

VARIABLE VALVE TIMING PROGRAM



**WHAT'S IN
YOUR BOX?™**

**HERE'S WHAT'S
IN OURS.**



600+
COMPONENTS



The most comprehensive VVT line in the aftermarket now features more than 600 VVT Solenoids, Sprockets, Oil Control Valves, Service Kits, and more

Blue Streak® VVT Solenoids and Sprockets feature design improvements for more durable, longer-lasting components

**COMPLETE
REPAIR**

Many Standard® and Blue Streak® VVT components include gaskets and seals where required for a complete repair



Variable Valve Timing

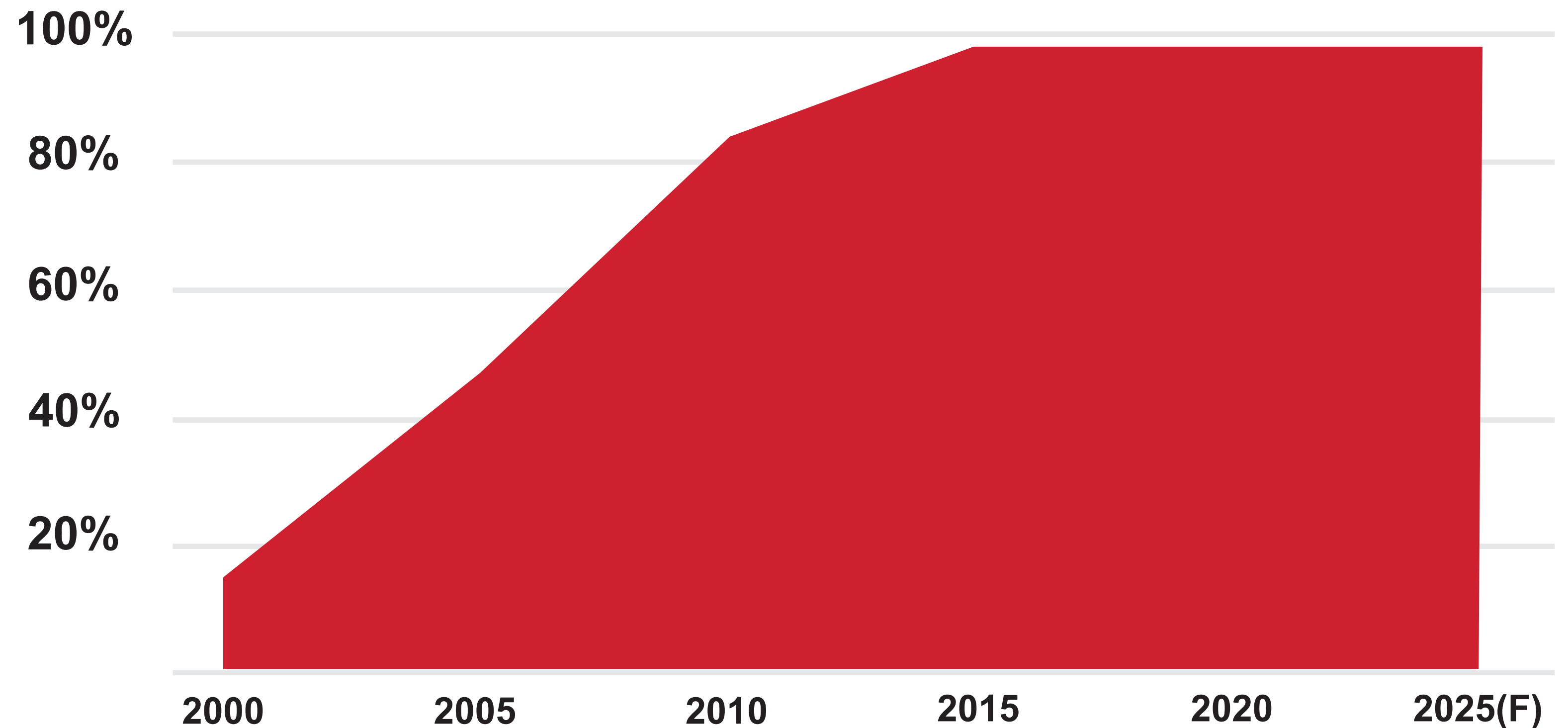
StandardBrand.com

Growing Market

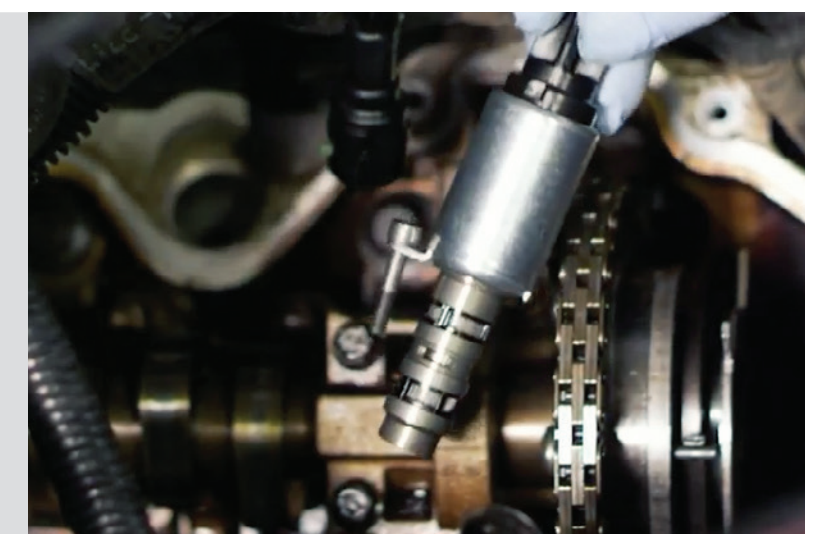
Almost every new vehicle with an internal combustion engine is now equipped with variable valve timing. There are already more than 270 million VVT-equipped vehicles on the road and they are getting older each day.

As an industry that generally services 6- to 12-year-old vehicles, the future for VVT maintenance and repair is bright.

New ICE Vehicles Equipped with Variable Valve Timing



In the next 5 years, 76 million more vehicles with Variable Valve Timing will enter the Aftermarket “Sweet Spot” (6-12 years old) during which their VVT sprockets and solenoids may need to be serviced or replaced.



Source: SMP Internal Data



Variable Valve Timing

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Opportunities

The OE VVT components on the Ford 5.4L are known for their high failure rates. Ford has even released a Technical Service Bulletin on this topic and recommends replacing the VVT solenoids when there is a rattling noise or a rough idle.



5.4L 3V – INTERMITTENT RATTLE NOISE WHILE DRIVING / ROUGH IDLE WHEN ENGINE IS AT OPERATING TEMPERATURE	TSB 14-0114
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FORD:
2004-2010 F-150
2005-2010 F-250, F-350
2005-2013 Expedition
LINCOLN:
2006-2008 Mark LT
2005-2013 Navigator

This article supersedes TSB 12-7-10 to update the vehicle model years and Service Procedure.

