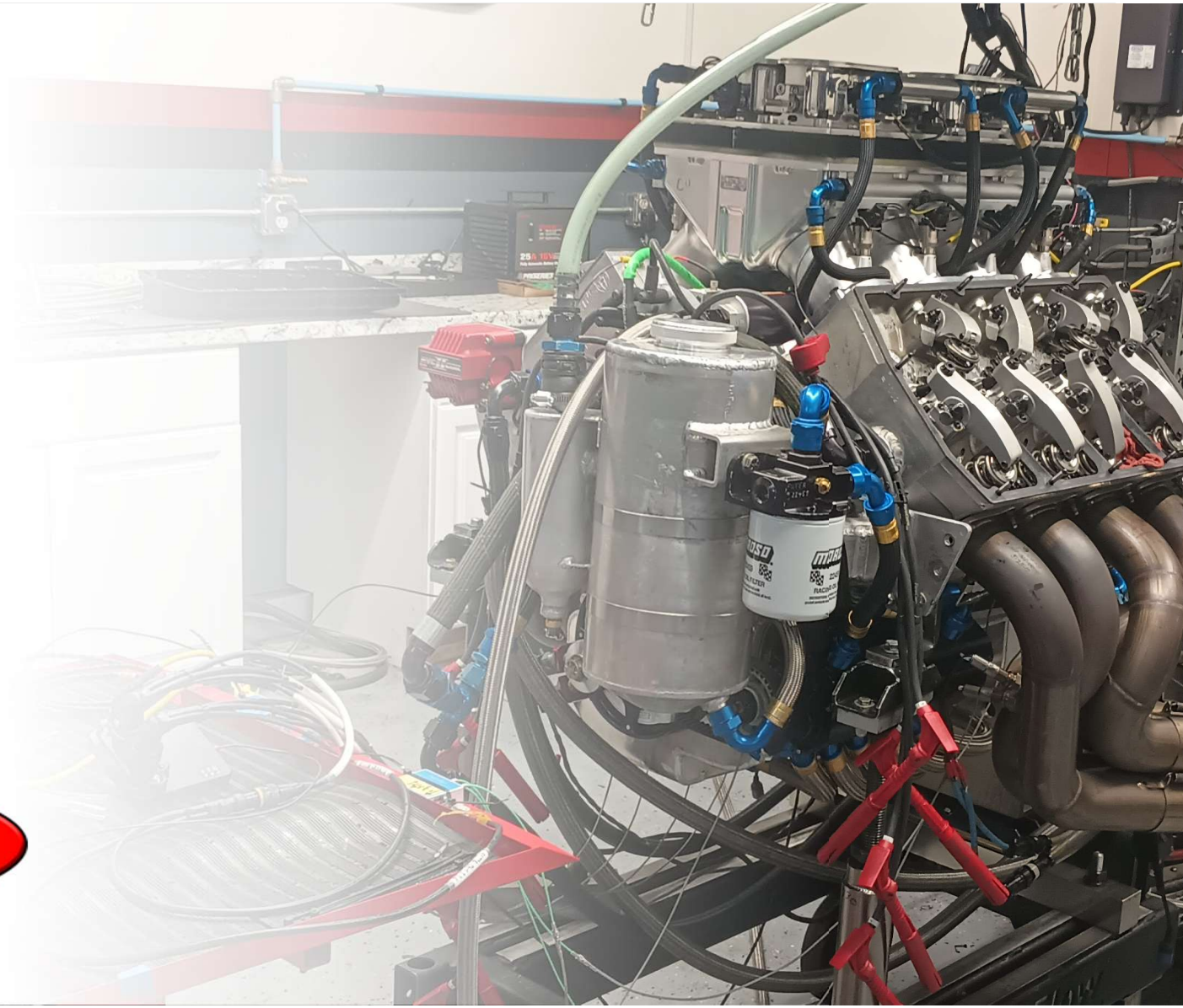
Big Stuff & DC Inc.

