



Dual-Speed Supercharger



Antonov Automotive Technologies Ltd



Background to Antonov

- Antonov Automotive Technologies Ltd (AAT) is a subsidiary of Antonov plc, a public company listed on the London Stock Exchange's Alternative Investment Market (AIM) and the 'Euro Next' – Amsterdam Stock Exchange.
- Antonov was founded by Roumen Antonov in 1991 to develop novel transmission inventions.
- Antonov has a market capitalisation of around €50m and operates from a Technical Centre based in Warwick.



AAT Ltd UK Technical Centre

Antonov's Technical Centre is located at:
2 Hawkes Drive
Heathcote Industrial Estate
Warwick, UK.



www.antonovat.com

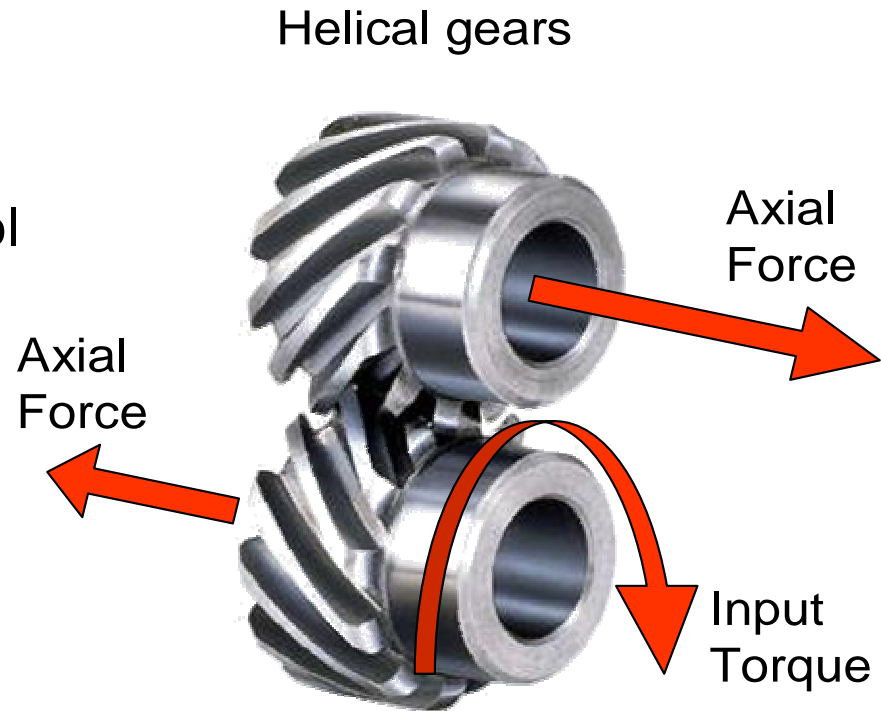


Operating Principle of Antonov Dual-Speed Mechanical Transmission

1. The input torque generates forces in the helical gears:

- Radial
- Tangential
- Axial

2. The axial force is used to control the ratio change





Operating Principle of Antonov Dual-Speed Mechanical Transmission

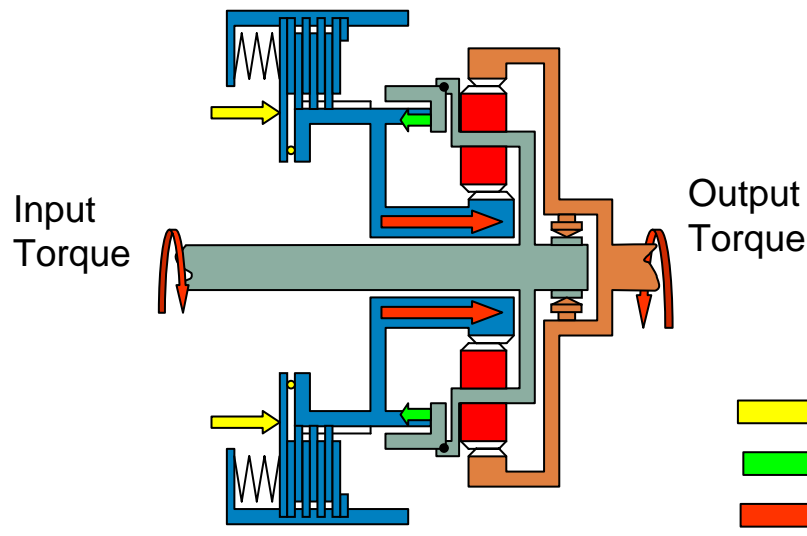
Low Input Speed:

- Flyweights cannot overcome torque thrust from gears & spring load.
- Clutch closed.
- Sun gear is locked to casing.
- Drive through planet set, one way clutch over-runs.

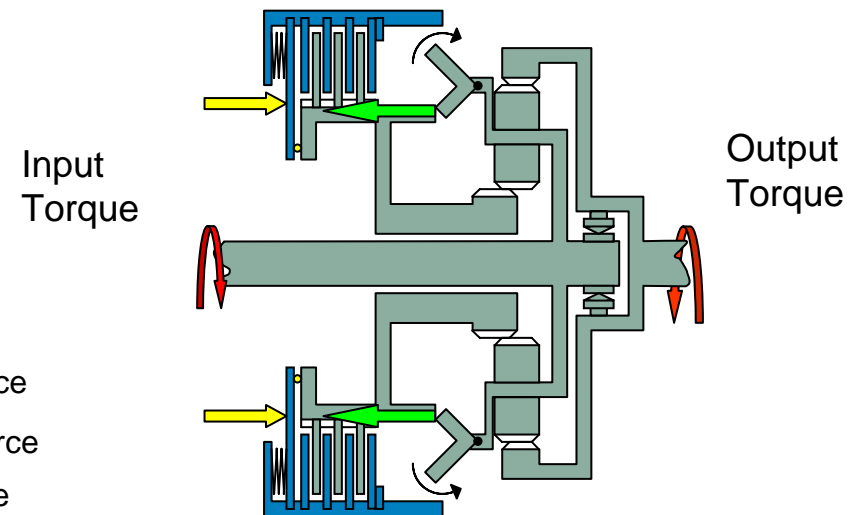
High Input Speed:

- Flyweights overcome torque thrust from gears & spring load.
- Clutch opened.
- Gear set is in neutral.
- Drive through one way clutch.

Ratio 1.36:1



Ratio 1:1





Antonov Dual-Speed Supercharger



**Dual-Speed Antonov
Transmission
combined with
traction drive**



3 Dual-Speed Supercharger Studies

- Down Sizing – Chevrolet Lacetti
 - 1.8 Engine fitted with Dual-Speed Antonov Rotrex Supercharger.
 - increased torque from 168 Nm to 256 Nm ~40%
 - Equivalent to a 1.8 sc engine or 2.4 litre na engine
 - 1.8 na to a 1.2 Dual-Speed Antonov Rotrex.
- Fun After Market Application – Ford Mustang
 - Torque increase at lower engine speed
 - Run the Supercharger close to it's choke speed in 1st and 2nd ratios for maximum performance.
- Under Powered Vehicle – GM Hummer H3 I5 Engine
 - Creating acceptable base performance
 - Give the engine low end torque to significant improve driveability
 - Improve real world fuel burn through lower engine speeds.