ISSUE
Some 2004-2010 F-150, 2005-2010 F-Super Duty 250/350, 2005-2013 Expedition, Navigator and 2006-2008 Mark LT vehicles equipped with 5.4L 3V engine may exhibit an intermittent rattle noise while driving from idle up to 1200 RPM when the engine is at operating temperature. In severe cases, a rough idle and diagnostic trouble codes (DTCs) P0022, P0021, P0340, and/or P0341 may be stored in the powertrain control module (PCM).

ACTION
Follow the Service Procedure steps to correct the condition.

SERVICE PROCEDURE
Replace the left and right variable cam timing (VCT) solenoids. Refer to Workshop Manual (WSM), Section 303.

PART NUMBER	PART NAME
8L3Z-6M280-B	VCT Solenoid
7L1Z-6584-B	Left Side Cam Cover Gasket—14 Bolt Cam Cover
7L1Z-6584-A	Right Side Cam Cover Gasket—8/9 Bolt Cam Cover
3L3Z-6584-EA	Right Side Cam Cover Gasket—14 Bolt Cam Cover
3L3Z-6584-DB	Left Side Cam Cover Gasket—15 Bolt Cam Cover
3L3Z-6C535-AA	VCT Solenoid To Cam Cover Gasket

OPERATION	DESCRIPTION	TIME
140114A	2005-2006 Expedition, Navigator F-Super Duty 250/350 2004-2006 F-150, 2006 Mark LT 5.4L 3V: Retrieve DTCs And Replace Both VCT Solenoids (Do Not Use With Any Other Labor Operations)	0.6 Hr.
140114A	2008-2010 F-Super Duty 250/350 5.4L 3V: Retrieve DTCs And Replace Both VCT Solenoids (Do Not Use With Any Other Labor Operations)	2.6 Hrs.
140114A	2007-2013 Expedition, Navigator, 2007 F-Super Duty 250/350 5.4L 3V: Retrieve DTCs And Replace Both VCT Solenoids (Do Not Use With Any Other Labor Operations)	3.1 Hrs.
140114A	2007-2010 F-150, 2007-2008 Mark LT 5.4L 3V: Retrieve DTCs And Replace Both VCT Solenoids (Do Not Use With Any Other Labor Operations)	3.5 Hrs.

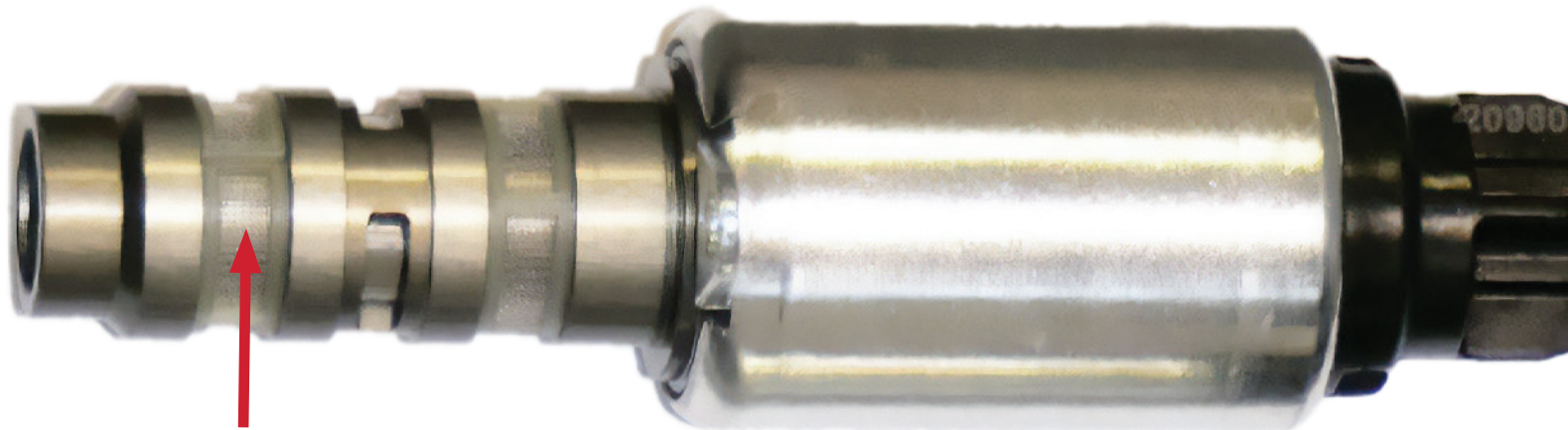
NOTE: The information contained in Technical Service Bulletins is intended for use by trained, professional technicians with the knowledge, tools, and equipment to do the job properly and safely. It informs these technicians of conditions that may occur on some vehicles, or provides information that could assist in proper vehicle service. The procedures should not be performed by "do-it-yourselfers". Do not assume that a condition described affects your car or truck. Contact a Ford, Lincoln, or Mercury dealership to determine whether the bulletin applies to your vehicle. Warranty Policy and Extended Service Plan documentation determine Warranty and/or Extended Service Plan coverage unless stated otherwise in the TSB article. The information in this Technical Service Bulletin (TSB) was current at the time of printing. Ford Motor Company reserves the right to supersede this information with updates. The most recent information is available through Ford Motor Company's on-line technical resources.

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Ford Technical Service Bulletin TSB-14-0114

OE Problem:

The oil screen often separates or the solenoids become clogged, causing a premature failure on the Ford 5.4L



Plastic Oil Screen:

Can separate or break down, clogging the solenoid

Blue Streak® Solution:

The Blue Streak® VVT101 features an improved steel oil screen welded to the solenoid body which won't break down or clog



Reinforced Steel Oil Screen:

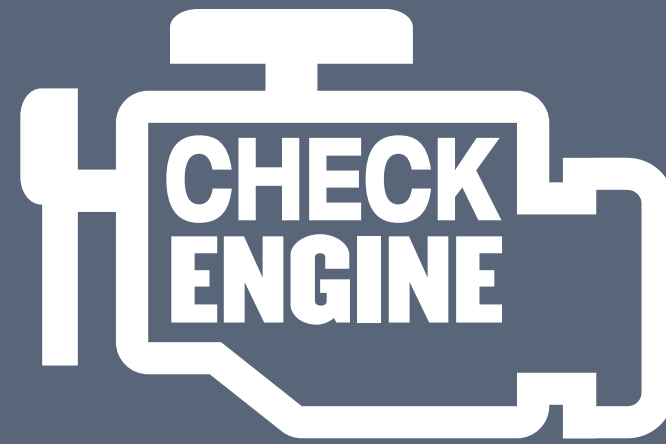
Can't separate from the body or break down like plastic



VVT Solenoids

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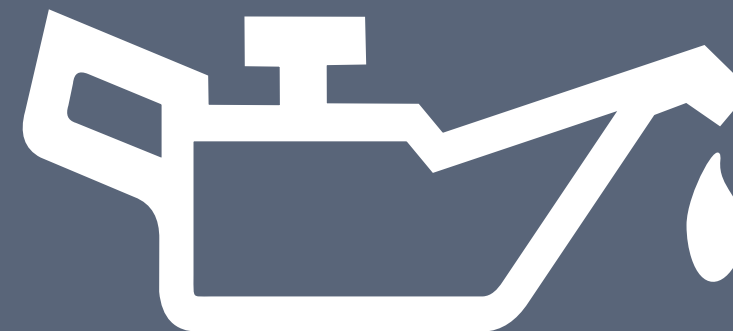
Impact on Engine Systems



