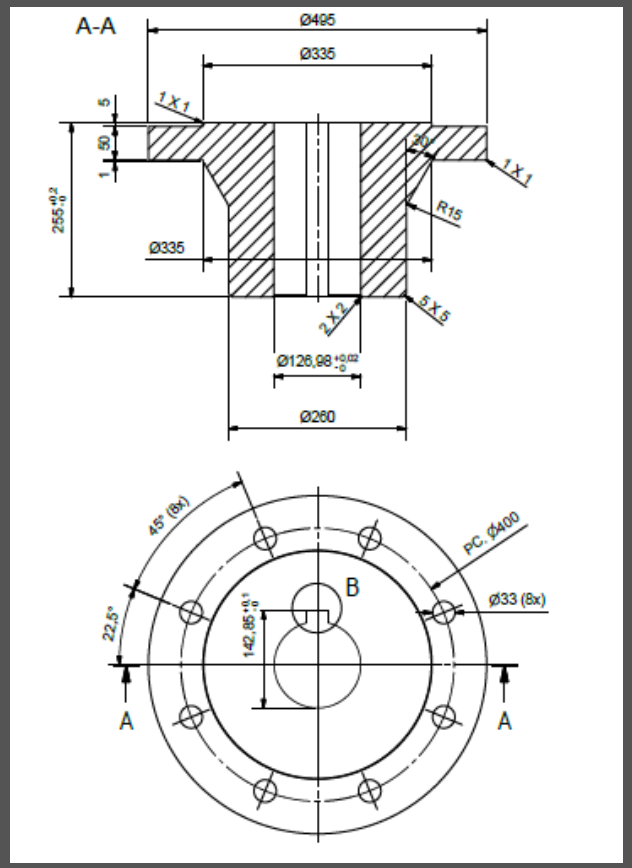
Retrofit – Engineering Requirements

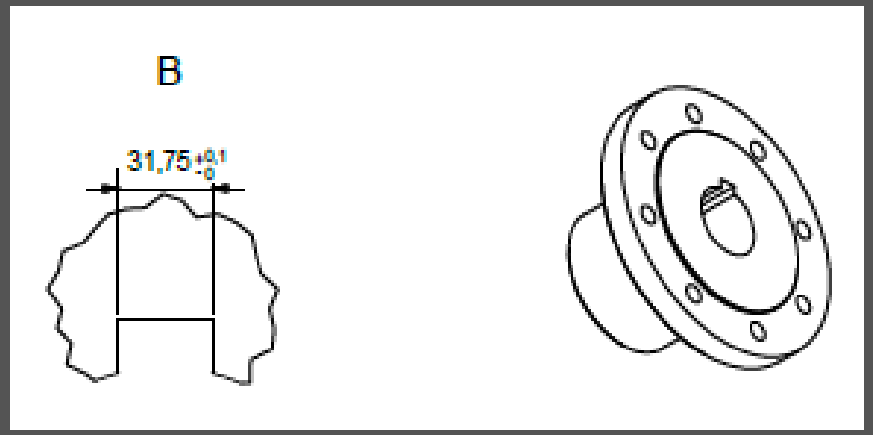
- Technical Comparison
- Coupling Flange
- Motor Stand & Adapter Plate
- Baseplate Modifications
- Vibration Analysis
- Installation
- Warranty/Repairs

Retrofit – Technical Comparison

Manufacturer	Amarillo	Existing
Motor Power (hp)	200	200
Input Speed (RPM)	1790	1790
Output Speed (RPM)	75.6	75.9
Reduction Ratio	23.57:1	23.56:1
Protection	Flow Switch	Pressure Switch
Bearing Grease	NONE	FAG Arcanol
Weight	2000 lbs	2425 lbs
Baseplate Adapter	YES	NO