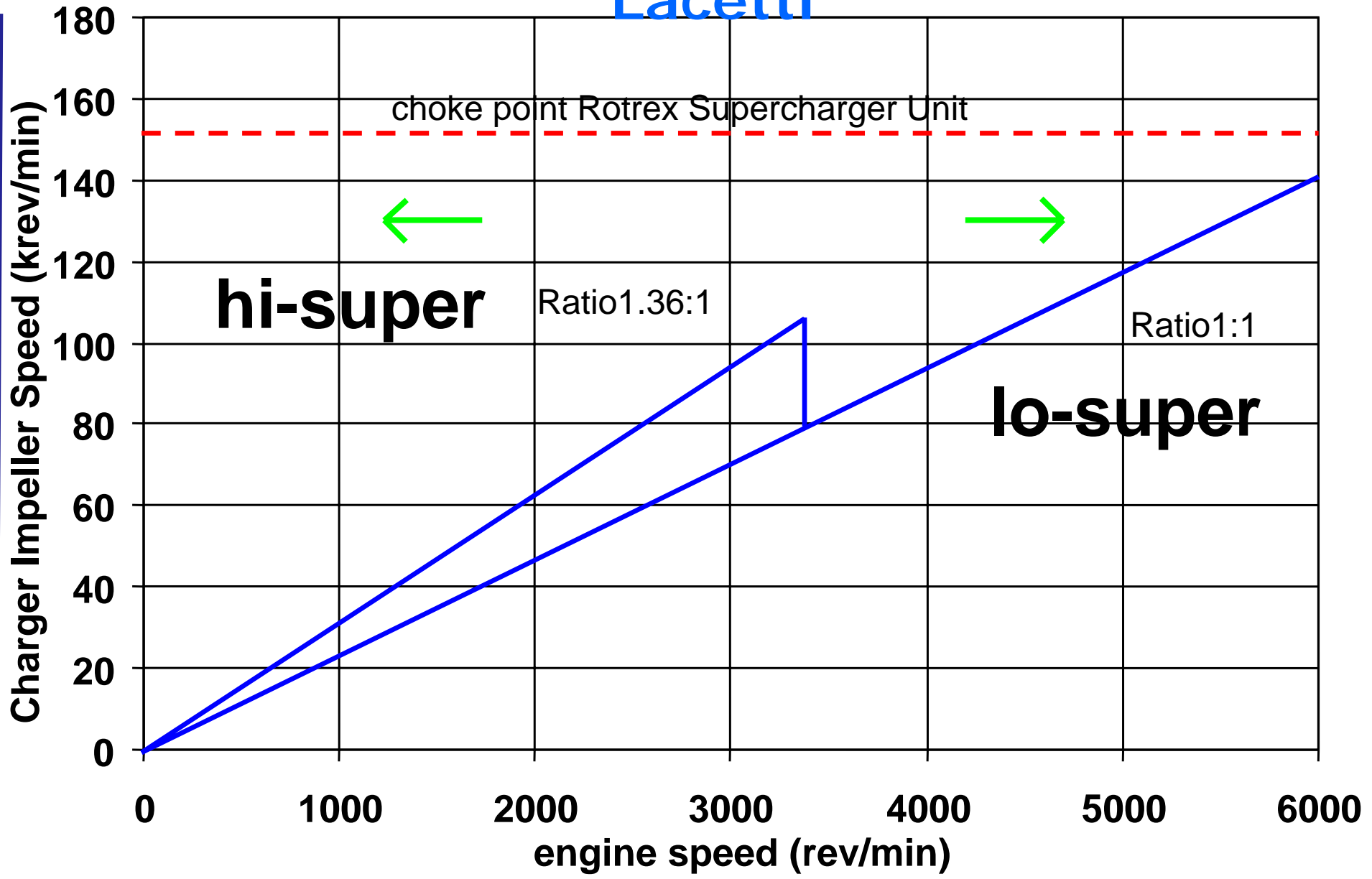


Chevrolet Lacetti 1.8lt Application





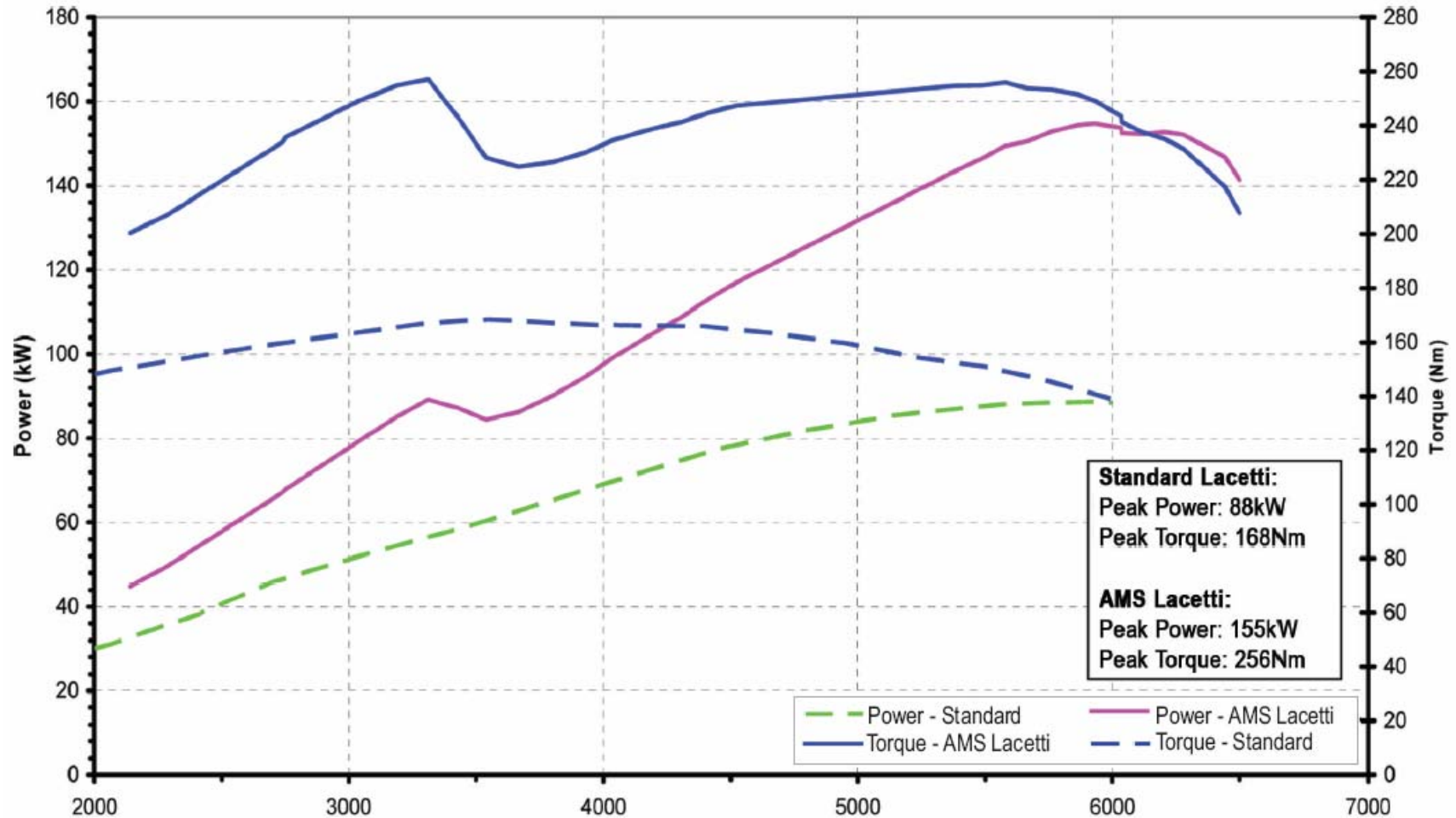
Supercharger Operation Lacetti





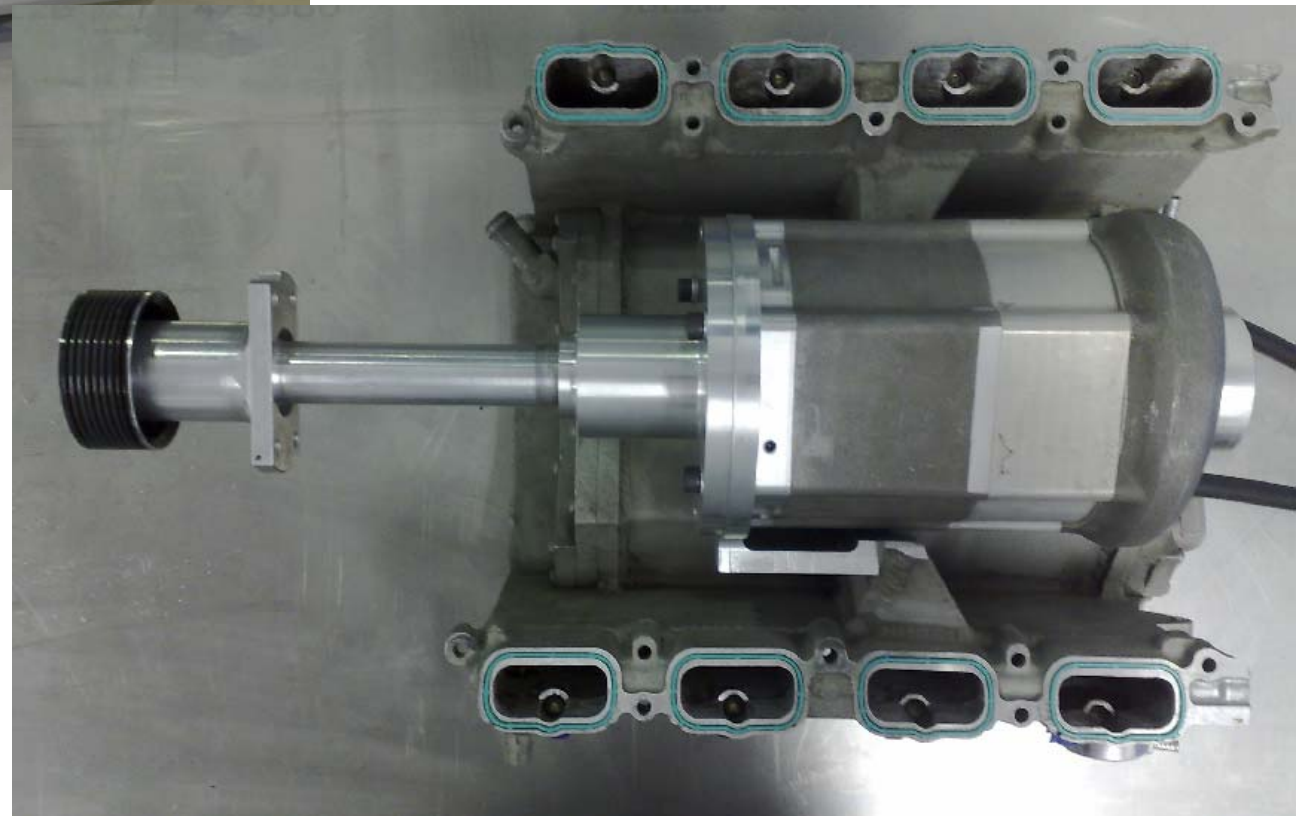
Lacetti