A VVT system that is “stuck” out of time can result in a crank / no start situation. Several manufacturers have TSBs related to this



Using the correct oil weight is critical to the operation of any variable valve timing system

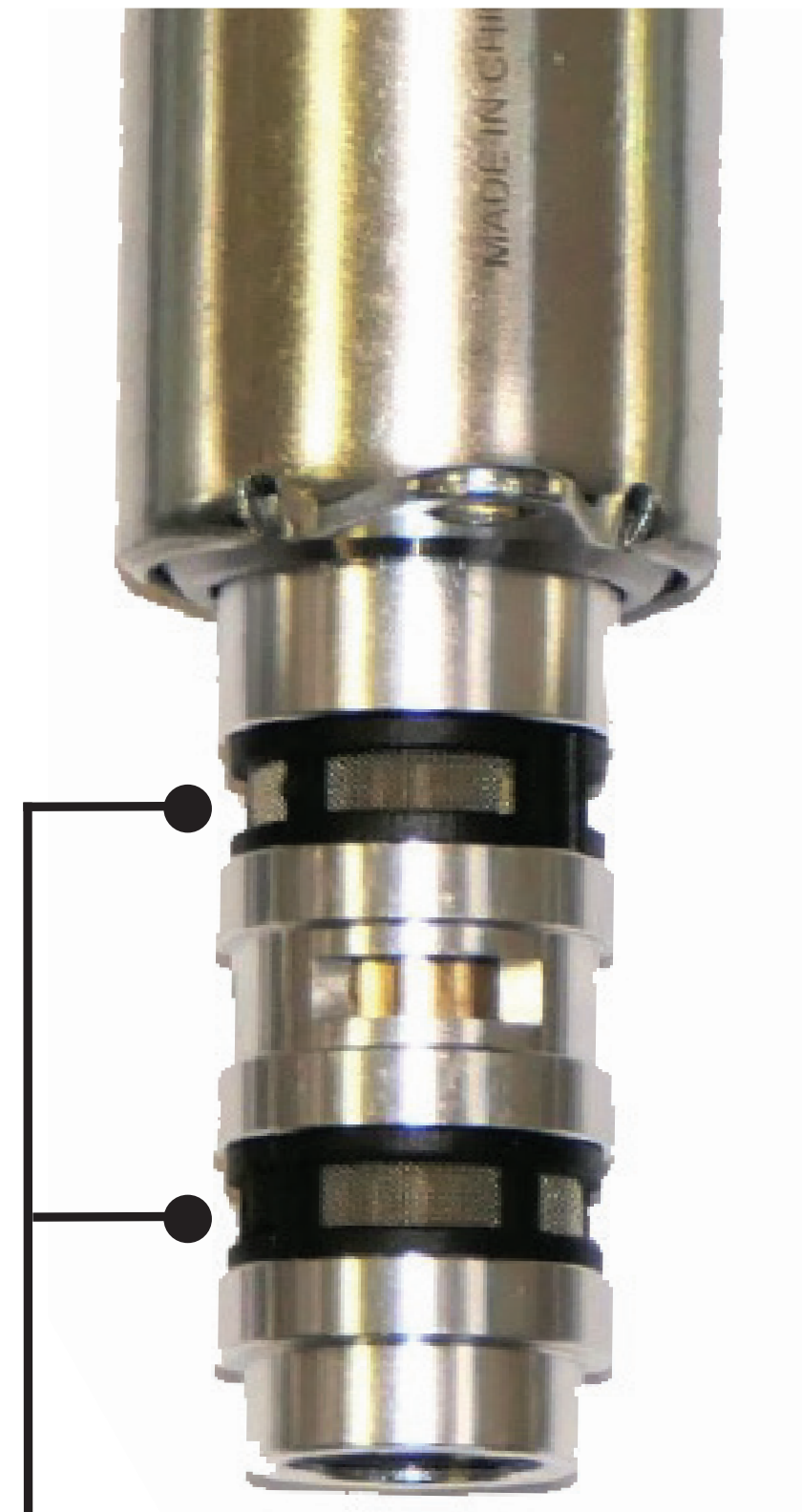


Low oil pressure will affect VVT system performance. Prior to installing new components, ensure that base engine oil pressure is within specifications