Working with common customer:

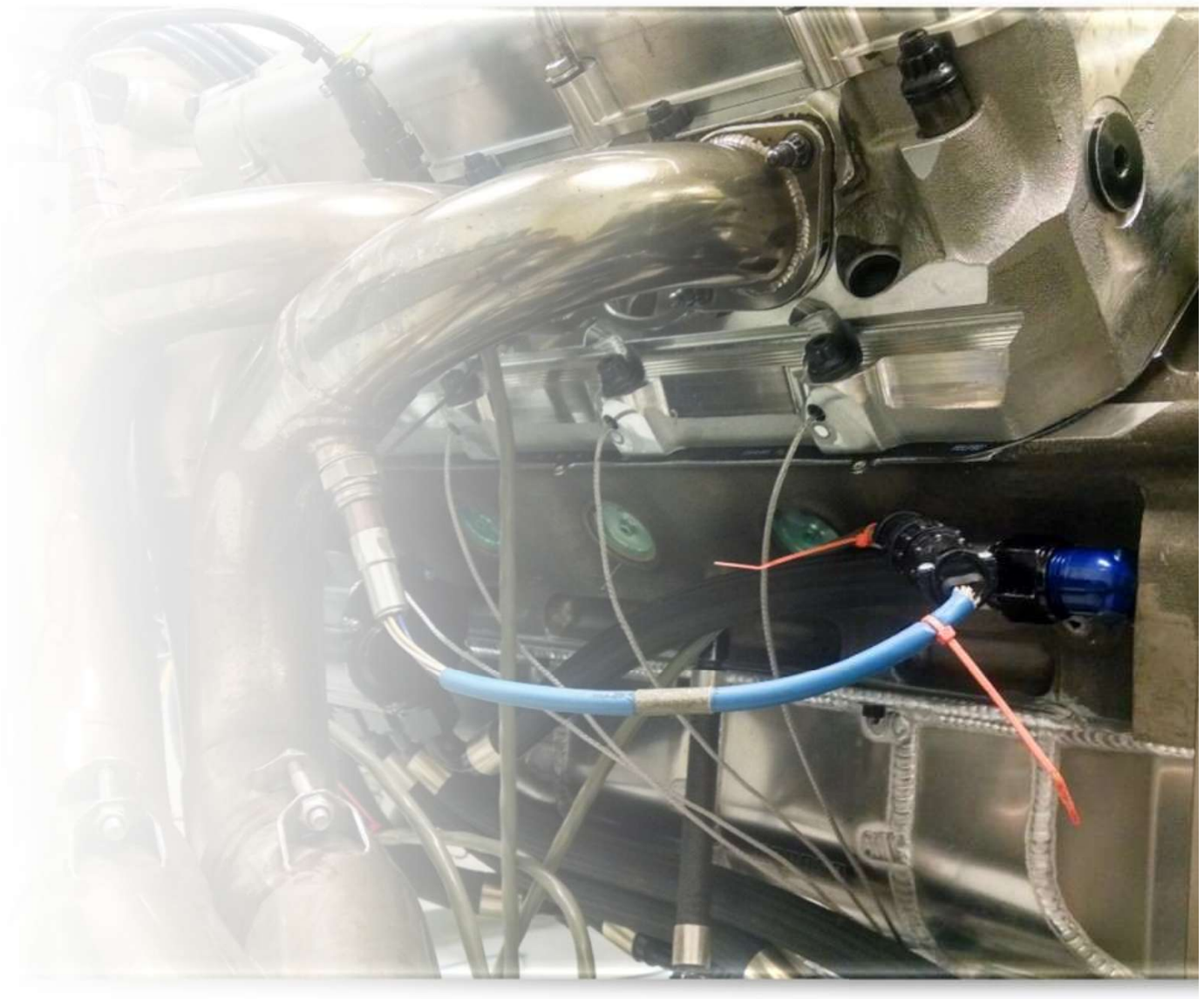
- MMPS needed control of ignition limited by MSD Grid ignition during combustion analysis work.
- Big Stuff visited NC for dyno test day to install individual coil system during combustion testing.
- DC Inc / Plex combustion system and new Big Stuff ECU configuration was installed in vehicle for race event.