Quasi Static Torque & Power Curves



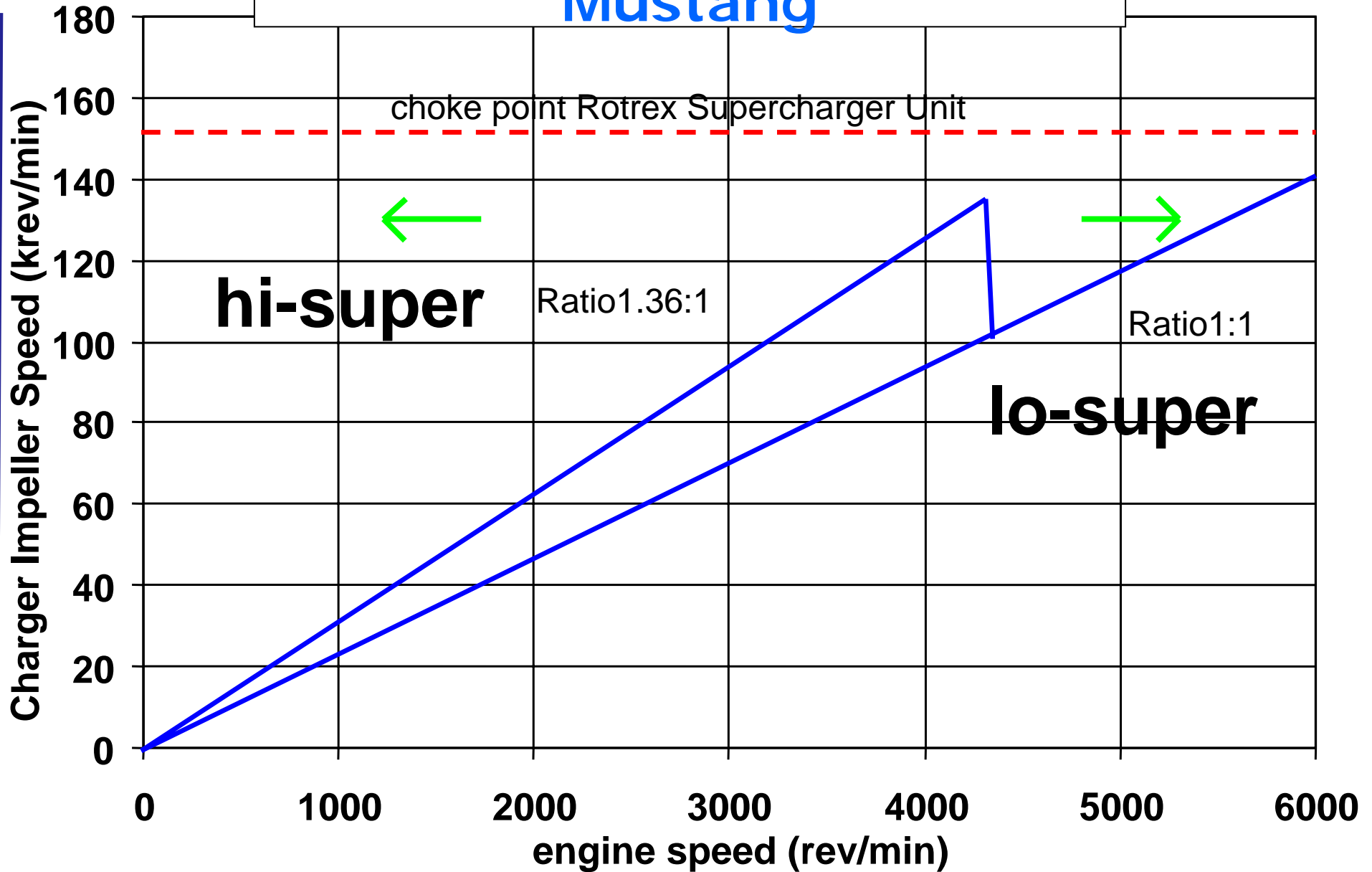


Mustang Quasi Static Power Curve





Supercharger Operation Mustang

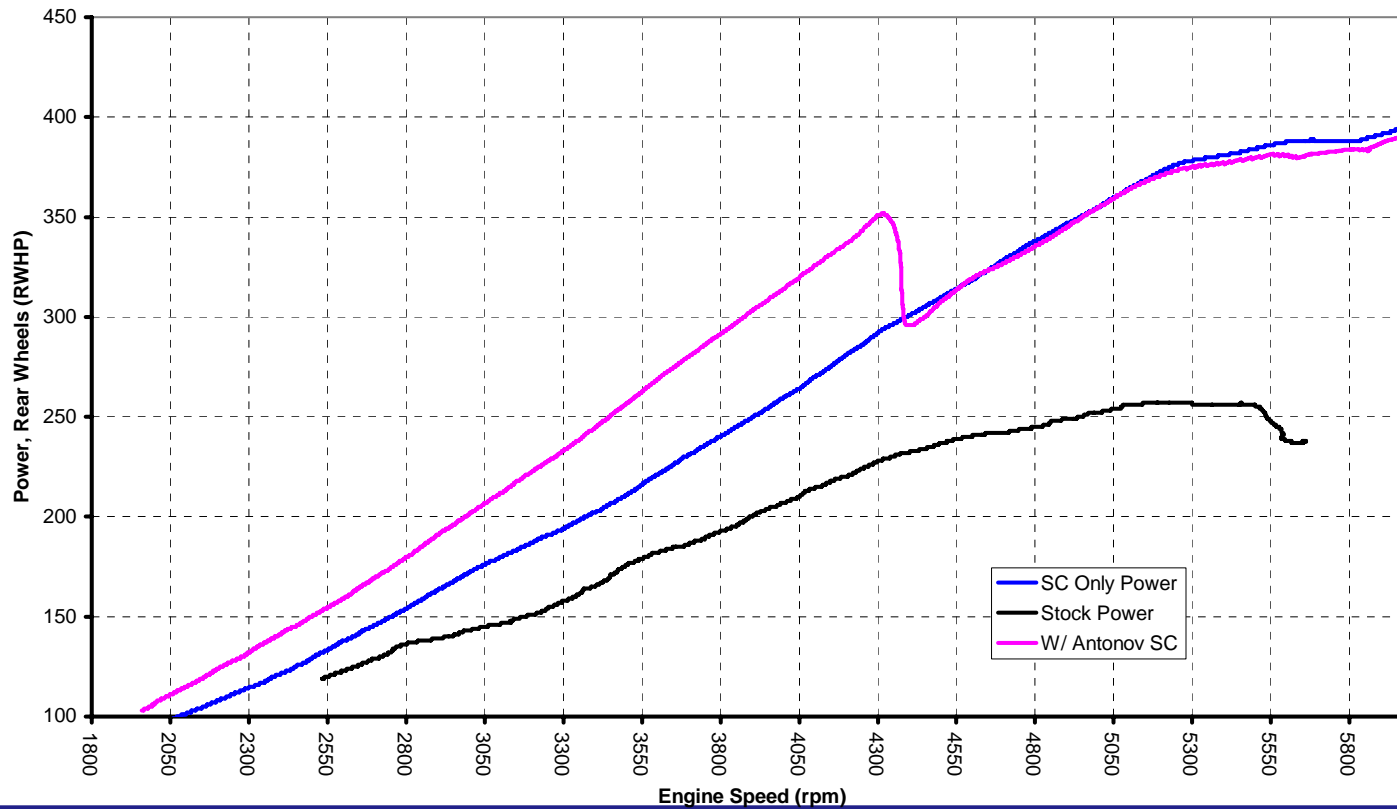