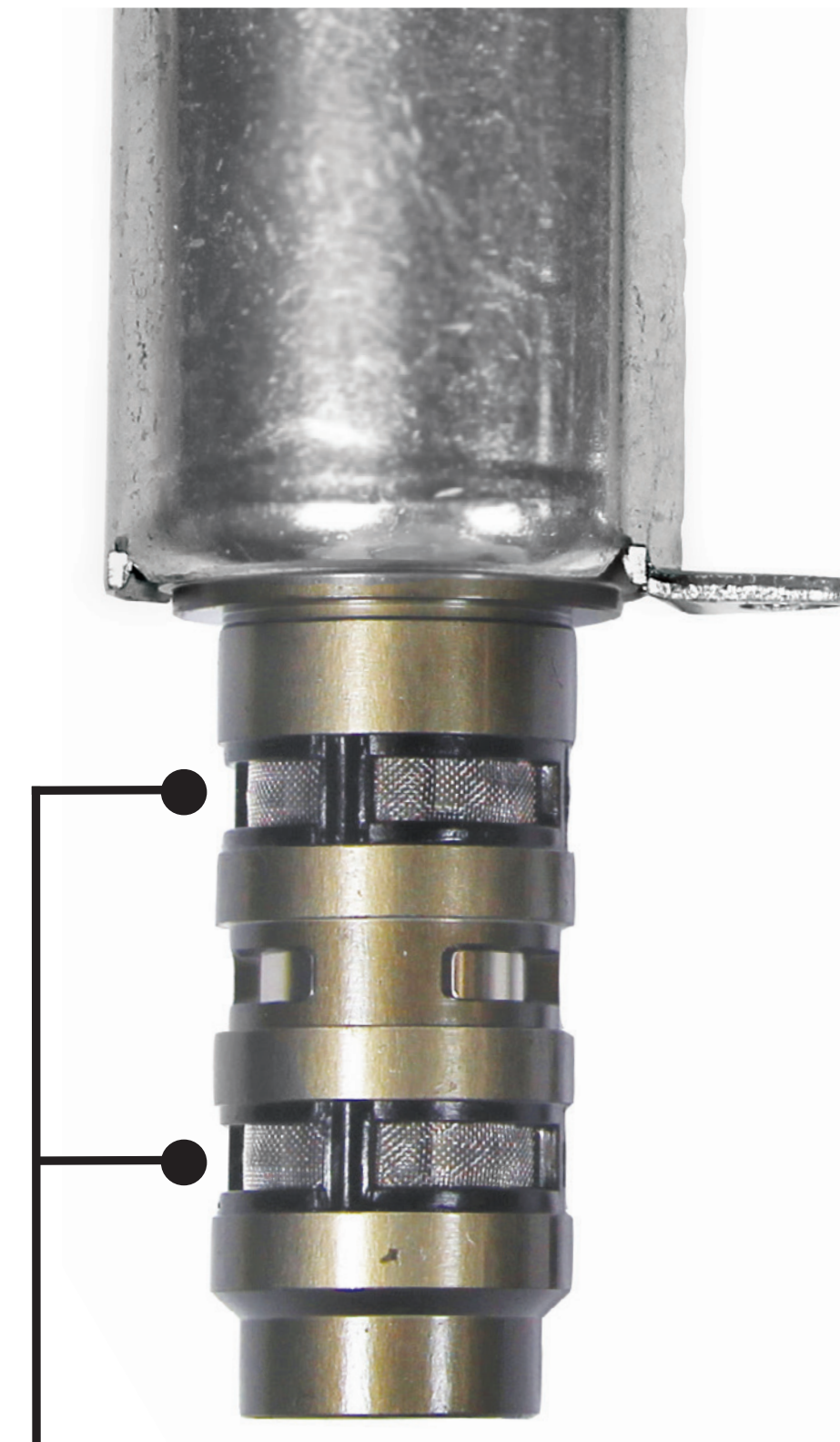
Engineering Improvements

Blue Streak® VVT Solenoids feature design improvements over the original and the competition.

For instance, OE and competitor solenoids use plastic retainers on the oil screen, which are prone to deteriorating and separating, failing to hold the screen to the body. Our improved screen is stamped and welded as a result of Standard's commitment to high-quality design and manufacturing.



**Competition
uses plastic**



**OE uses
plastic**



**Blue Streak®
VVT101 uses
a reinforced
metal screen**

Engineering Improvements

Blue Streak® VVT Solenoids feature a stainless steel shaft for a durable and more reliable solution while the OE and competitor units use weaker materials which are prone to deformation and wear.

In addition, Blue Streak® VVT Solenoids include a groove on the armature for improved lubrication, allowing for faster valve switching and decreased wear of the armature. Competitors do not use grooves for lubrication, resulting in slower valve switching and accelerated wear.

VVT Solenoid Comparisons

The Blue Streak® VVT198 uses a stainless steel shaft pressed all the way to the armature for durability and reliability

OE: Thin, rolled sheet-metal shaft – prone to deformation, resulting in a change in valve timing

Competitor 1: Aluminum shaft – can deform over time and alter valve timing

Competitor 2: Plastic shaft – prone to breaking, cracking, or premature wear

Blue Streak® & OE:
Groove on the armature for lubrication

Competitor 1 & Competitor 2:
No grooves for lubrication

Source: SMP Testing Lab, 2020



VVT Solenoids

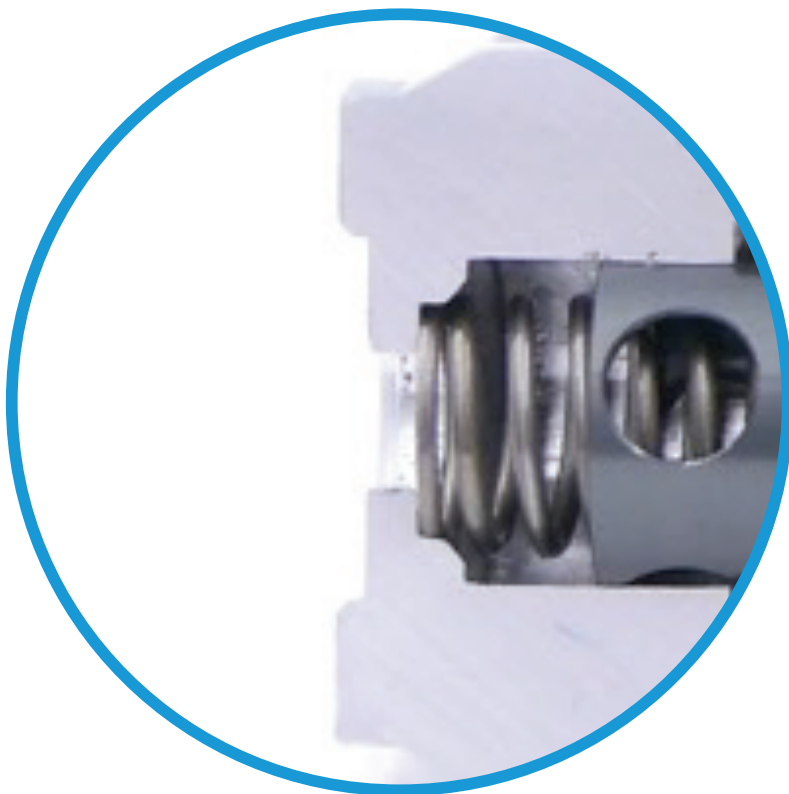
StandardBrand.com

Engineering Improvements

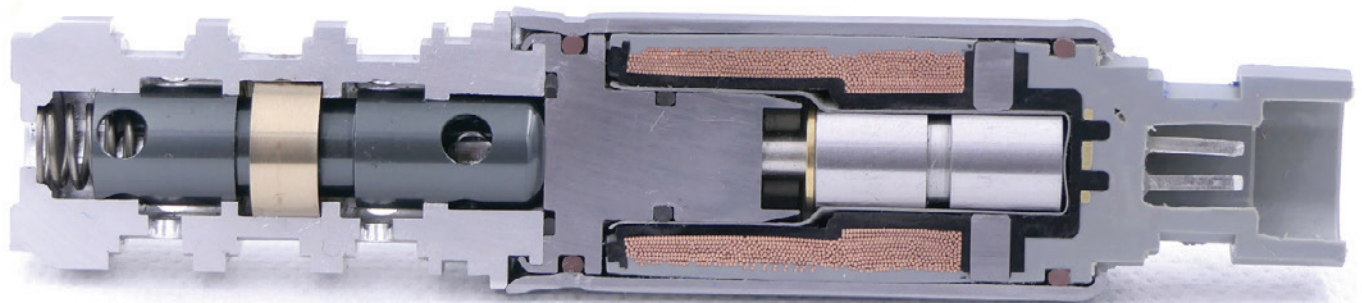
The OE and competitors' VVT solenoids use pressed rings for spring support that can fall apart over time.

Blue Streak® VVT Solenoids feature a closed valve body for spring support, which keeps the spring intact, even after millions of valve switches.