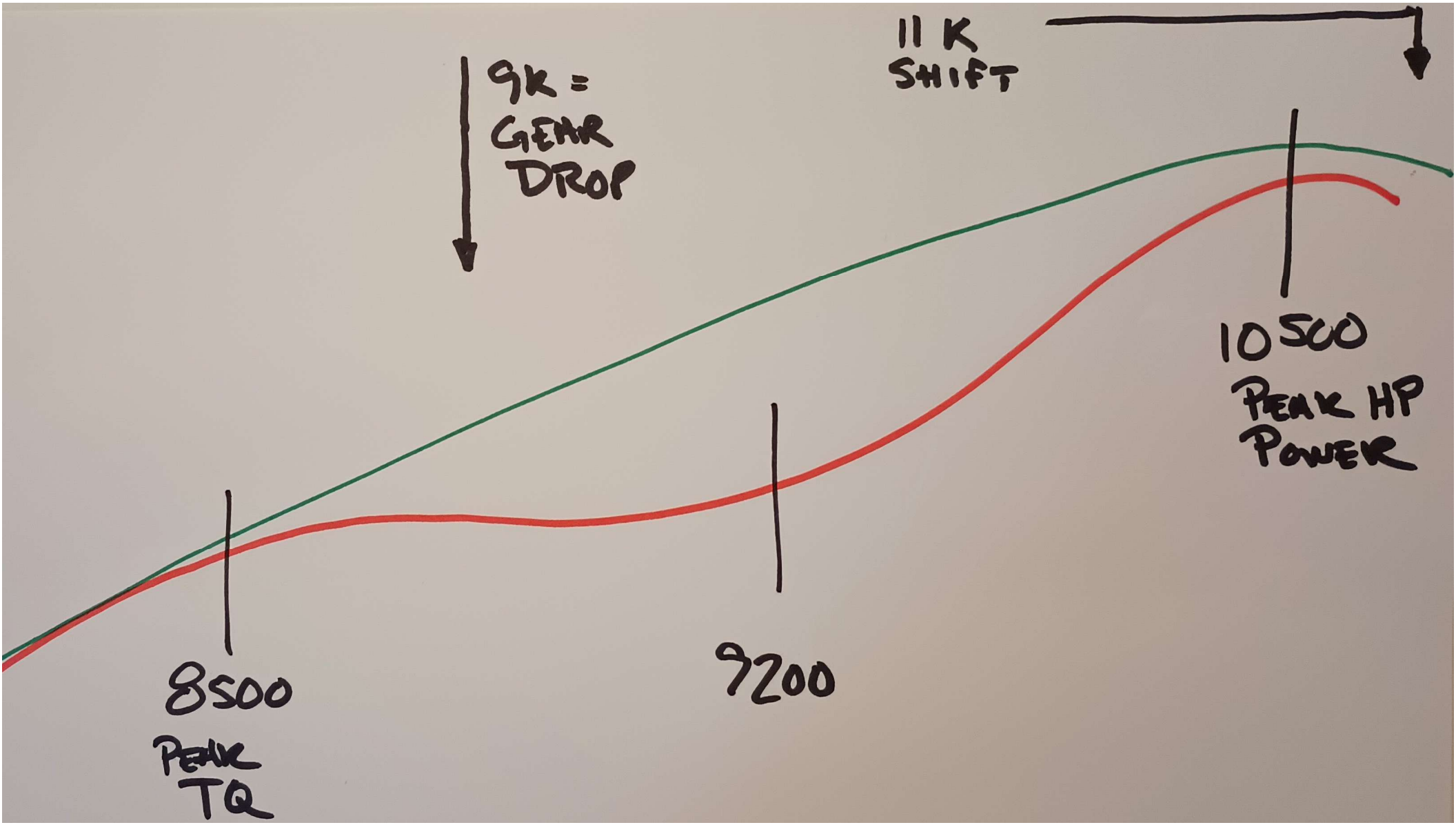


COMBUSTION ANALYSIS DISCUSSION

Background

- Introduction of DC Inc
- Combustion testing in Pro Stock introduction via GM / COPO program
- First test with combustion analysis 2014
  (photo description)
- Beyond 2018
- Development with Plex
- Turnkey Systems / Sales

