FORGE HEAVY INDUSTRIES

MAAC-ASU-180

High Level Design Philosophy

CONFIDENTIAL – Prepared for Pinewood & Associates

SPECIFICATIONS

Performance:

- Airflow Capacity: Up to 180 PPM Continuous (~68 m^3/min)
- Air Delivery Pressure: Up to 40 PSIG (2.75 barg)

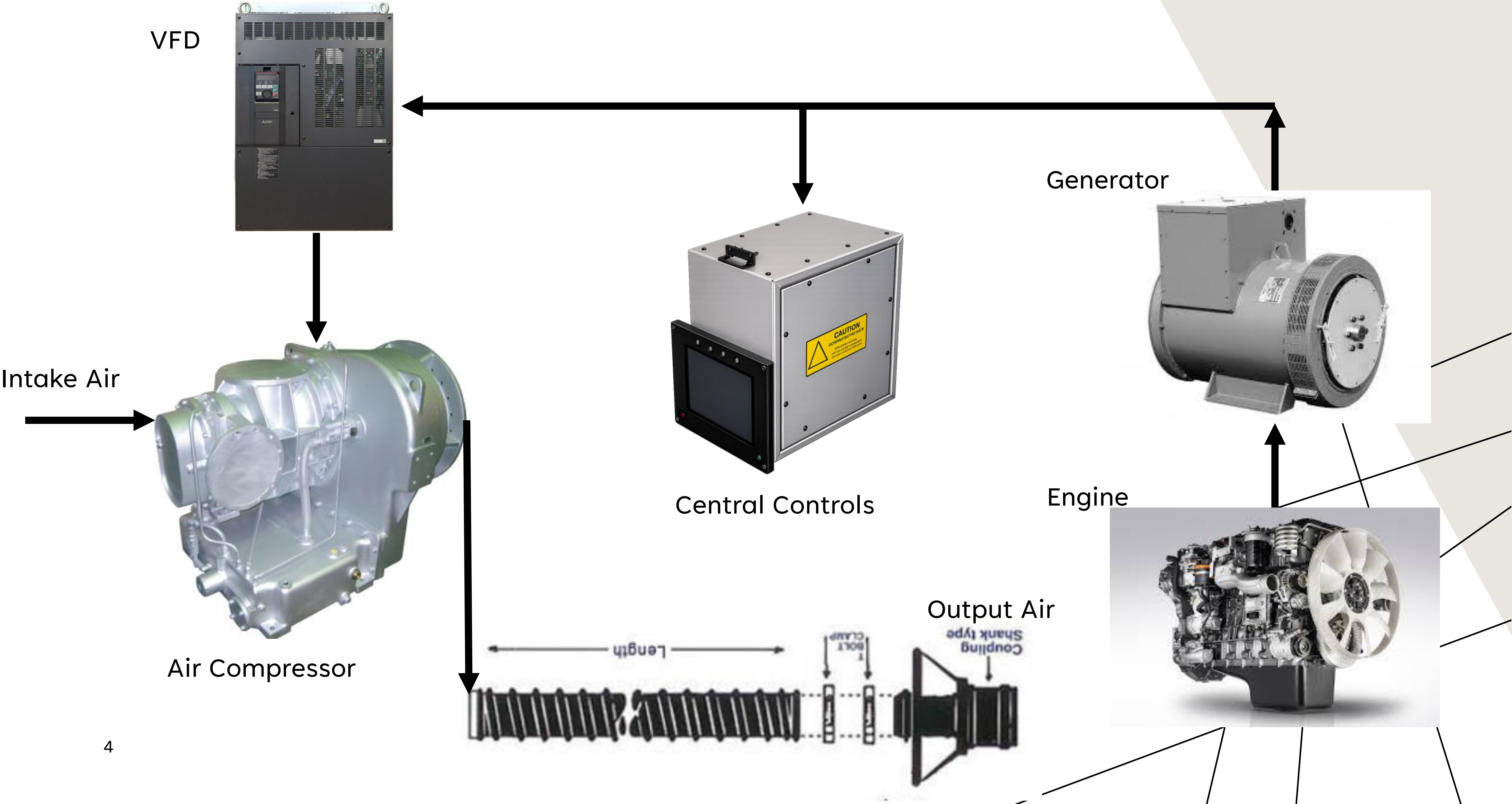
Powertrain:

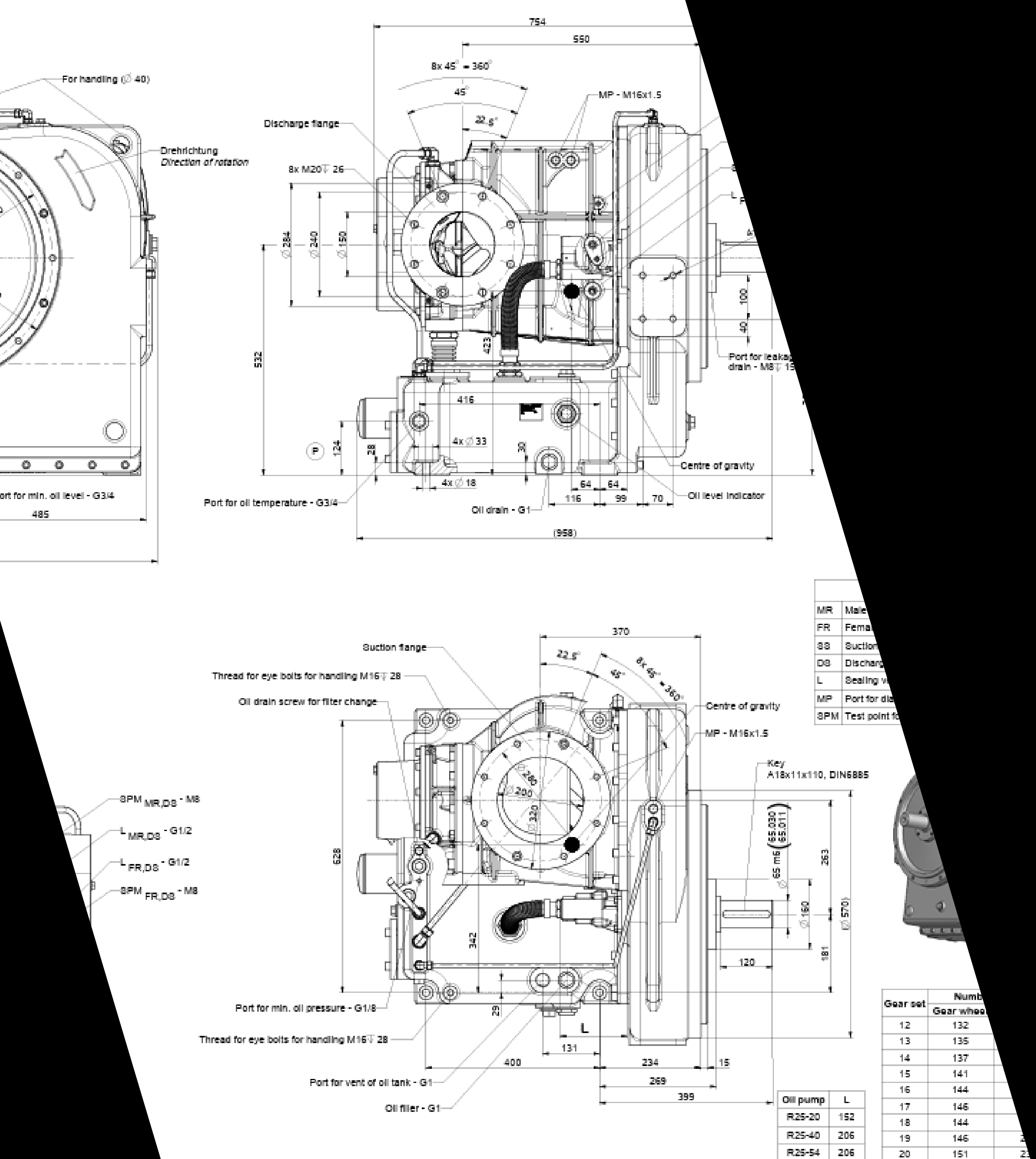
- Engine: FPT Cursor 13 Diesel Engine
- Engine Output: 500 HP

Mechanical:

- Compressor: Ingersoll Rand CD26S-JET
- Compressor Type: Oil-Free Rotary Screw
- Compressor Drive: Electric Motor / VFD Controlled

HIGH LEVEL COMPONENTS OVERVIEW


VFD
Generator
Intake Air
Central Controls
Engine
Output Air
Air Compressor



DESIGN BENEFITS

DESIGN BENEFITS

- Air Compressor is not directly coupled with the engine
  - This keeps engine vibrations and pulsations from internal combustion from damaging the air-end.
- Variable Frequency Drive (VFD) controls output air flow
  - The VFD allows variable air output and soft starting air flow
  - Precise Airflow and Pressure Control
- Central Controls Similar to the MAAC (and JO3C)
  - Familiar Operational Layout and usage based on Legacy JO3C
- High Airflow Density
  - MAAC-ASU-180 delivers very high airflow from a relatively compact platform.

UNIVERSAL MAAC PLATFORM

- Standard MAAC Platform and Running Gear
  - May have to grow but the design theory of modularity and serviceability will remain intact
- Modules
  - Engine and Generator on one side
  - Central Controls and Switchgear in the middle (400Hz converter would sit in the middle as well)
  - ASU (or AC) sits on the opposite side of the other modules
- This limits the overall structural changes that might need to be made and quicker design cycle overall

CONTROL THEORY

- After Boot Sequence, Display shows a start engine screen
- After selecting start engine, crank engine and wait for warmup
- Display goes to Run Screen and shows Start Air System Button with other important info
- Once Start Air System is pressed, main power is routed to the VFD
- VFD powers up and is commanded to start the air compressor at a low speed
- During low speed, the blow off valve is open and all air is being dumped to atmosphere
- Display has another button once warmup of the air compressor is completed, showing Start Air Delivery
- The MAAC-ASU will ramp up to ~40PSIG and close loop the VFD speed to the output pressure
- Aircraft opens air start valve and pressure drops at the sensing location for the MAAC-ASU and the system starts ramping up the airflow to achieve ~40PSIG at whatever flow the aircraft demands.
    - Note: Although the airflow will be measured, that is a function of the backpressure of the aircraft and only the pressure can be controlled via the MAAC-ASU. But keeping pressure at ~40PSIG will create enough airflow in the aircraft to turn on the engines
- The blowoff valve will close to almost 100% during air start activities, once the Aircraft closes the air start valve, pressure will shoot up dramatically, at this point the blowoff will open to 100% and the air compressor will start slowing down and the system will determine that an airstart is complete and go to idle speed, awaiting a command to turn off or do another airstart.

THANK YOU

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