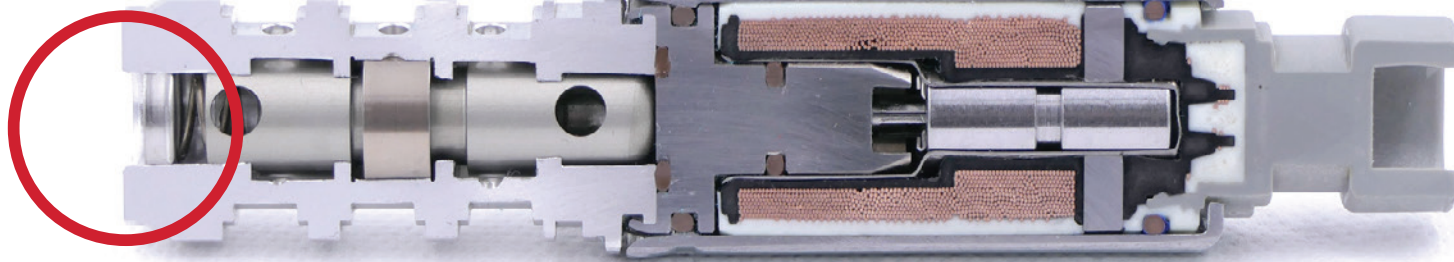
VVT Solenoid Comparisons



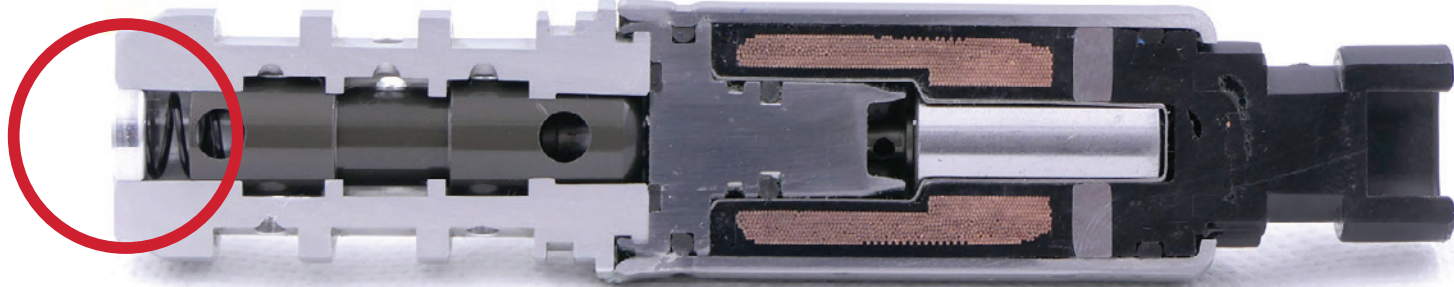
Blue Streak®
VVT198



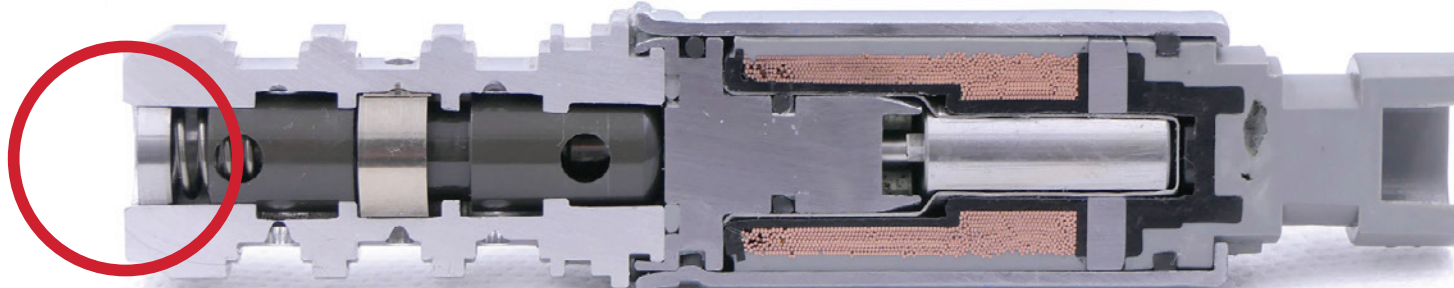
OE



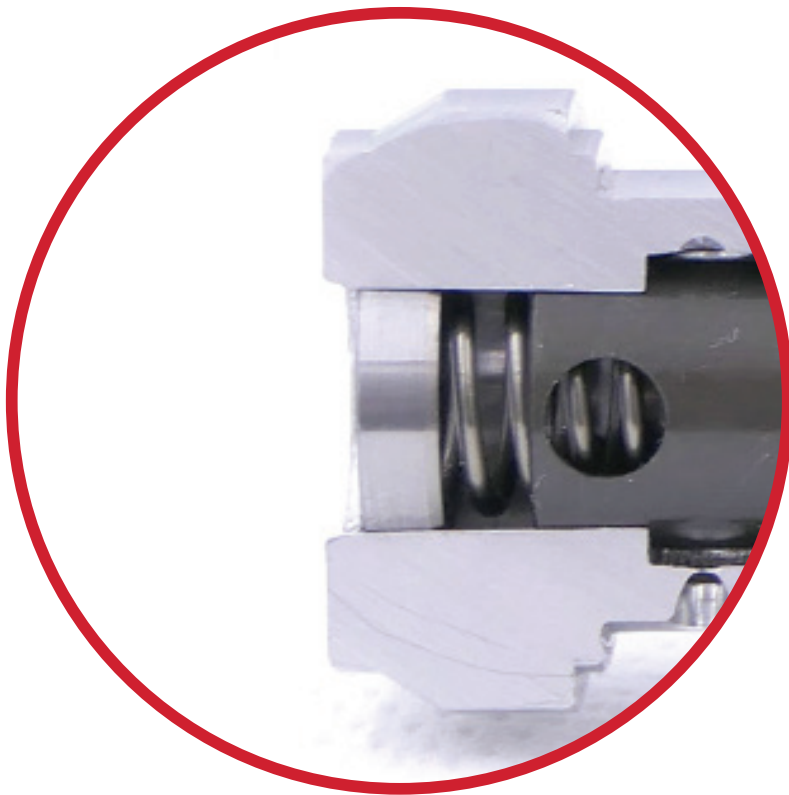
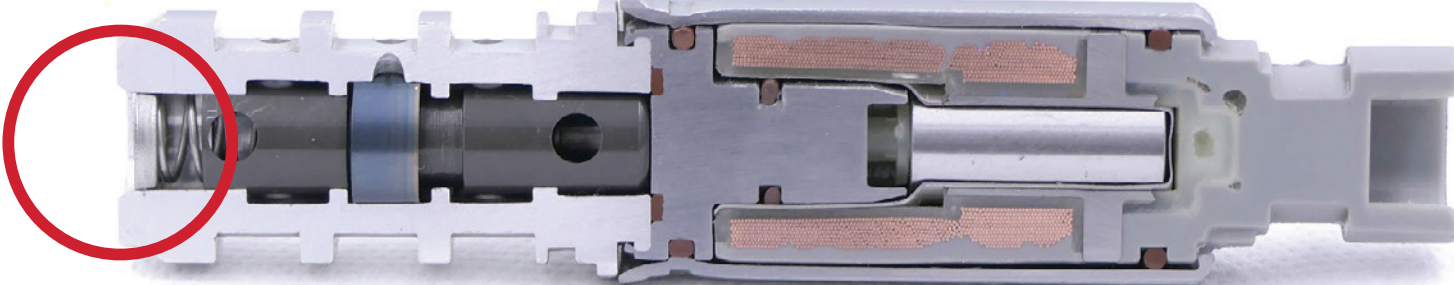
Competitor 1