Mustang Quasi Static Power Curve



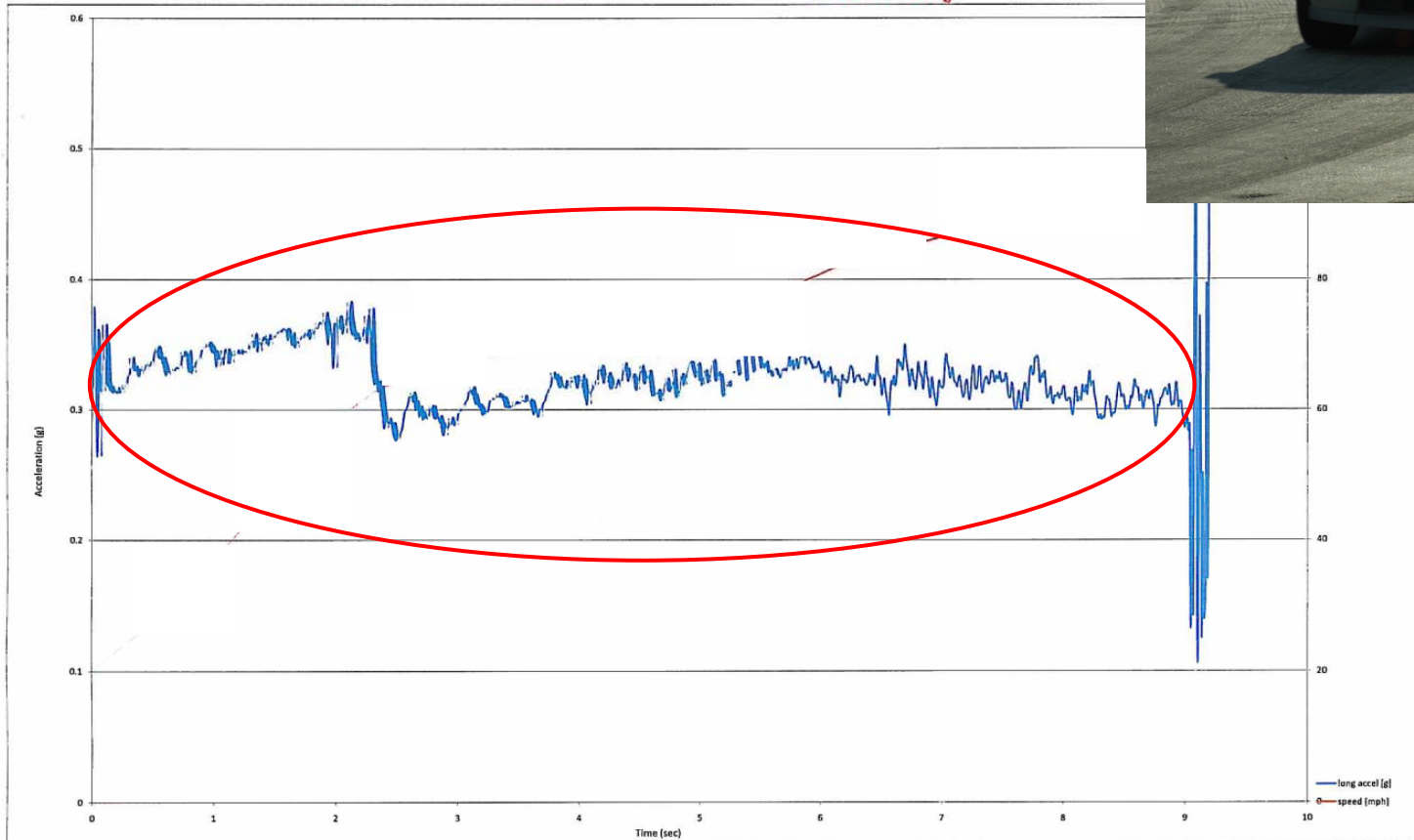
Mustang Power Comparison Data





Mustang V8 Application

MUSTANG 3RD GEAR 25.4.08



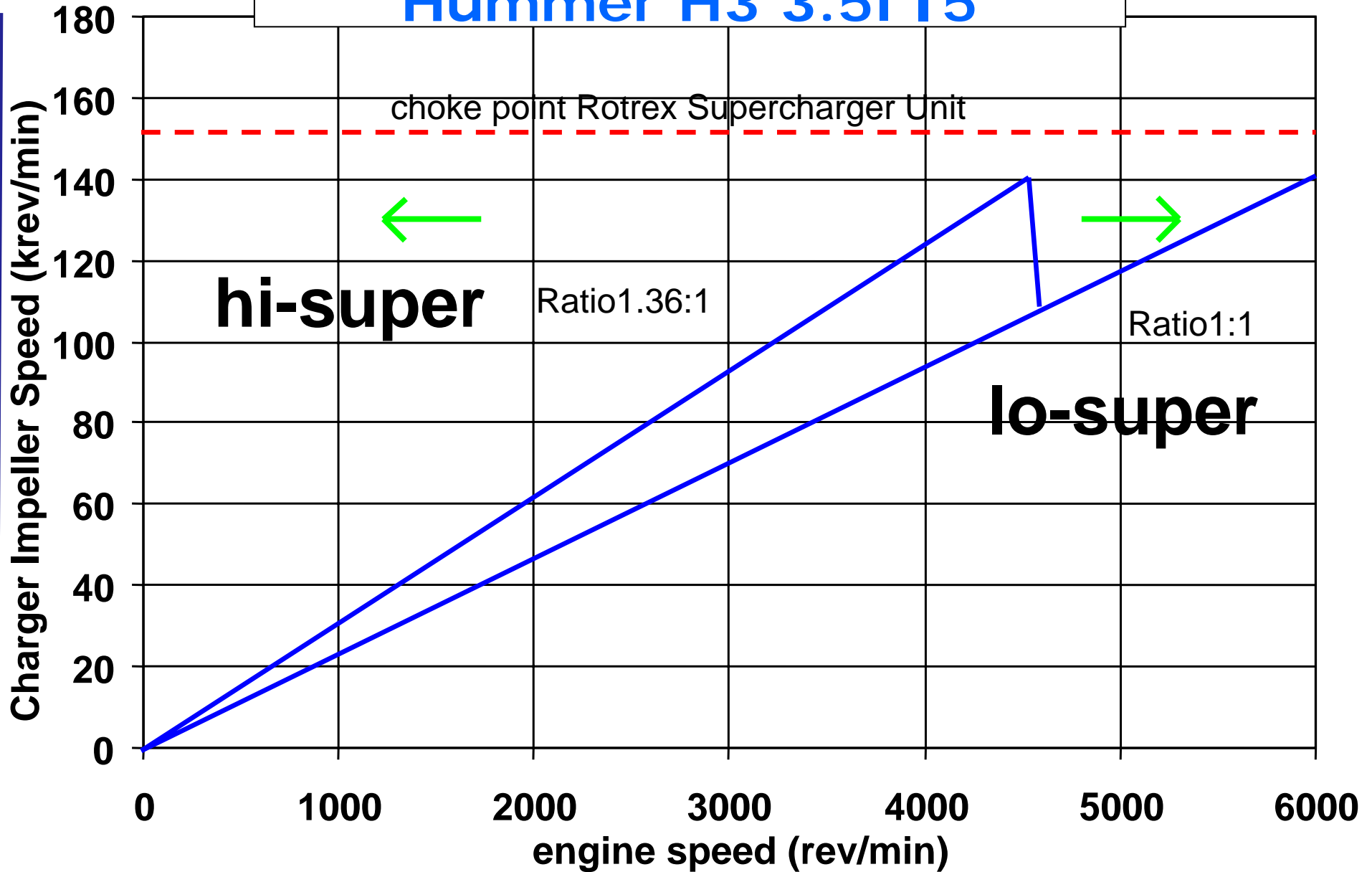


Hummer H3 Application



