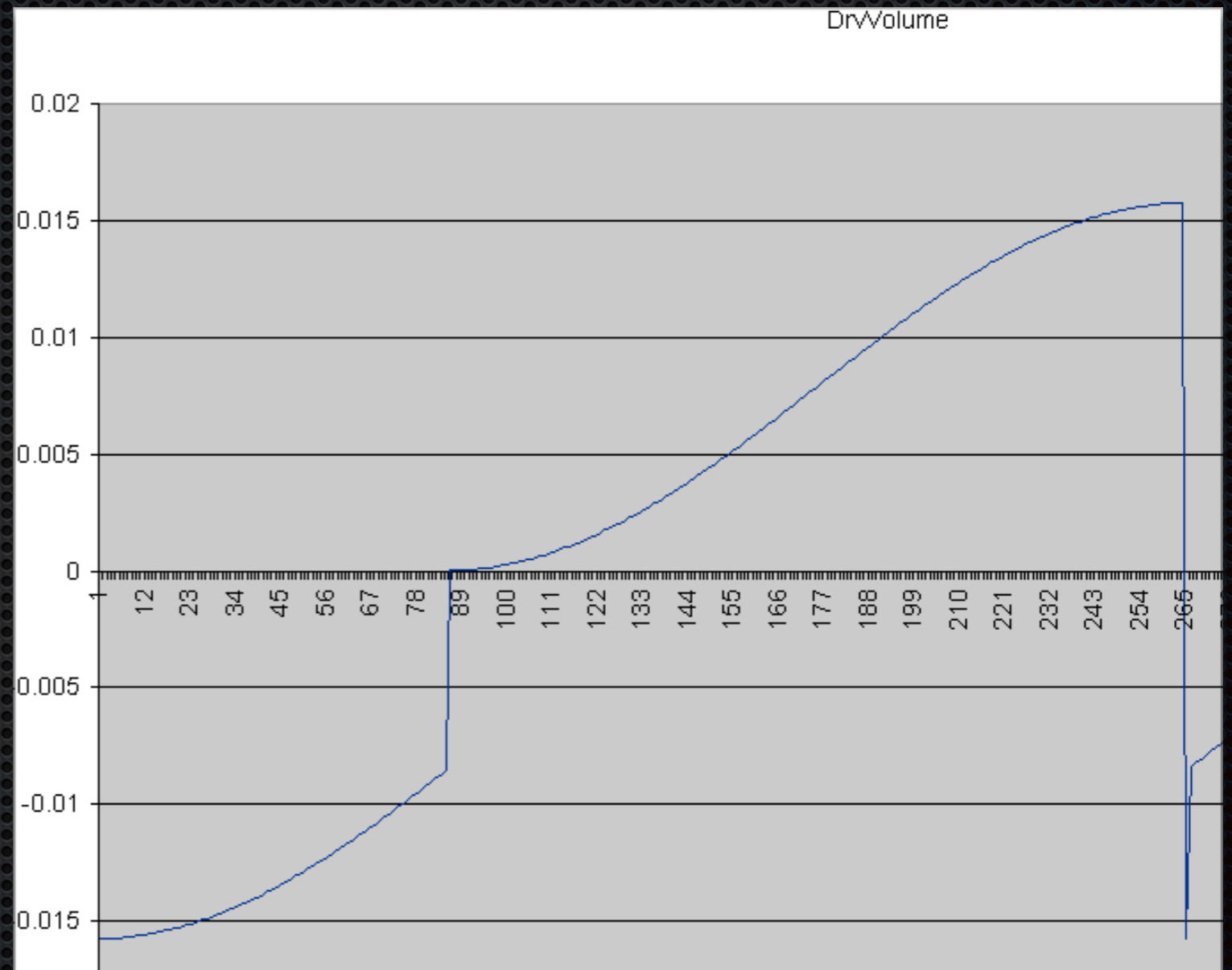


# TUNING ENGINE TIMING

**KANE TOMLIN**

**CEO OF PPO2 PERFORMANCE, INC.**

General Gas Law affects timing due to change in volume, temperature and pressure per degree of crank rotation.



# Mechanical Advantage

- 12 ATDC
- Takes a few milliseconds to burn
- Faster the engine rotates; the more degrees are required for each burn
- The higher the load; the more air and fuel and therefore the faster the mixture burns
- So we have to Advance for RPM and Retard for Load

# Compression Ratios

- Stock Timing is the best start point.