Competitor 2



Competitor 3



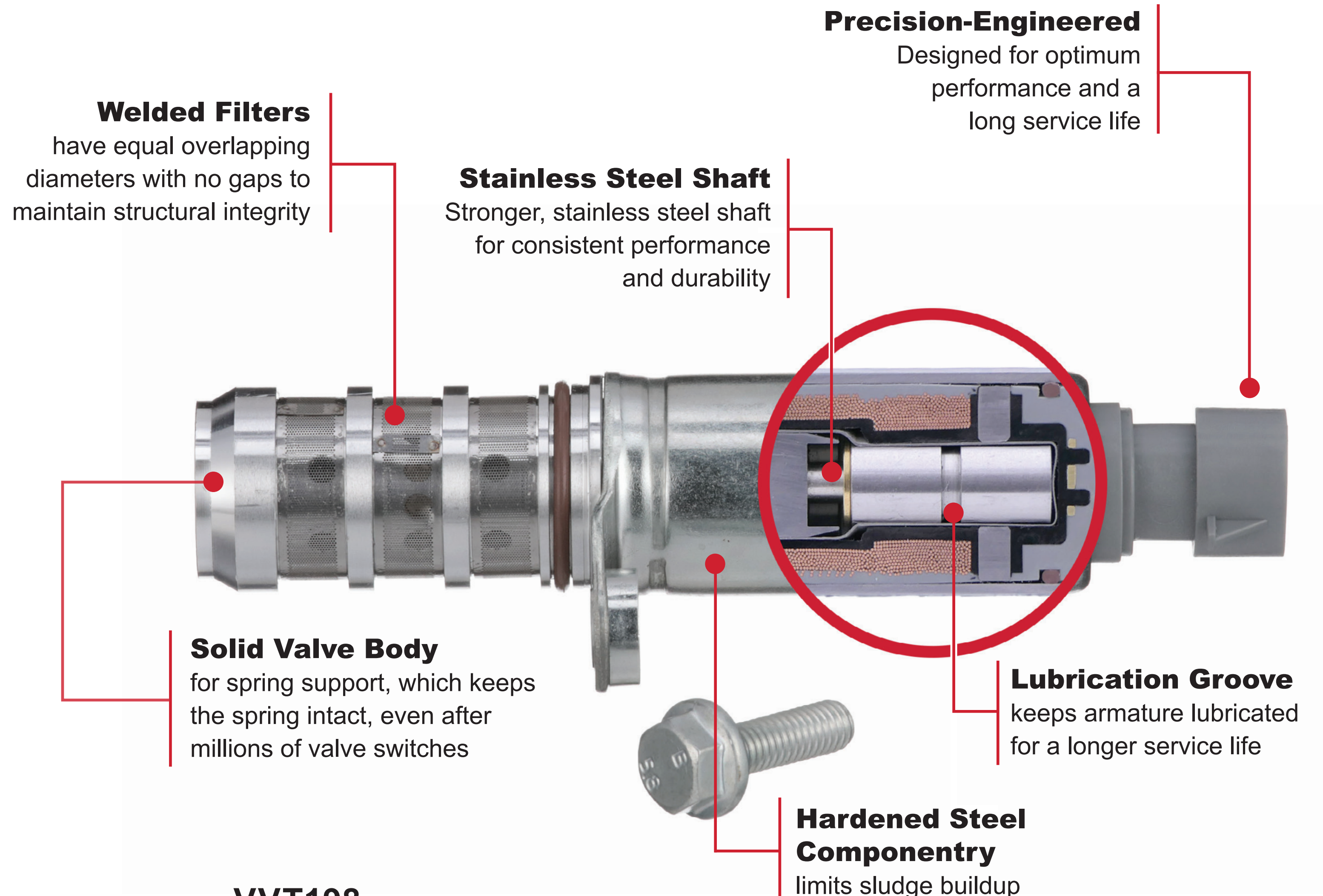
Pressed Ring

Source: SMP Testing Lab, 2020

Premium Quality

Generally located on or around the cylinder head, VVT solenoids meter the oil flow to control the actuation of the VVT sprocket.

Each Standard® and Blue Streak® VVT Solenoid features anodized steel componentry, which limits sludge buildup and protects against sticking. Standard® and Blue Streak® Solenoids also feature premium O-rings and gaskets to prevent oil leaks, as well as an OE-matching harness connector.



VVT198
GM Cars & SUVs
(2022-06)



VVT Solenoids

StandardBrand.com

Product Spotlight

Problem:

VVT is a complex system, and solenoid designs can vary from application to application. For example, the Honda / Acura 3.5L engine features a solenoid with an upper and lower portion.

The upper portion contains the moving elements and electric components while the lower portion is a cast aluminum housing. Often, it is only the top part that fails. In most cases, there is no reason to replace the whole unit.

Blue Streak® Solution:

The Blue Streak® VVT282UP includes a new upper solenoid, gaskets and hardware, allowing the technician to replace only the failed upper portion of the solenoid with just three bolts. VVT282UP is manufactured in SMP's state-of-the-art Poland facility.

Design Improvements

Retaining surface increased to prevent the bushing from being pressed incorrectly

Precision Manufactured

in our state-of-the-art Poland facility

New Seals Included

which are easily replaced during installation

Simplified Installation

Installation requires removing only three screws, while replacing the entire solenoid requires disassembling the intake manifold, valve cover, and valvetrain components

New Hardware Included

so the original hardware doesn't need to be reused



VVT282UP
Acura / Honda 3.5L
(2016-08)



VVT Solenoids

StandardBrand.com

TOP MOVERS RANKED: VVT Solenoids

IMPORT APPLICATIONS



VVT144

Honda / Acura
Cars & SUVs
(2012-02)

1



VVT377

Nissan / Infiniti
Cars, Trucks, SUVs & Vans
(2025-13)

2



VVT374

Subaru
Cars & SUVs
(2021-11)

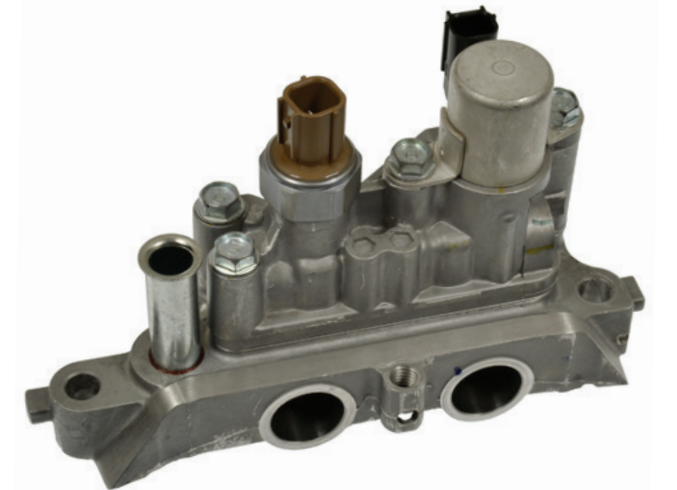
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VVT143

Nissan
Cars & SUVs
(2020-13)

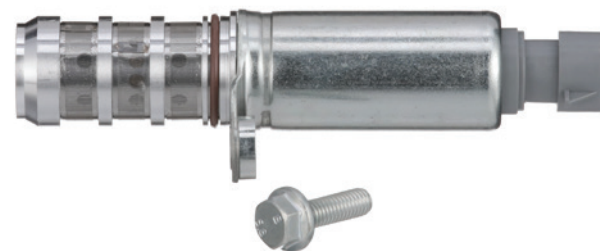
4



VVT282

Honda / Acura
Cars & SUVs
(2016-08)