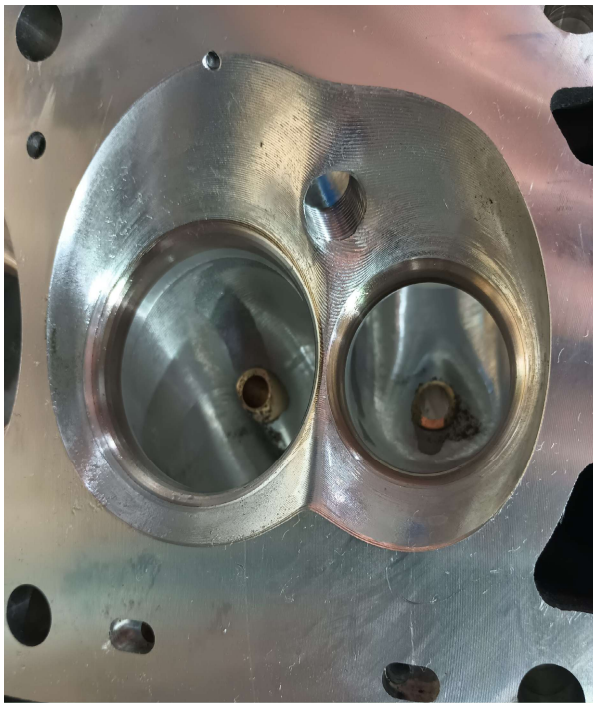



11 K
SHIFT
9K =
GEAR
DROP
10500
PEAK HP
POWER
8500
PEAK
TQ
9200

HOW IS COMBUSTION DATA COLLECTED ?

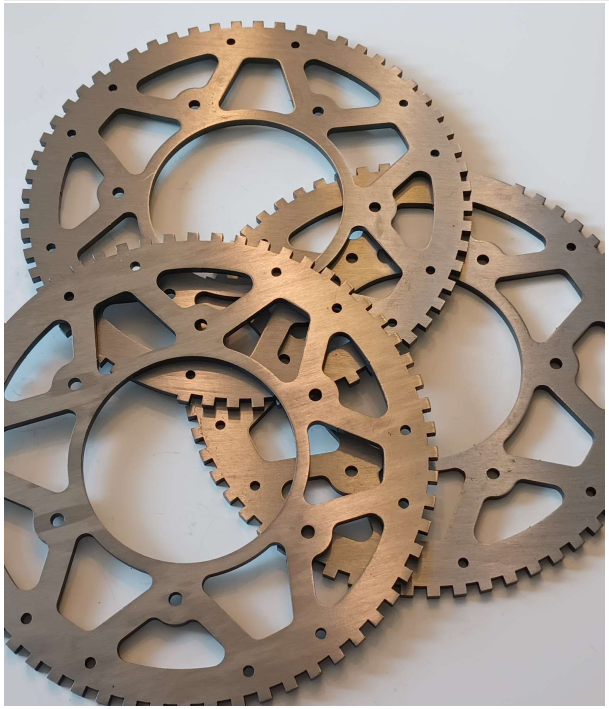
- Piezoelectric Sensor
- Charge Amplification
- Crank Angle Detection
- Combustion System
- Software
- Wiring

