

Performance engine preparation

Engine realities

- Production engines used as a base
 - Designed for WOT 10% of the time
 - RPM limits & improved components are needed
- Cold starts and operation
 - Enrichment & idle speed
 - Fuel vaporization
- Street engines require vacuum
 - EFI sensors
 - Power brakes
 - Spark timing on some engines

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Engine realities

- Emissions testing

CO & HC must be controlled

NOX tested on a chassis dyno

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Enhancements for reliability

- Increased bearing clearance for cooling
 - Oil volume increases 5x, with double clearance
- High volume oil pumps to *maintain* pressure
- Increased sump capacity & windage trays
- Increased spring pressure
- Guide plates to stabilize valve trains
- Reduced reciprocating weights
- High strength fasteners
- Engine balance

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Improving efficiency

- Increase cylinder filling on intake stroke
 - Increase volumetric efficiency
 - Increase flow into cylinders
- Increase cylinder pressure
 - Higher mean effective pressure
 - Avoid detonation

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Volumetric efficiency

- Air flow into engine divided by swept volume
 - Does not include clearance volume
 - Includes air flow lost during overlap

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Volumetric efficiency explained

- 90% VE means...
The volume of piston displacement plus the clearance volume at low pressure after the intake stroke, is equal to 90% of swept volume only at atmospheric pressure.