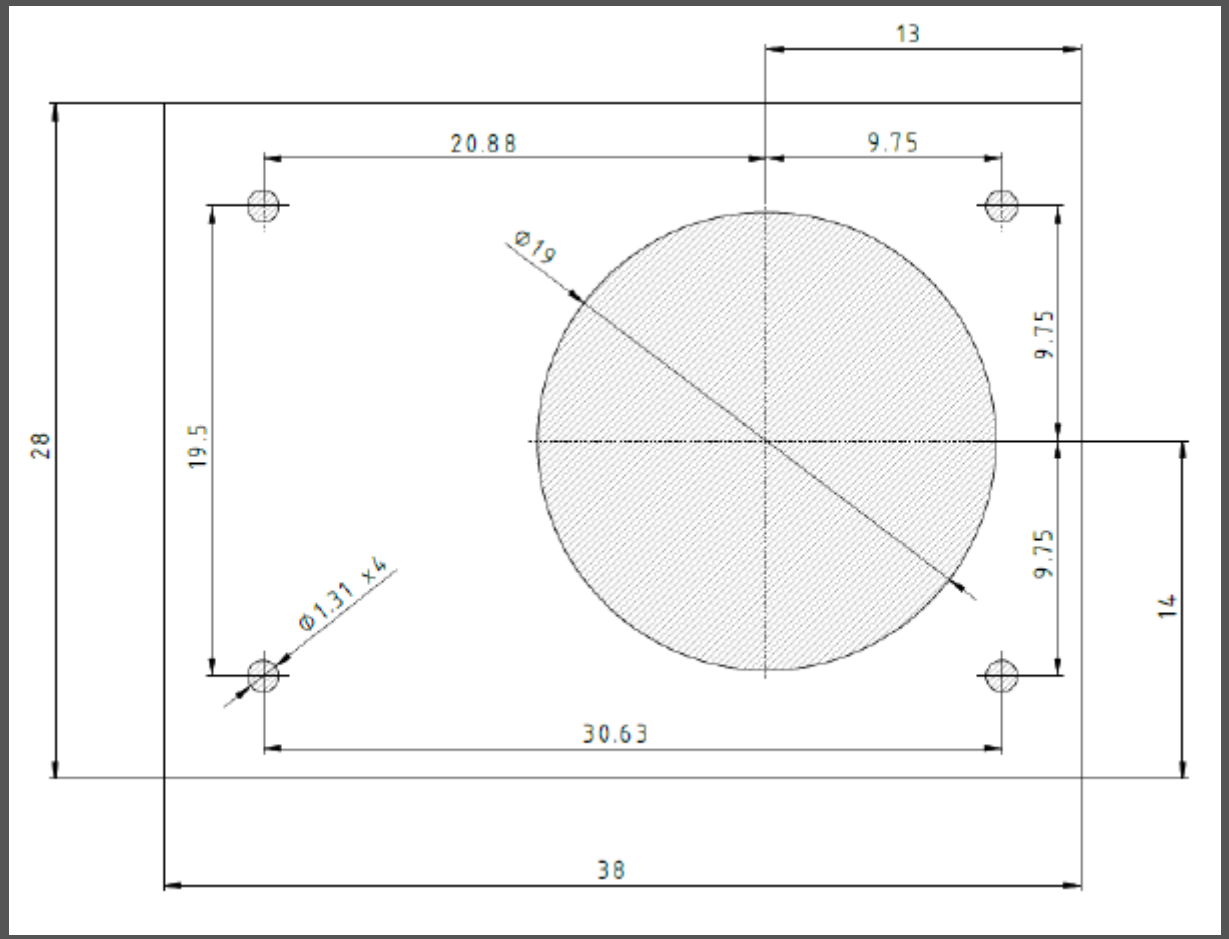
Retrofit - Coupling Flange





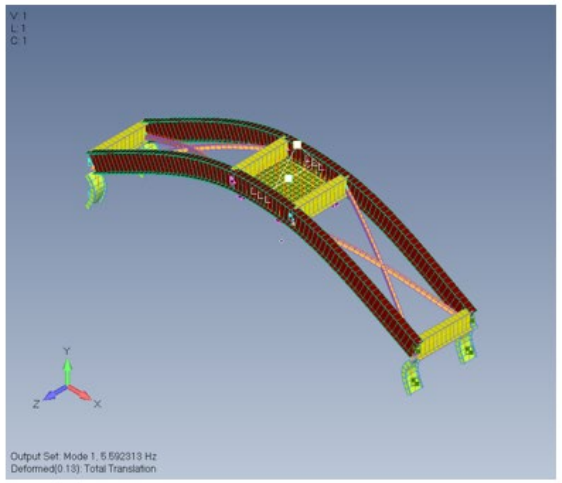
Retrofit – Motor Stand / Plate

Retrofit – Adapter Baseplate

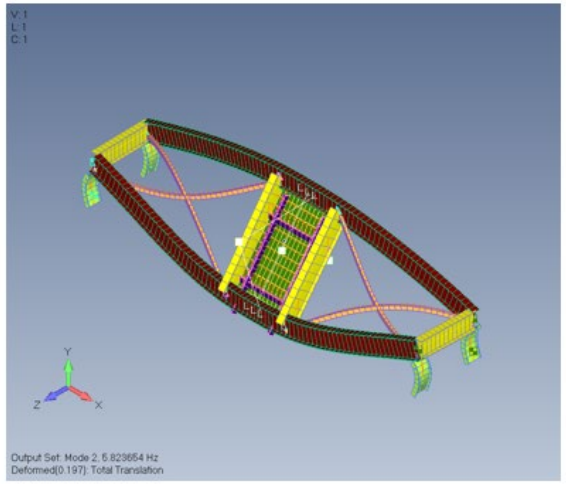