Machining for Combustion Sensors



Sensor Installation

Equipment Required for Data Collection

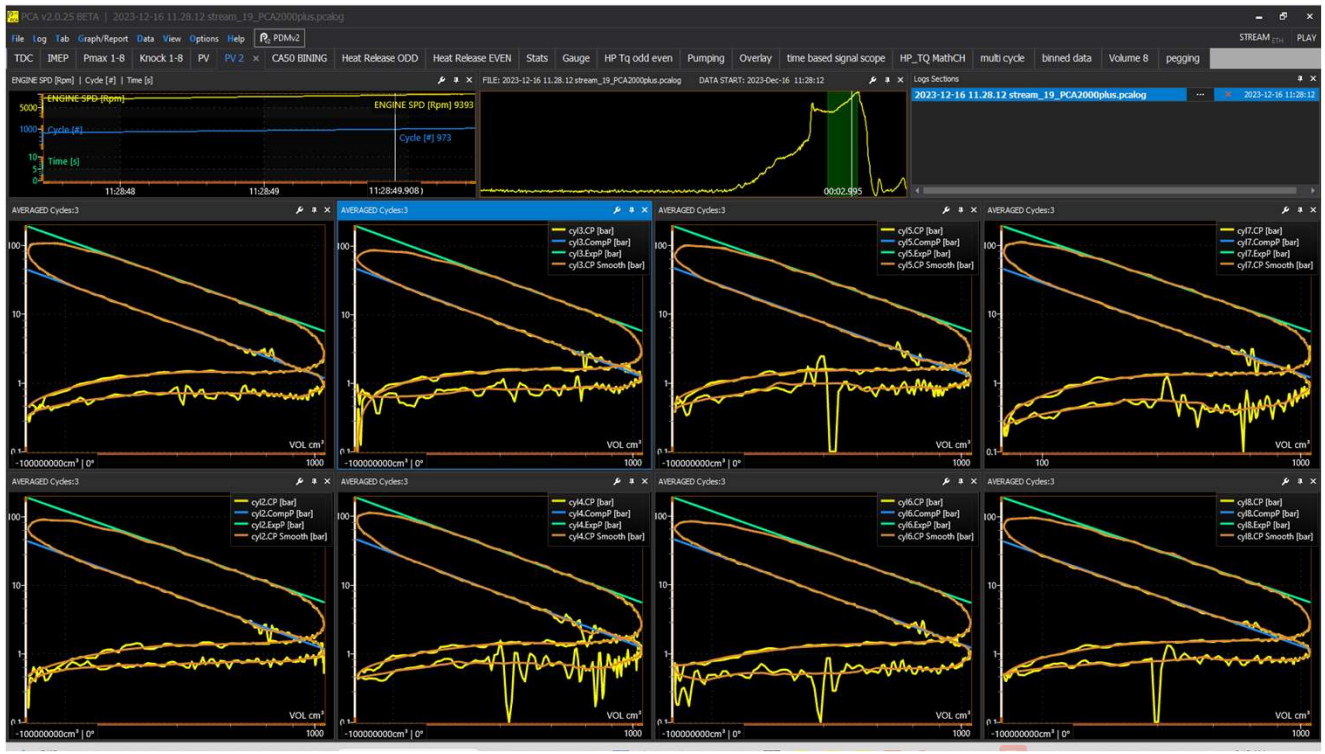


WHAT ARE SOME IMPORANT COMBUSTION METRICS CAPTURED ?