5



VVT198

GM
Cars & SUVs
(2022-06)



VVT199

GM
Cars & SUVs
(2017-06)



VVT352

Chrysler / Dodge / Jeep / Ram
Cars, Trucks & SUVs
(2025-16)



VVT317

GM
Cars, Trucks & SUVs
(2025-16)



VVT319

Chrysler / Dodge / Jeep / RAM
Cars, Trucks & SUVs
(2024-11)

DOMESTIC APPLICATIONS



VVT Components

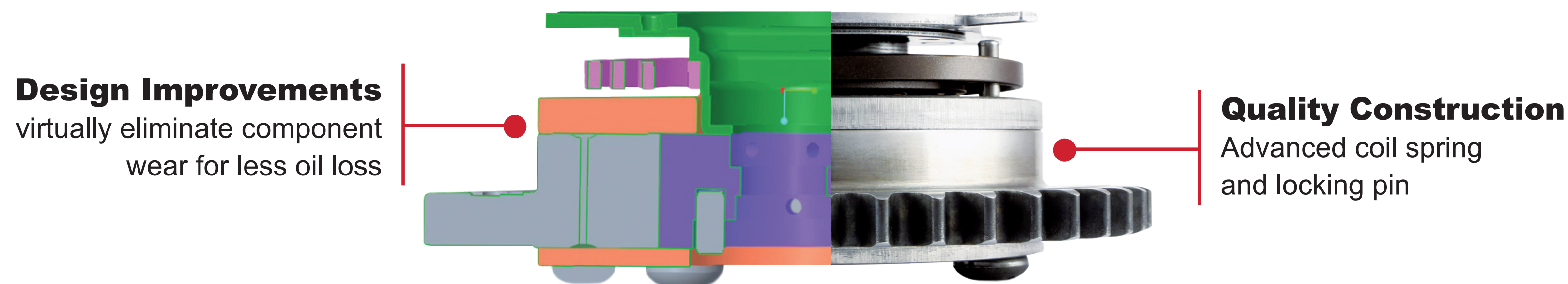
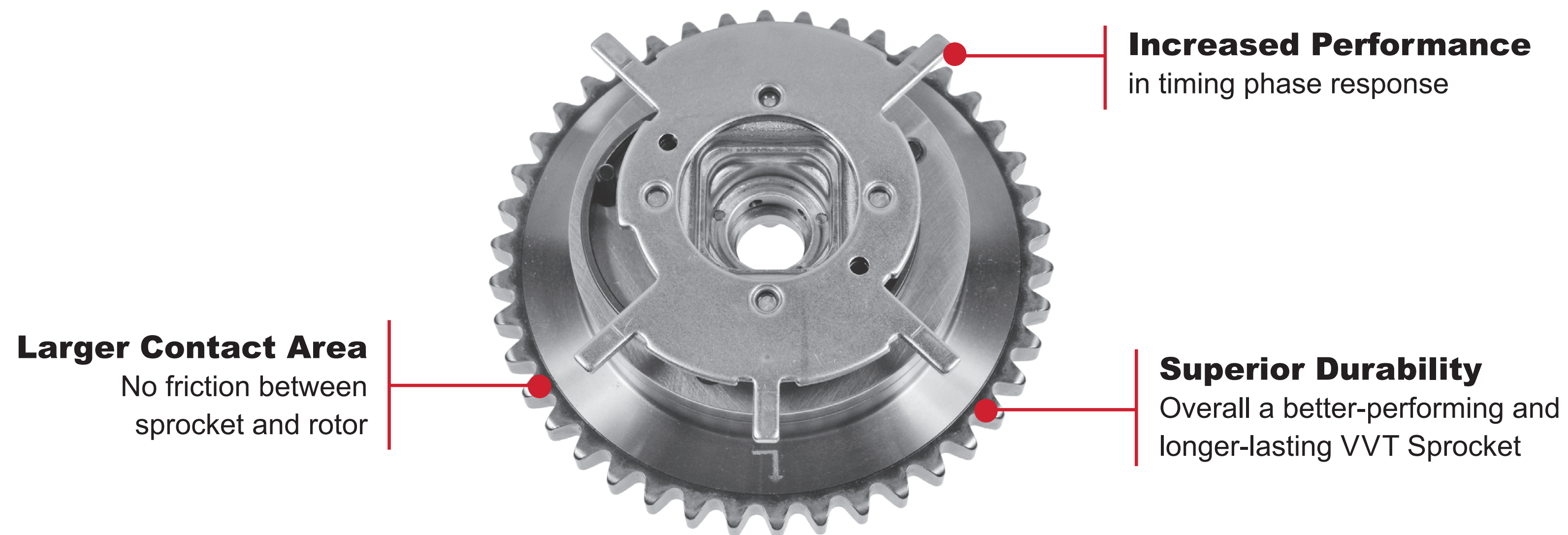
StandardBrand.com

Engineering Improvements

Located on the camshaft, sprockets help maximize horsepower and torque curves, reducing emissions and improving vehicle efficiency. Standard® engineers have designed numerous improvements into our most popular VVT Sprocket for enhanced performance and long-term durability.

To ensure proper performance, Standard® and Blue Streak® VVT Sprockets are direct-fit OE replacements and meet tight dimensional tolerances to improve internal sealing, minimize oil drain back, and reduce frequency of PCM correction. The result is a better-performing, longer-lasting Sprocket.

The Blue Streak® Advantage



VVT500

Ford / Lincoln Cars, Trucks & SUVs
(2014-04)

Source: SMP Testing Lab, 2020



VVT Sprockets

StandardBrand.com

Engineering Improvements

Blue Streak® matches the original in all key tolerances and then improves on it with an all-metal, integrated, machined design – no paddle inserts to wear out, larger contact area, faster response times and longer service life.

The OE metal paddles may produce iron shavings that impede performance and shorten sprocket life.

Low-cost competitors use plastic paddle inserts that wear easily and an “R” chamfer which can affect the timing signal.