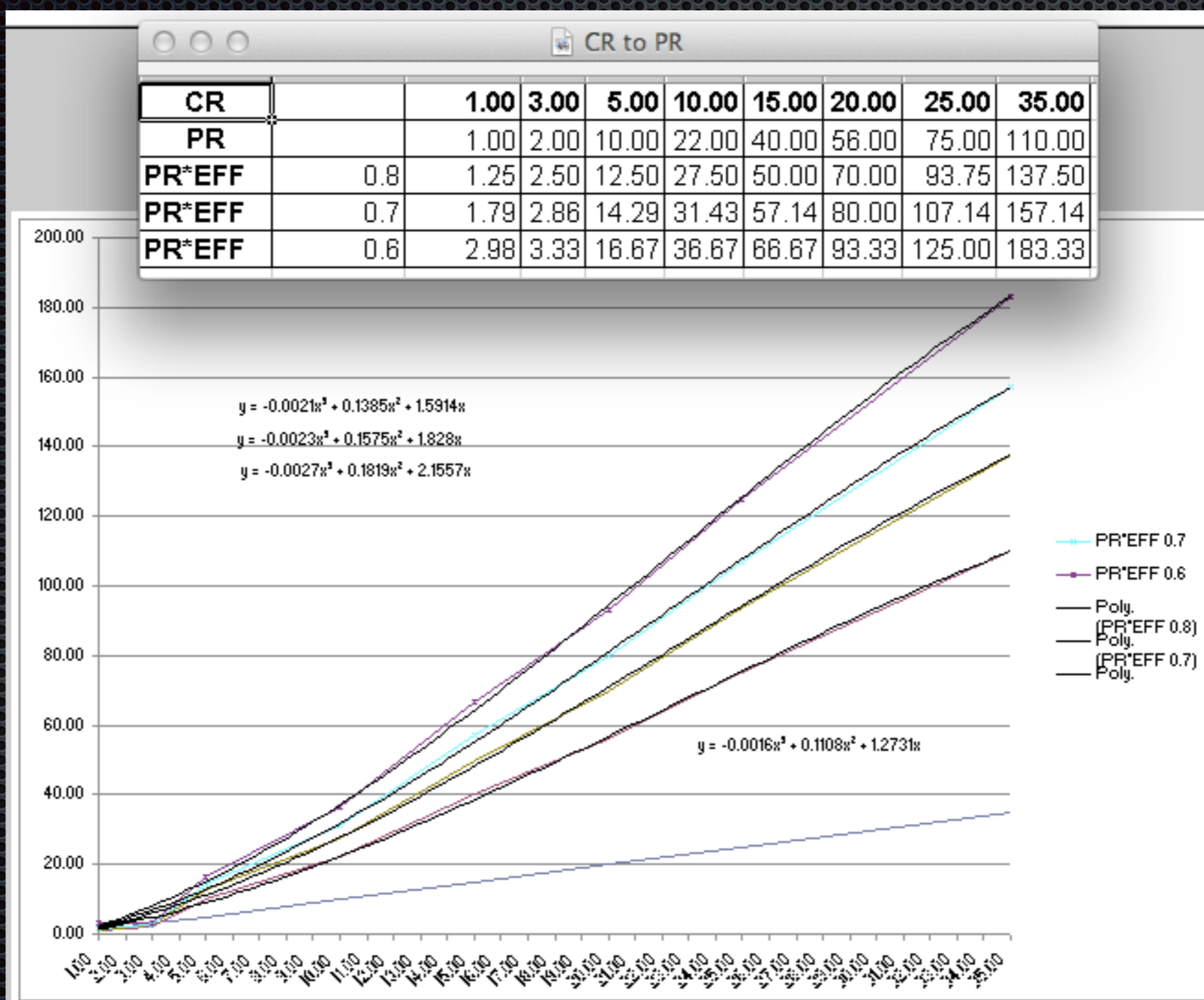
**Ignition Tables: Leading Ignition Main**