- IMEP
- PMAX
- HEAT RELEASE
- BURN DURATION

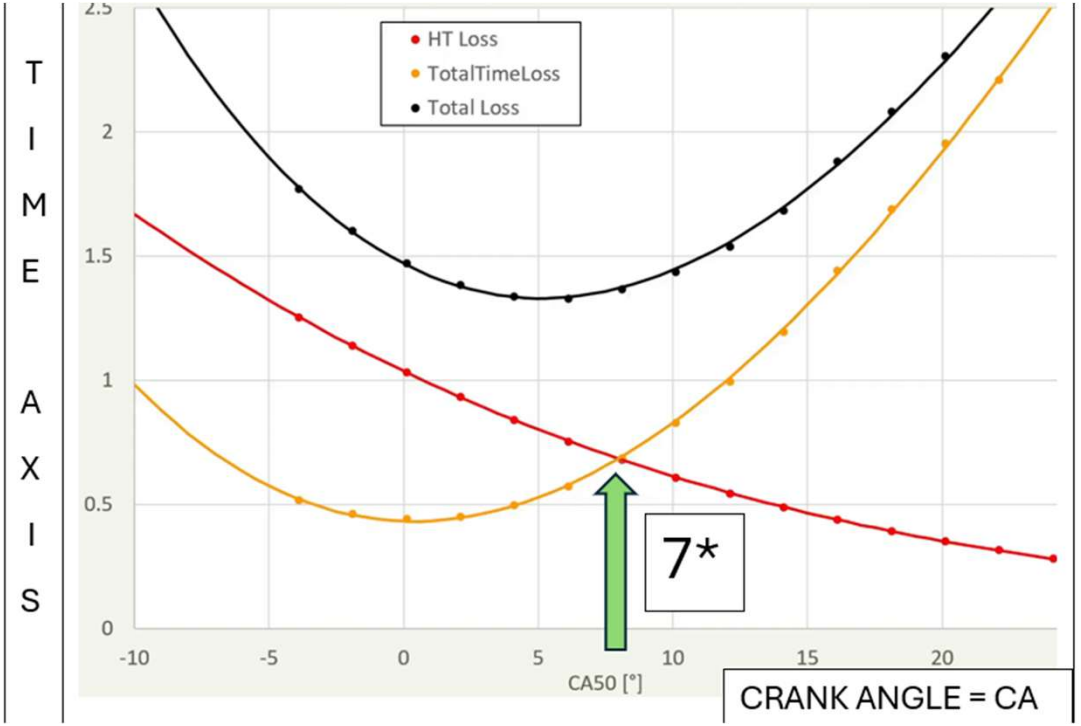
What can we do with the data collected ?

- Ignition timing / tuning work
- A/B testing comparisons
- Camshaft design optimizations
- Exhaust design work
- Data quality checks
- Engine health / inspection
- Knock detection
- Power per cylinder
- Total observed engine power
- Information for manufacturing
- Dyno Validation



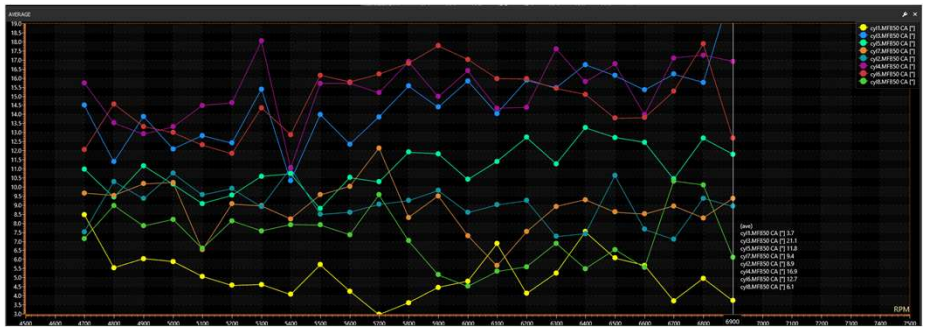
What is CA 50 ?

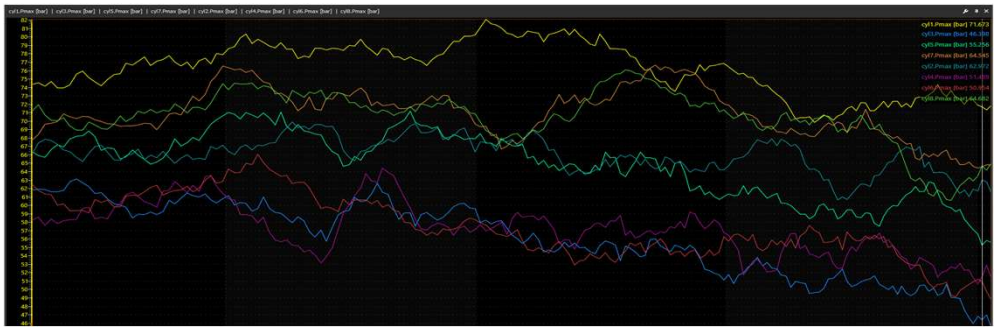
- C represents Crank
- A represents Angle
- 50 is the 50 % 0f the burn
- The convergence of Heat Transfer Losses Combustion Time Loss align near 7* ATDC
- Optimum CA 50 generally occurs near 7* ATDC in most **NA** engines
- FORCED INDUCTION engines are generally tuned below optimum CA50 in trade for mechanical durability of the components with high Pmax