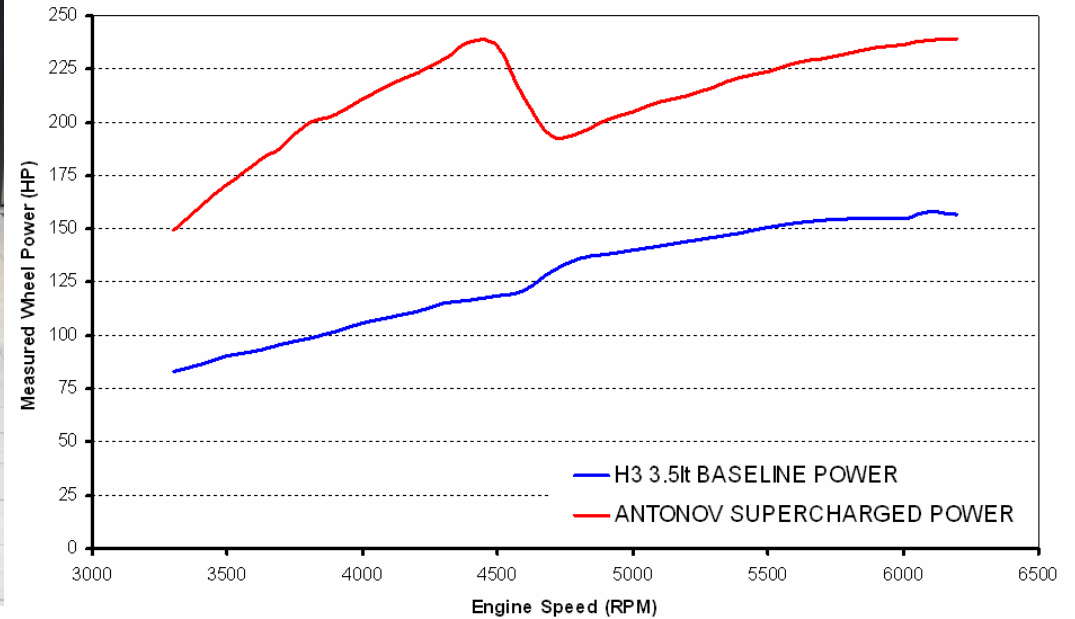


Supercharger Operation Hummer H3 3.5l I5





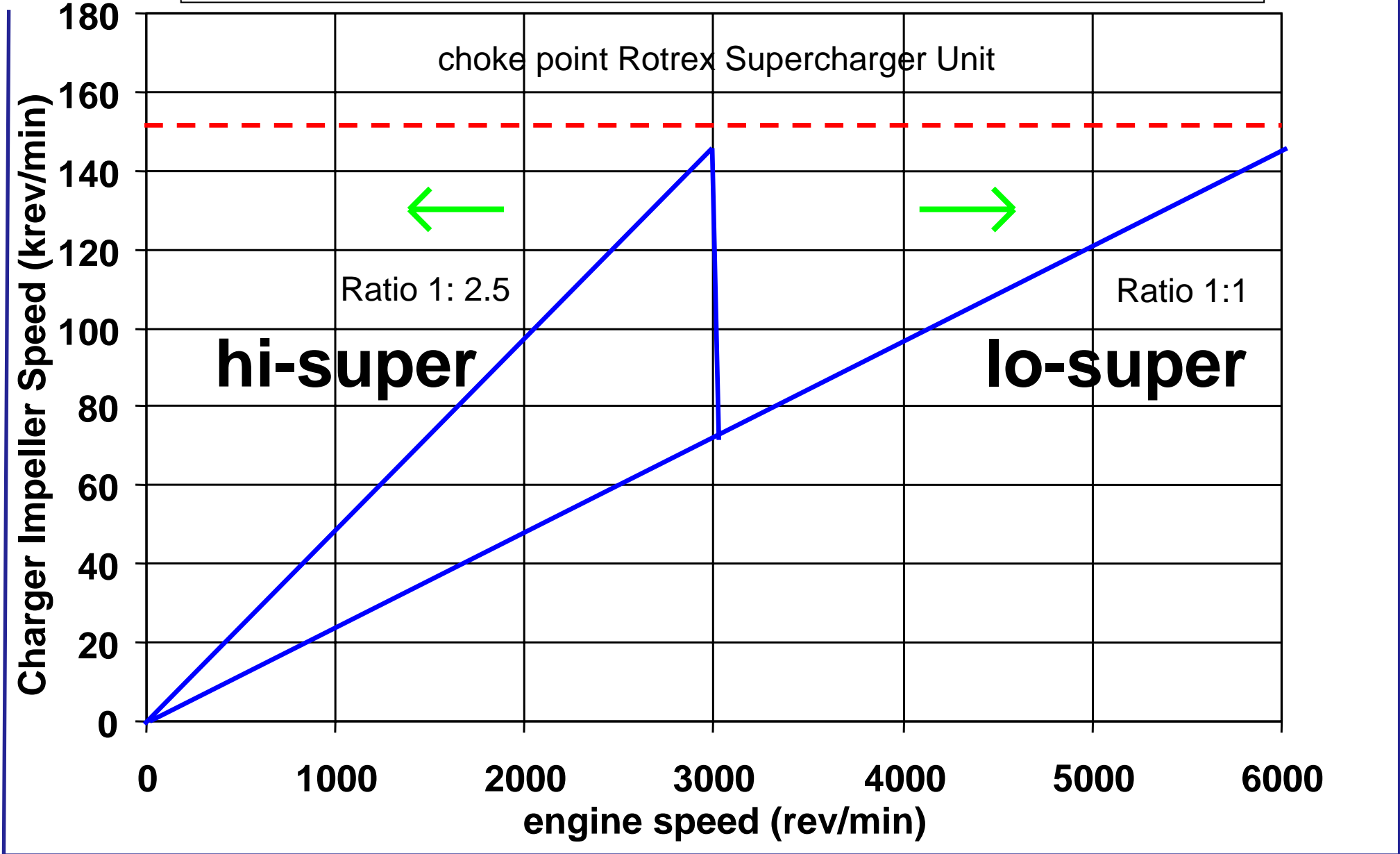
Hummer H3 3.5lt Application



	Hummer H3 3.5lt			
	Standard Engine		2 Speed Supercharged Engine	
	Time (s)	Speed (kph)	Time (s)	Speed (kph)
Flat ground 400m - Drive	18.6	122	16.7	150
Hill climb 125m - Drive	14.9	52	10	82
0-100kph Flat ground - Drive	13.6	100	8.6 (Wet) 7.3 (dry)	100