	<b>Calculated Load</b>													
	0.13	0.19	0.25	0.31	0.38	0.44	0.50	0.56	0.63	0.69	0.75	0.81	0.88	0.94
750	16.00	16.00	16.00	12.00	8.00	6.00	3.50	-3.00	-6.00	-9.00	-11.00	-11.00	-11.00	-11.00
1000	18.50	18.50	18.50	15.00	12.00	10.00	5.50	0.00	-3.00	-7.00	-11.00	-11.00	-11.00	-11.00
1500	30.00	30.00	27.00	22.00	17.50	15.50	10.50	9.50	5.50	2.00	1.00	1.00	0.00	0.00
2000	33.00	33.00	33.00	28.00	22.50	20.50	18.50	12.50	9.50	5.00	5.00	5.00	5.00	5.00
2500	38.50	38.50	38.50	32.50	27.00	25.00	23.00	19.50	17.00	13.00	12.00	10.00	8.00	6.50
3000	44.00	44.00	44.00	39.00	34.00	30.50	26.50	24.00	21.00	17.50	13.00	10.00	8.00	8.00
3500	44.00	44.00	44.00	39.50	34.50	30.50	27.00	25.00	21.50	19.50	16.00	14.00	12.00	12.00
4000	43.50	43.50	43.50	40.00	36.50	32.50	27.00	24.00	21.00	18.00	14.00	14.00	14.00	14.00
4500	41.50	41.50	41.50	40.00	38.00	34.00	30.00	28.00	25.50	24.00	22.00	21.00	18.00	18.00
5000	39.00	39.00	39.00	40.00	41.00	36.50	32.50	30.00	27.50	27.00	27.00	23.50	24.00	22.00
5500	38.00	38.00	38.00	37.50	37.00	36.50	34.50	33.00	31.50	30.00	28.50	28.00	27.00	25.00
6000	37.50	37.50	37.50	37.50	37.00	37.00	37.00	34.50	31.50	30.00	28.50	26.00	26.00	25.00
6500	36.50	36.50	36.50	36.50	37.00	35.00	33.00	32.00	30.50	30.50	27.50	30.00	28.50	28.00
7000	37.50	37.50	37.50	37.50	37.50	36.00	34.00	31.00	29.50	28.50	27.00	26.00	28.00	30.00
7500	36.00	36.00	36.00	36.00	36.00	33.50	31.00	30.00	29.00	28.00	27.00	26.00	28.00	30.00
8000	32.50	32.50	32.50	32.50	32.50	30.50	29.00	29.00	28.50	28.00	27.00	26.00	28.00	30.00