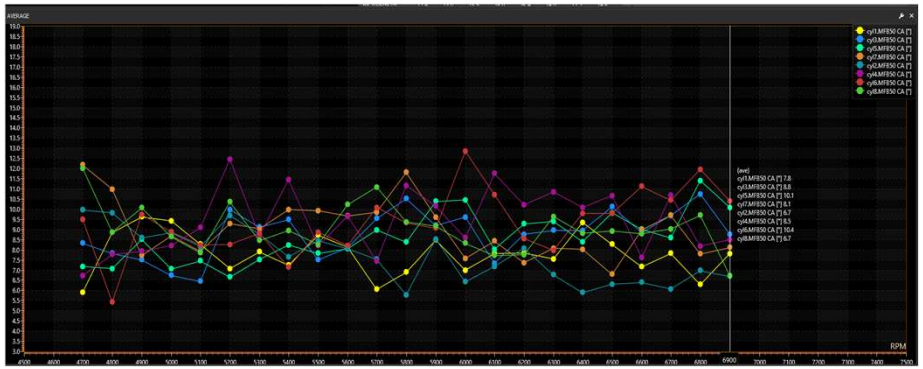


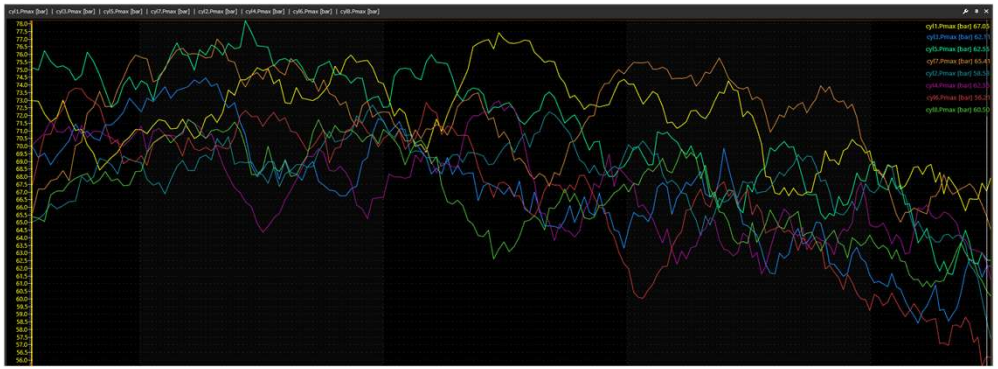
CA50 is also known as MFB50 Mass Fraction Burned (term used often in Europe)

Ignition tuning utilizing CA 50 and Pmax







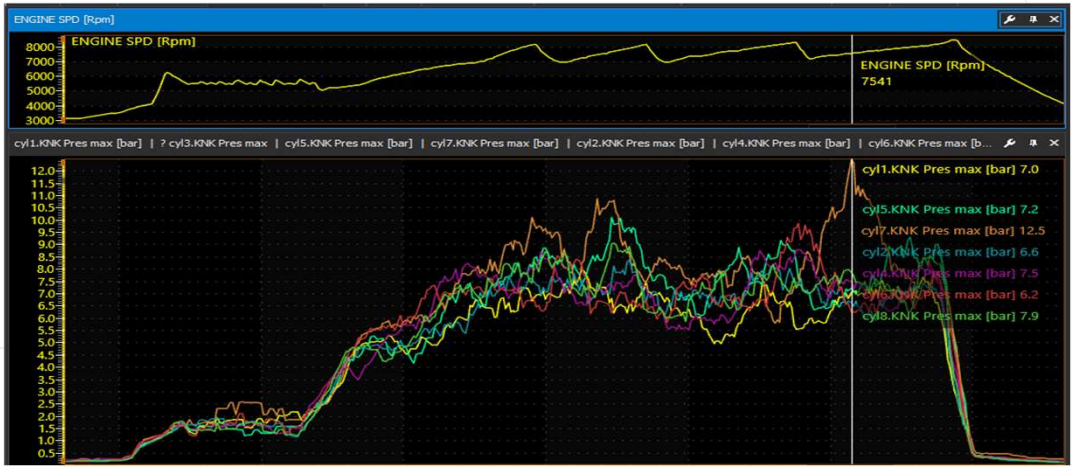


WHY IS IT IMPACTFUL TO USE COMBUSTION DATA ?

