

AIR OPERATED FAN DRIVES- HOW AI AND ML CAN DETECT PENDING FAILURES

October-2020

By – B. Rutherford

President of Rutherford and Company, Bob has more than 30 years of experience as a marketing consultant and identifying and transfer of technology in the industry. ([linkedin.com/in/bobrutherford1](https://www.linkedin.com/in/bobrutherford1))

This article is about applying #AI to air operated fan clutches. One of the most popular is manufactured by Horton Inc.

The Basics:

How does a Horton fan clutch work?

The **clutch** engages and makes the **fan** turn when the valve opens, sending air pressure to overcome a spring and push the Piston Friction Disc (PFD) against the friction material. It disengages when the valve closes, allowing the **clutch** solenoid to exhaust air and let the spring return.

How do you test a clutch fan solenoid?

An easy **test** for the function of the **solenoid** only is to start the truck, let it run and wait for the **fan** to disengage when air pressure builds to normal. If you then shut the truck off, which kills power to the **solenoid**, you should immediately hear the **solenoid** vent the air that is in the line going to the **clutch**.



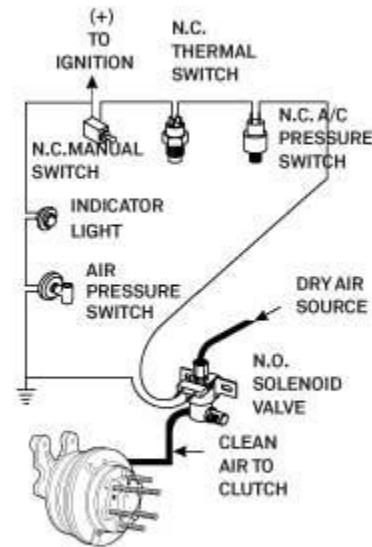
Clutch Slippage

A fan clutch needs 100 psi (6.8 bar) for solid engagement. Look for a problem that is causing partial engagement – usually air leaking past the solenoid valve seals into the airline causing a pressure build-up. Is there a

pressure drop causing partial disengagement? This usually is caused by an inoperative solenoid, airline blockage, up-stream air leaks, air leaks from the fan clutch body itself or low air pressure.

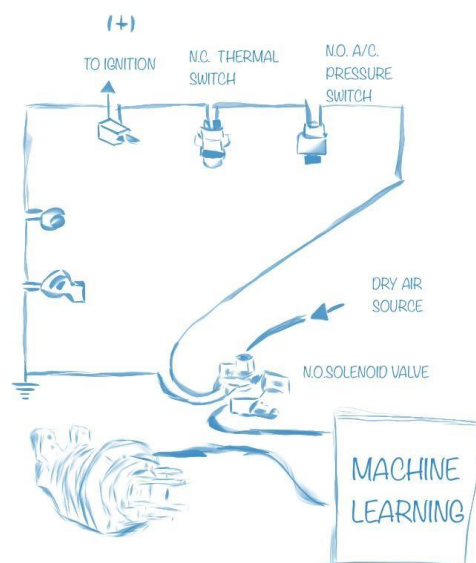
This is the point where AI can prevent road failures or catastrophic failures (i.e. the fan destroys the radiator) by monitoring the air entering and leaving the fan drive.

Electrically Normally Closed N.O.



The PSI sensor is installed at the fan clutch end of the air line marked "Clean Air to Clutch" air line.

ELECTRICALLY NORMALLY CLOSED

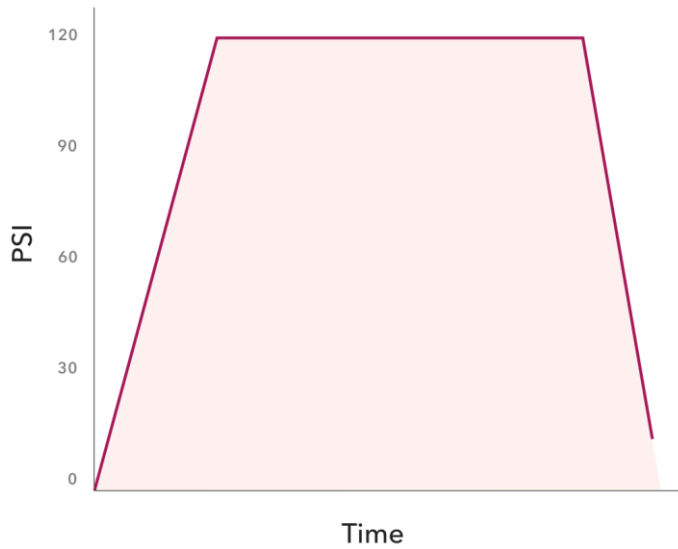


The AI system can detect:

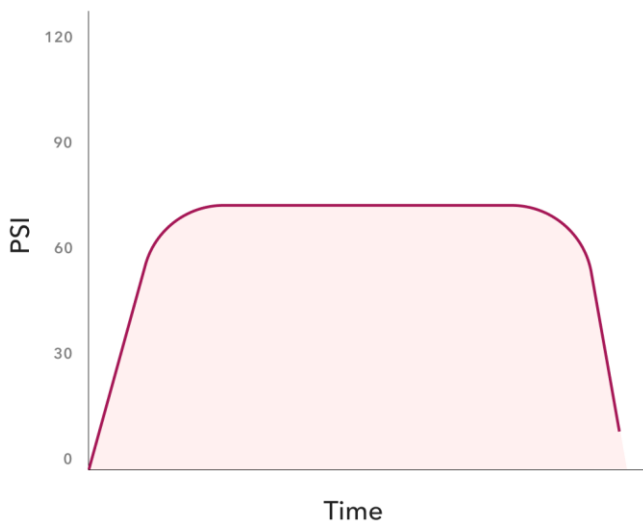
- Air leaks
- Plugged Exhaust Port
- Other reasons for low air pressure during clutch engagement.

THIS IS WHAT THE AI SYSTEM WOULD REPORT IN GRAPHIC IMAGES:

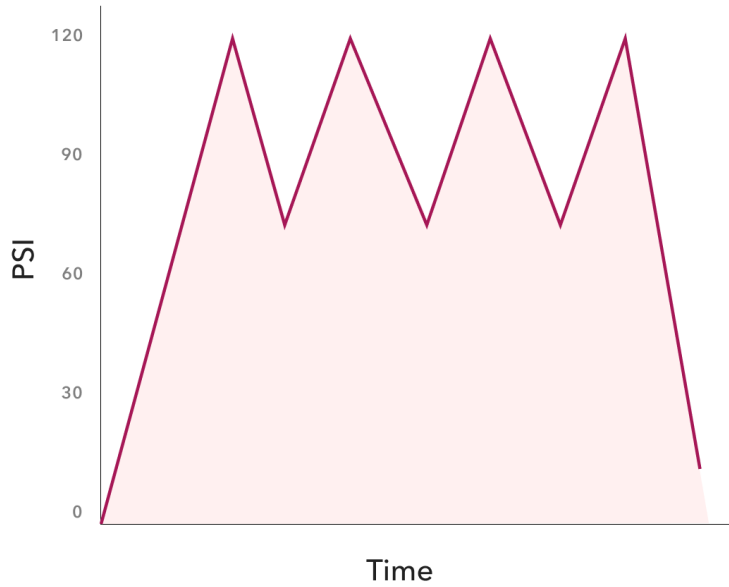
CONDITION 1 - Normal Operation, Air in, runs until activation switch is reset, then air exhaust then fan off.



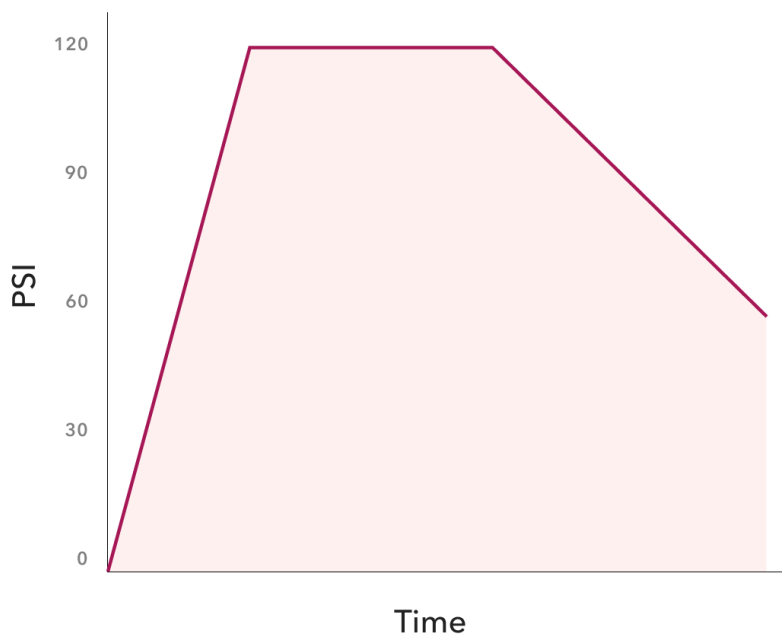
CONDITION 2 - Low Air Pressure with generate heat, grease leaves the bearings, dry bearing result in a major problem.



CONDITION 3 - Poorly grounded solenoid or other problem, plunger flutters due to lack of magnetic field.



CONDITON 4 - Plugged exhaust port. Proper air in, clutch slips as PSI slowly leaves the fan clutch.



CONDITION 5 - Air conditioning activated during start up of a vehicle with zero PSI. Clutch is slipping until proper PSI is reached.