**RPM**

**Leading Timing**

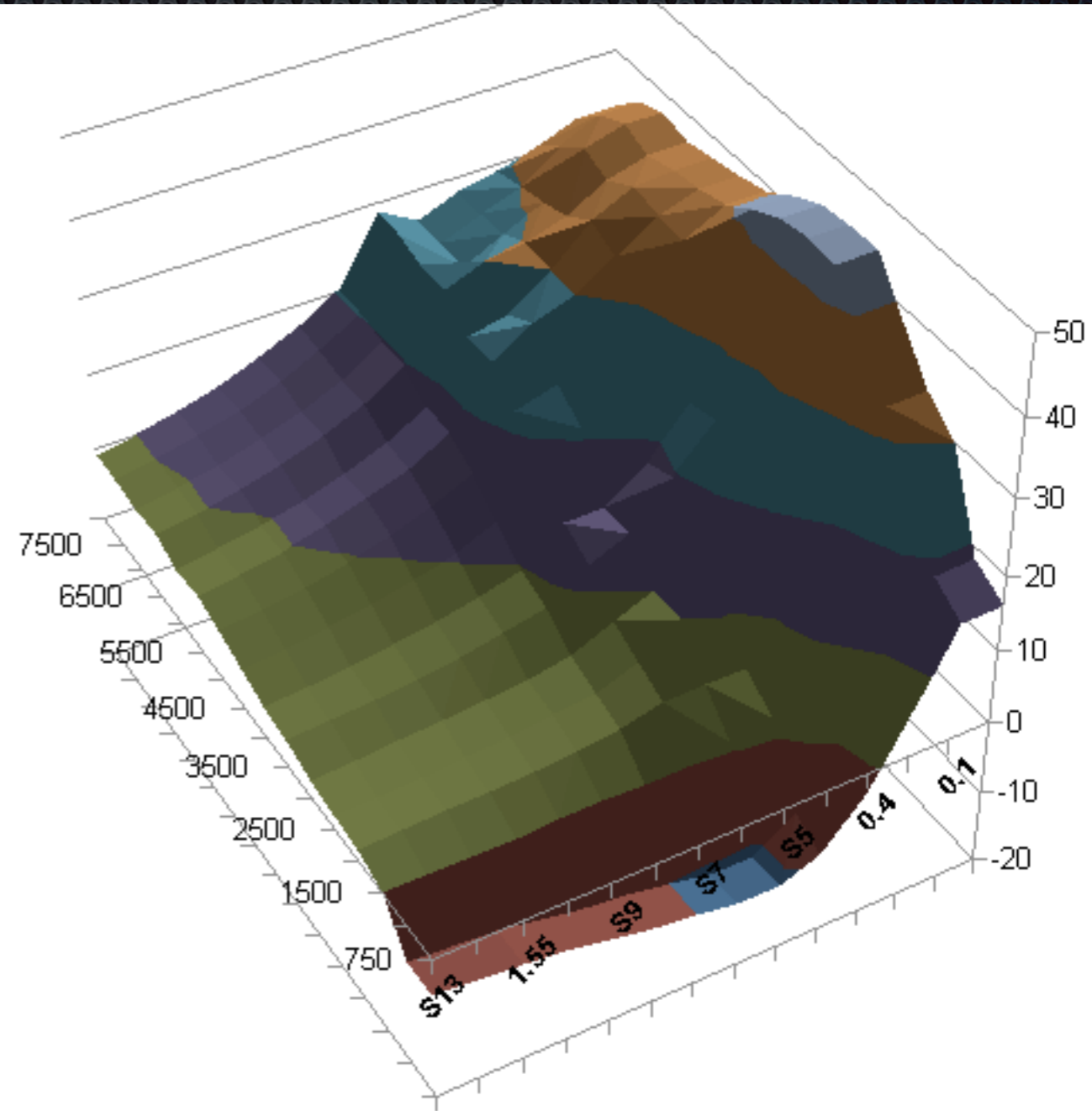
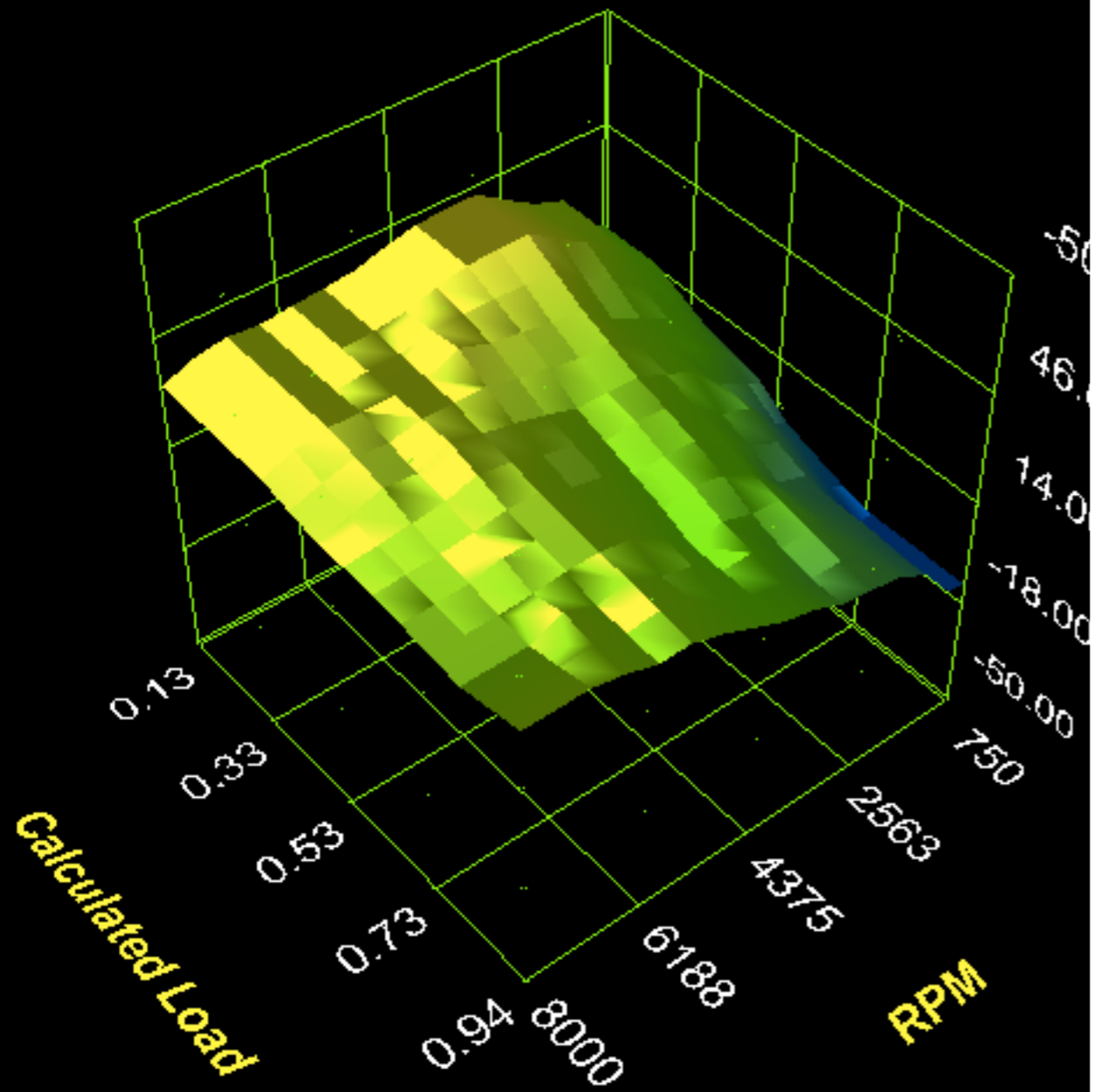
# Adjust CR Timing for PR