- Save Time
- Development Direction
- Prioritize / Focus
- Minimize Waste
- Reduce Cost
- Increase Durability
- Increase Power

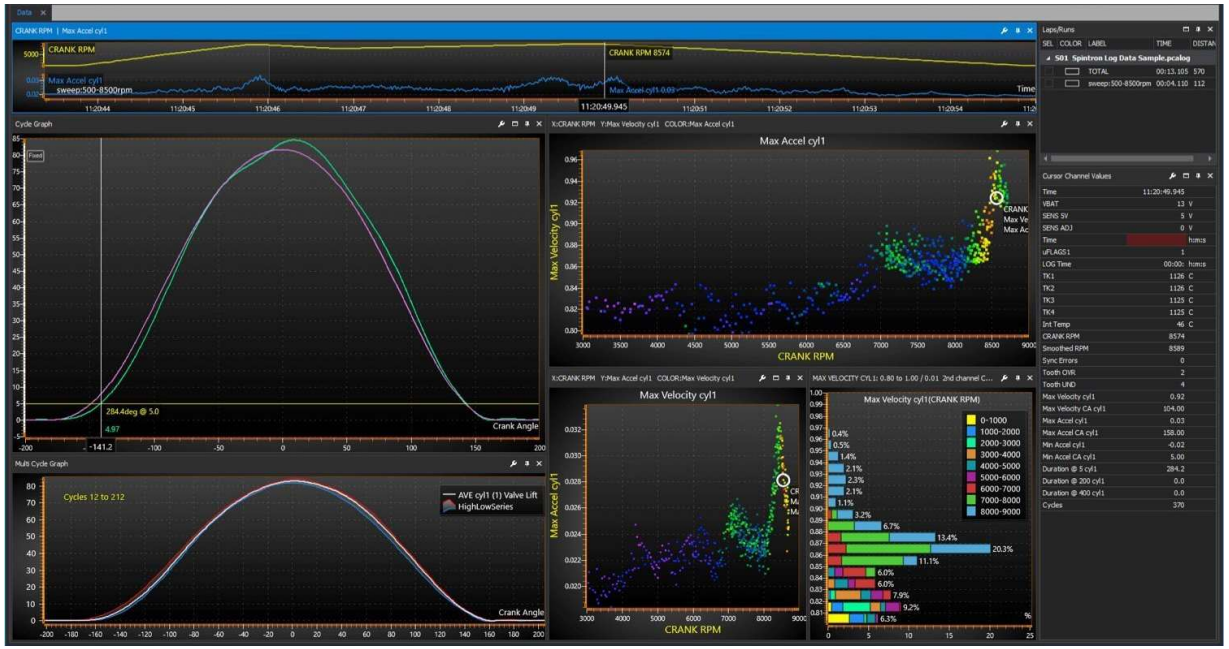
Expansion:

- On track / In Vehicle (video/graph)
- Spintron Software / Analysis
- CANBUS Integrations
- Emissions Based Calibration
- Scientific Validation
- Other HS data IE intake pressure and exhaust pressure data



Plex Spintron Valve Train Software:

Direct Replacement for Spintron 2004 with greater capabilities and data acquisition , its like using your cam doctor with RPM !



- With the new Valve Analysis software module, the PCA-2000 Plus can be used as for datalogging and processing data from a Spintron machine. Plex PCA-2000 Plus interfaces with the Spintron crank position encoder and laser tracking system as well as other sensors including temperature and strain gauges to provide real time graphical and numeric analysis of the valve motion. It is easy to detect valve loft, toss and bounce as well as measure spring harmonics using the valve lift, velocity, acceleration graphs and calculated values. The modern software provides advanced customizable data visualization capabilities including a database for storing and documents test results.

Product Images