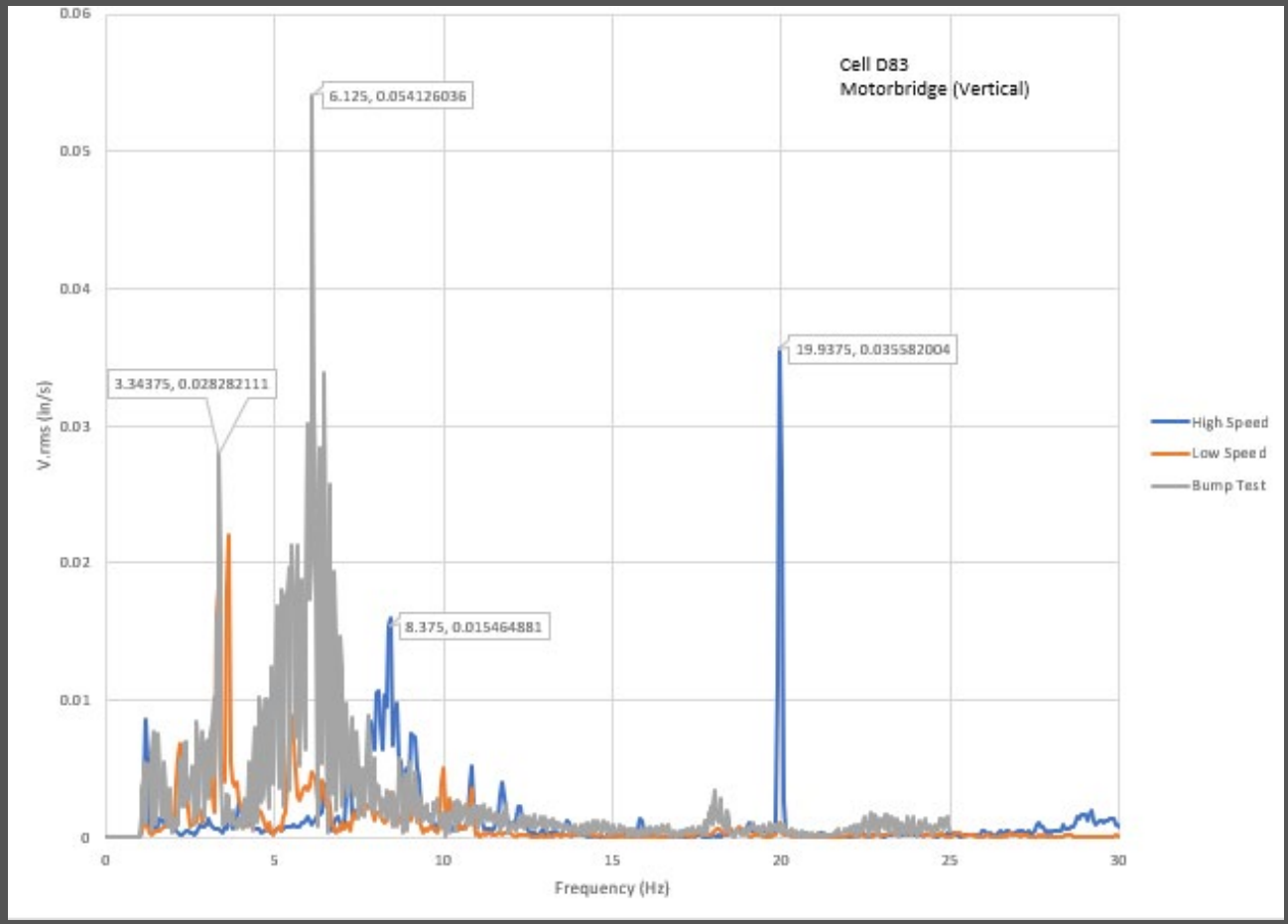
Retrofit - Vibration Analysis

Mode Shape 1



Mode Shape 2





Retrofit - Installation

Retrofit – Installation (cont.)

Q & A

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