# Use Efficiency Ratio

- Pick the Efficiency % you can afford
- Modify higher Load (PR) off stock table
- Use Line of Best Fit to Get Dynamic Compression Ratio at each Load in Boost
- Verify using 3D modeling can be helpful, ensure things don't look too crazy

<b>Leading Ignition</b>											
<b>Load</b>	<b>0.1</b>	<b>0.25</b>	<b>0.4</b>	<b>0.55</b>	<b>0.7</b>	<b>0.85</b>	<b>1</b>	<b>1.1</b>	<b>1.25</b>	<b>1.4</b>	<b>1.5</b>
<b>Load Compression</b>	<b>1</b>	<b>2.5</b>	<b>4</b>	<b>5.5</b>	<b>7</b>	<b>8.5</b>	<b>10</b>	<b>11</b>	<b>12.5</b>	<b>14</b>	<b>15</b>
<b>Static Compression Ratio</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>
<b>Dynamic Compression Ideal</b>	<b>1.3823</b>	<b>3.85025</b>	<b>6.7628</b>	<b>10.08755</b>	<b>13.7921</b>	<b>17.84405</b>	<b>22.211</b>	<b>25.2813</b>	<b>30.10125</b>	<b>35.1498</b>	<b>40.3923</b>
<b>Dynamic Comp + Eff</b>	1.7278	4.811313	8.4472	12.59294	17.206	22.24386	27.664	31.4688	37.43156	43.6632	50.121
<b>Load</b>	<b>0.1</b>	<b>0.25</b>	<b>0.4</b>	<b>0.55</b>	<b>0.7</b>	<b>0.85</b>	<b>1</b>	<b>1.1</b>	<b>1.25</b>	<b>1.4</b>	<b>1.5</b>
<b>750</b>	16	16	6	-3	-9	-11	-11	-10	-9	-8	-7
<b>1000</b>	18.5	18.5	10	0	-7	-11	-11	-10	-9	-8	-7
<b>1500</b>	30	27	15.5	9.5	2	1	0	0	0	0	0
<b>2000</b>	33	33	20.5	12.5	5	5	5	3.50	2.94	2.52	2.25
<b>2500</b>	38.5	38.5	25	19.5	13	10	6.5	4.54	3.82	3.28	2.85
<b>3000</b>	44	44	30.5	24	17.5	10	8	5.59	4.70	4.03	3.5
<b>3500</b>	44	44	30.5	25	19.5	14	12	8.39	7.05	6.05	5.25
<b>4000</b>	43.5	43.5	32.5	24	18	14	14	9.79	8.23	7.05	6.25
<b>4500</b>	41.5	41.5	34	28	24	21	18	12.58	10.58	9.07	7.875
<b>5000</b>	39	39	36.5	30	27	23.5	22	15.38	12.93	11.08	9.75
<b>5500</b>	38	38	36.5	33	30	28	25	17.48	14.69	12.60	10.875
<b>6000</b>	37.5	37.5	37	34.5	30	26	25	17.48	14.69	12.60	10.875
<b>6500</b>	36.5	36.5	35	32	30.5	30	28	19.57	16.46	14.11	12.25
<b>7000</b>	37.5	37.5	36	31	28.5	26	28	19.57	16.46	14.11	12.25
<b>7500</b>	36	36	33.5	30	28	26	29	20.27	17.04	14.61	12.75
<b>8000</b>	32.5	32.5	30.5	29	28	26	29	20.27	17.04	14.61	12.75





# Torque Peak on Dyno

- Adjust Timing on the Dyno (live tuning) for torque peak at solid state
- Based on your table, verify % deviation
- Modify rest of table and test a few cells
- AFR changes will affect Timing and Vice Versa