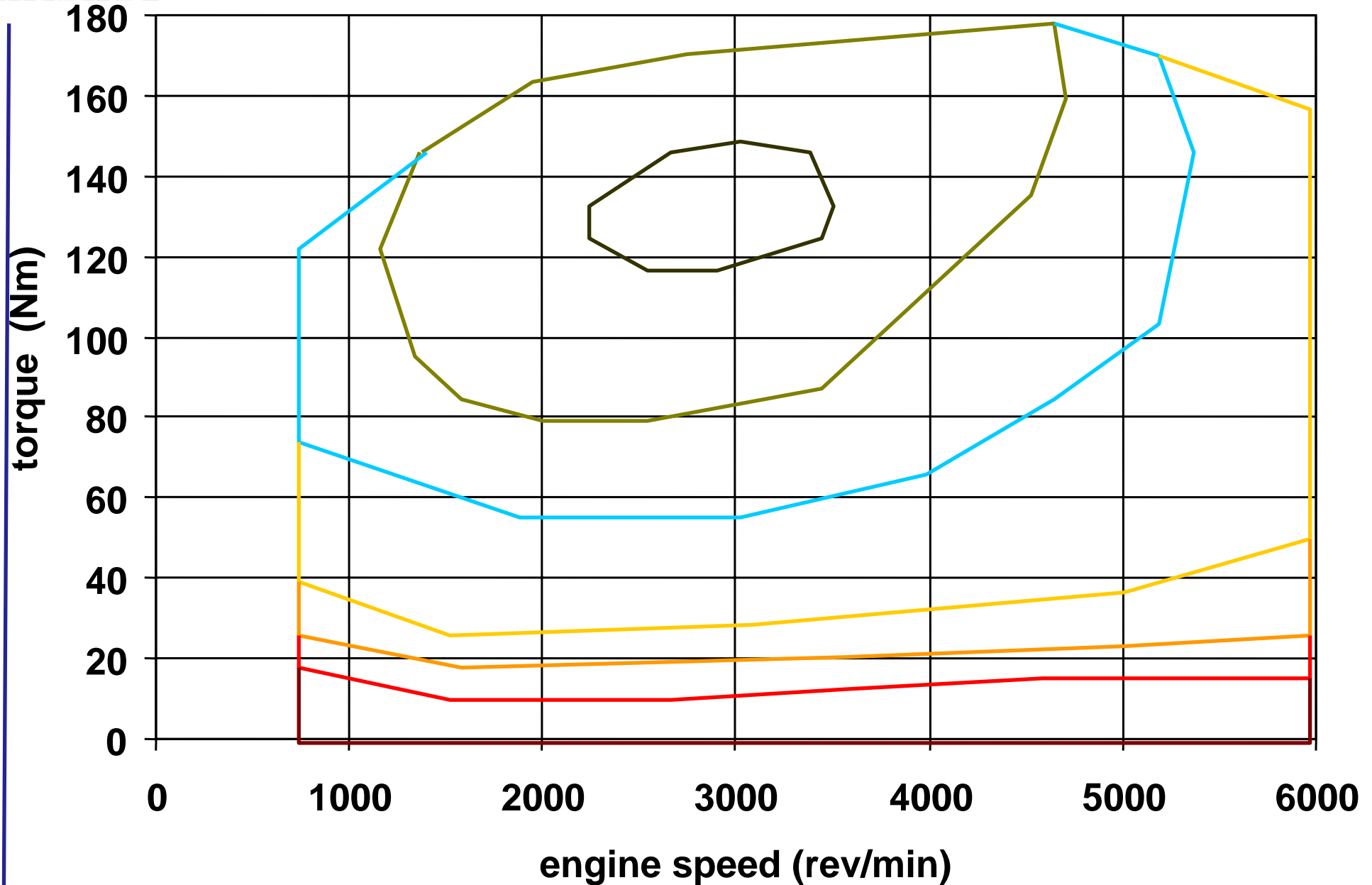


Extreme Supercharger Operation



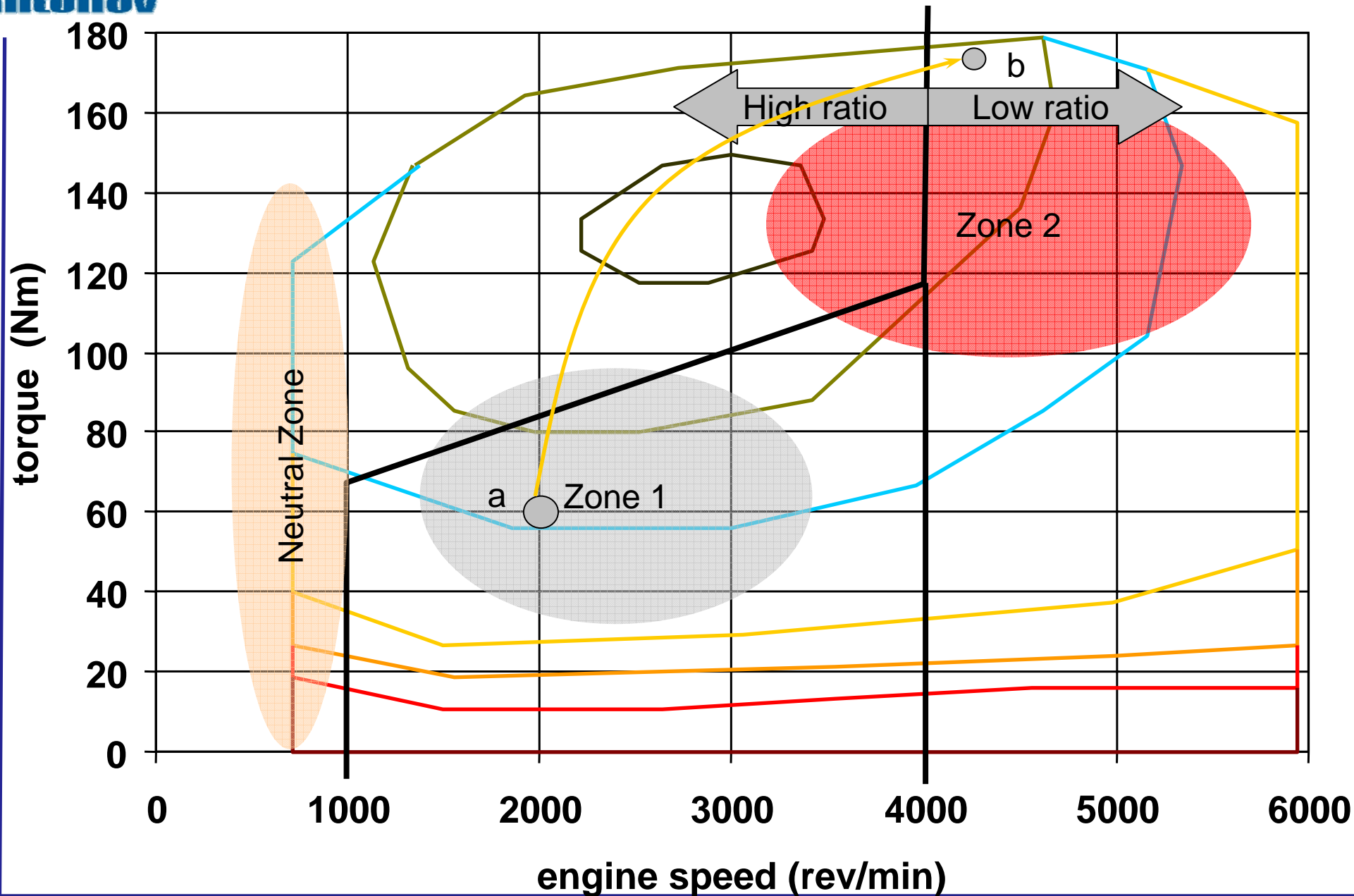


Typical Load Speed Map



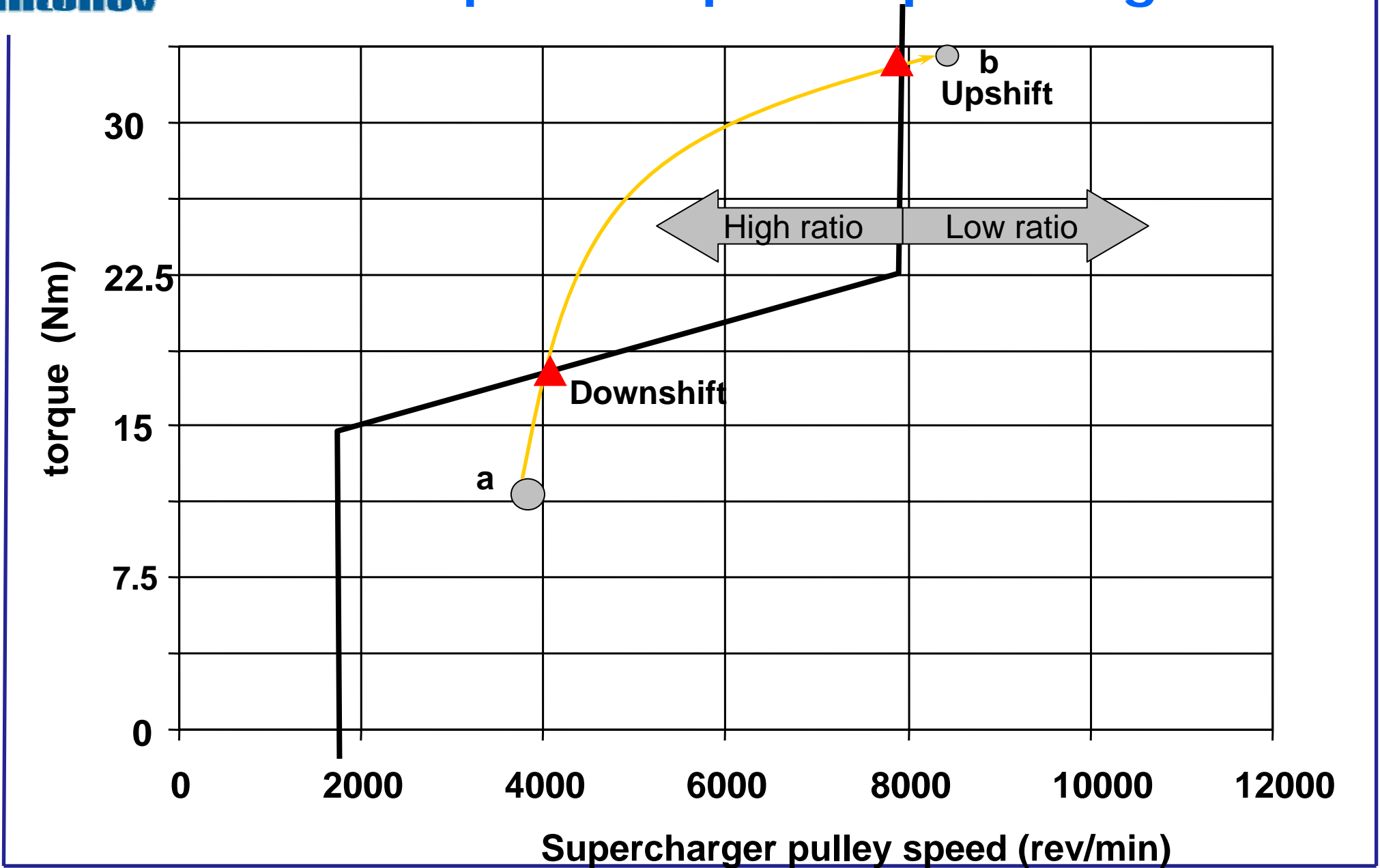


Revised Shift Schedule





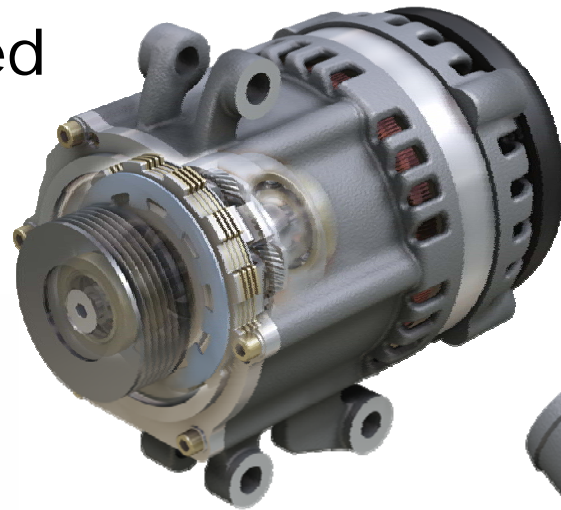
Load Speed Map of Supercharger





Dual-Speed Technology Applications

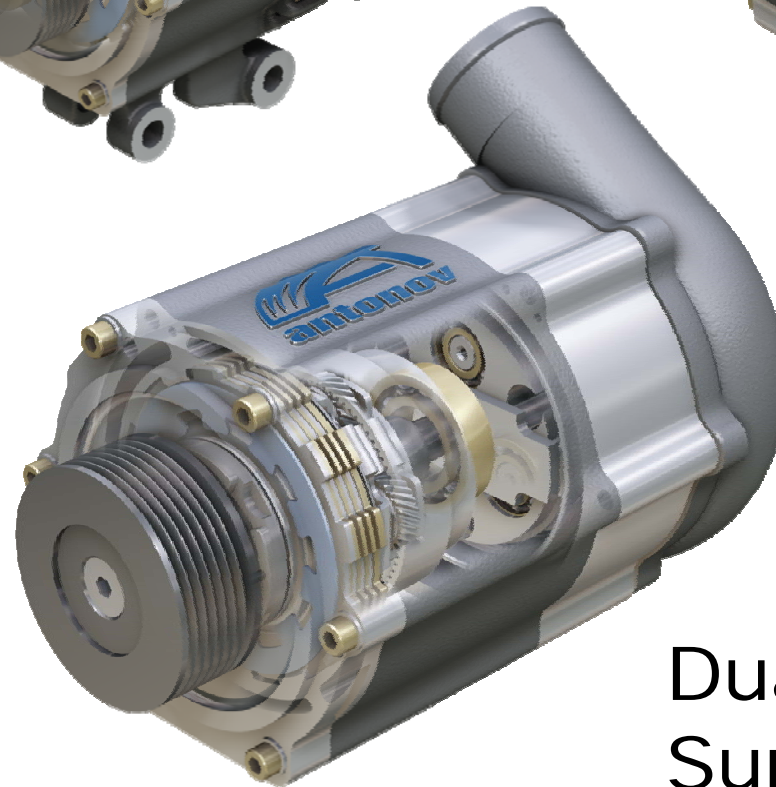
Dual-Speed
Alternator



Dual-Speed
Accessory Drive



Dual-Speed
Crank Pulley



Dual-Speed
Supercharger



Supercharger Matching

- Are two speeds better than one? **YES**
 - The Antonov supercharger enables Engineers to match the airflow / charge to the engine by running the Supercharger faster at low engine speed.
 - The benefit is predictable low speed engine torque that is always available to enhance drivability.

- Are two speeds enough? **YES**
 - Two speeds are enough when considering the cost, weight and packaging balance and with no high temperatures to manage.
 - Driving the vehicles demonstrates the benefit of additional torque at low engine speed and the smooth change between drive ratios.

- How Engineers can use the Dual-Speed technology
 - Down-sizing of engines by 25% to 50% seems feasible
 - Better fuel economy through engine running at low rpm.
 - Performance with excellent Driveability



Antonov Dual-Speed Supercharger

- Antonov has demonstration cars available so you can experience the Dual-Speed Supercharger systems working yourself.
- The 'Mustang' is now here in Germany for selected demonstration purposes with my colleague Dom Toni
- This or other vehicles are available for appropriate persons to test drive by contacting through

www.antonovat.com

Thank You for your attention