OE



Original – Metal Paddles

Produce iron shavings, paddles wear rapidly

Blue Streak®



Best – Integrated Design

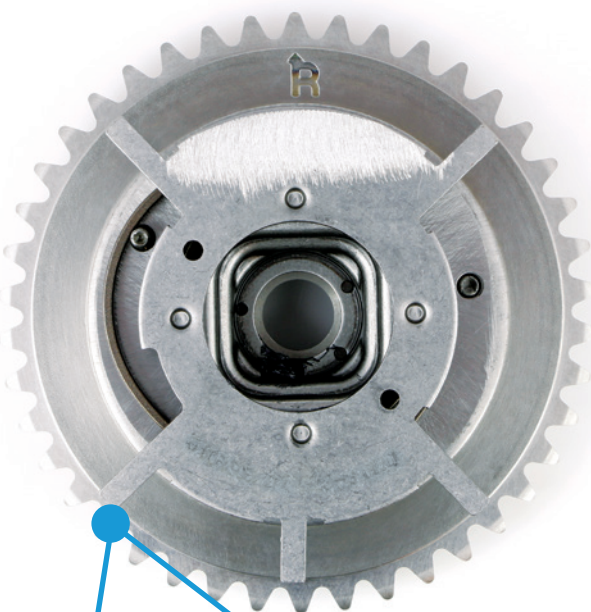
Larger contact area with no paddle to wear out

Low-Cost Competitor

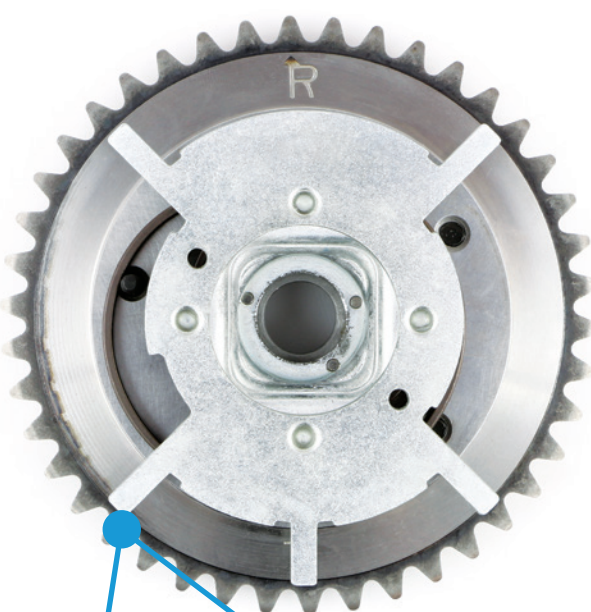


Inferior – Plastic Paddles

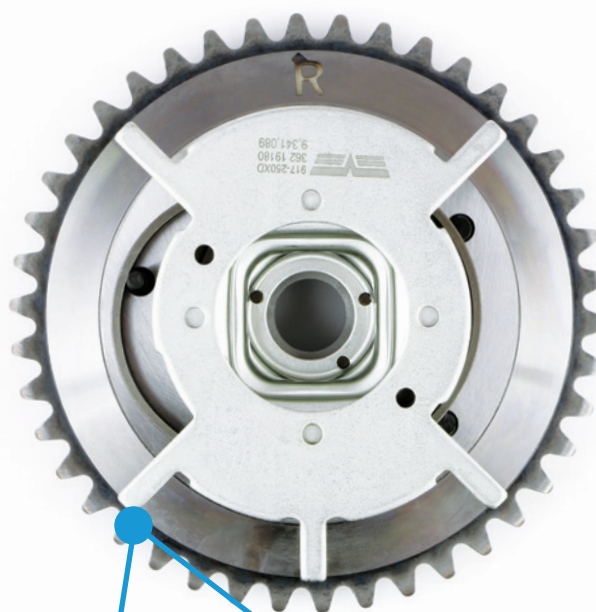
Components wear easily



No R chamfer on signal-driven area



No R chamfer on signal-driven area



R chamfer on signal-driven area

Source: SMP Testing Lab, 2020



VVT Sprockets

StandardBrand.com

TOP MOVERS RANKED: VVT Sprockets

IMPORT APPLICATIONS



VVT519

Honda
Cars & SUVs
(2015-08)

1



VVT718

Hyundai / Kia
Cars & SUVs
(2023-14)

2



VVT689

Hyundai / Kia
Cars & SUVs
(2023-17)

3



VVT654

Honda / Acura
Cars & SUVs
(2020-13)

4



VVT669

Honda / Acura
Cars & SUVs
(2015-09)

5

DOMESTIC APPLICATIONS



VVT704

Ford / Lincoln
Cars, Trucks & SUVs
(2021-17)



VVT703

Ford / Lincoln
Cars, Trucks & SUVs
(2021-17)



VVT575

Ford
Cars & Trucks
(2020-15)



VVT604

Chrysler / Dodge / Jeep / RAM
Cars, Trucks & SUVs
(2025-09)



VVT556

GM
Cars & SUVs
(2021-11)



VVT Components

StandardBrand.com

Variable Valve Timing Solenoid Kits

Blue Streak® VVT Solenoid Kits include two new premium Solenoids that feature improved designs that address the OE weak points, optimize lubrication, and provide a longer service life. They also include new O-rings and gaskets to help prevent oil leaks, include the required hardware for a complete repair, and are color-coded for easy installation.



Variable Valve Timing Solenoid Kits

StandardBrand.com

VVT Service Kit

Ford 5.4L engines feature highly technical VVT systems which are susceptible to failure. They typically fail due to low engine oil levels, poor oil circulation, or oil and filter change irregularities.

Blue Streak® offers a Complete Timing Repair Kit to solve this OE problem.

VVT420K VVT Service Kit Ford / Lincoln (2014-02) VIO: 3.1M



VVT Kit Components

- | | |
|--|-------------------------------|
| 1 – VVT Sprockets | 6 – Drive Gear Sprocket |
| 2 – VVT Solenoids | 7 – Crankshaft Position Wheel |
| 3 – Timing Chain Tensioners | 8 – Crankshaft Seal |
| 4 – Timing Chains | 9 – Gaskets |
| 5 – Timing Chain Guides & Tensioner Arms | |



VVT Systems

StandardBrand.com

Related Parts

In addition to the highest-quality Sprockets and Solenoids, Standard® and Blue Streak® offer a variety of complementary parts necessary to maintain and repair today's VVT systems.



VVT Spool Filters

Spool filters can become clogged over time, hindering performance and potentially causing damage to the solenoids

Standard's replacement VVT Spool Filters allow technicians to service the filter and gaskets without replacing solenoids

Available for popular Honda and Acura applications through 2019



VVT Chain Tensioner Kits

Worn chain tensioners can cause a vehicle to run poorly and can even lead to a catastrophic engine failure

Standard's VVT Chain Tensioner Kits include a new chain tensioner, gasket and seal for a complete repair

Available for popular Audi and VW vehicles with high failure rates



VVT Position Sensor Magnets

Newer VVT systems may also incorporate adjuster magnets

Standard's VVT Position Sensor Magnets are a drop-in replacement part and include new seals to help prevent oil contamination

39 SKUs available with coverage through 2026



Camshaft & Crankshaft Position Sensors

Grime, water damage and bad wiring can all cause camshaft and crankshaft sensors to fail

All Standard® Cam and Crank Sensors undergo a testing regimen that includes a 35-hour vibration test, chamber test, and more to ensure durability

More than 1,000 Cam and Crank Sensors available for import and domestic vehicles



Advanced Technology Solutions

In addition to a complete VVT program, Standard® offers precision-engineered Cylinder Deactivation Solenoids and Solenoid Assemblies to replace failed OE components.

To improve fuel efficiency and reduce emissions, some vehicle manufacturers use cylinder deactivation technology, which temporarily disables select engine cylinders under light-load conditions, thereby enhancing fuel efficiency and reducing emissions.

Available for popular GM, Chrysler, Dodge, Jeep and RAM applications.

Cylinder Deactivation Solenoids



CDS01

Chrysler / Dodge / Jeep / RAM
Cars, Trucks & SUVs
(2021-10) VIO: 3.9M

MANUFACTURED IN EUROPE



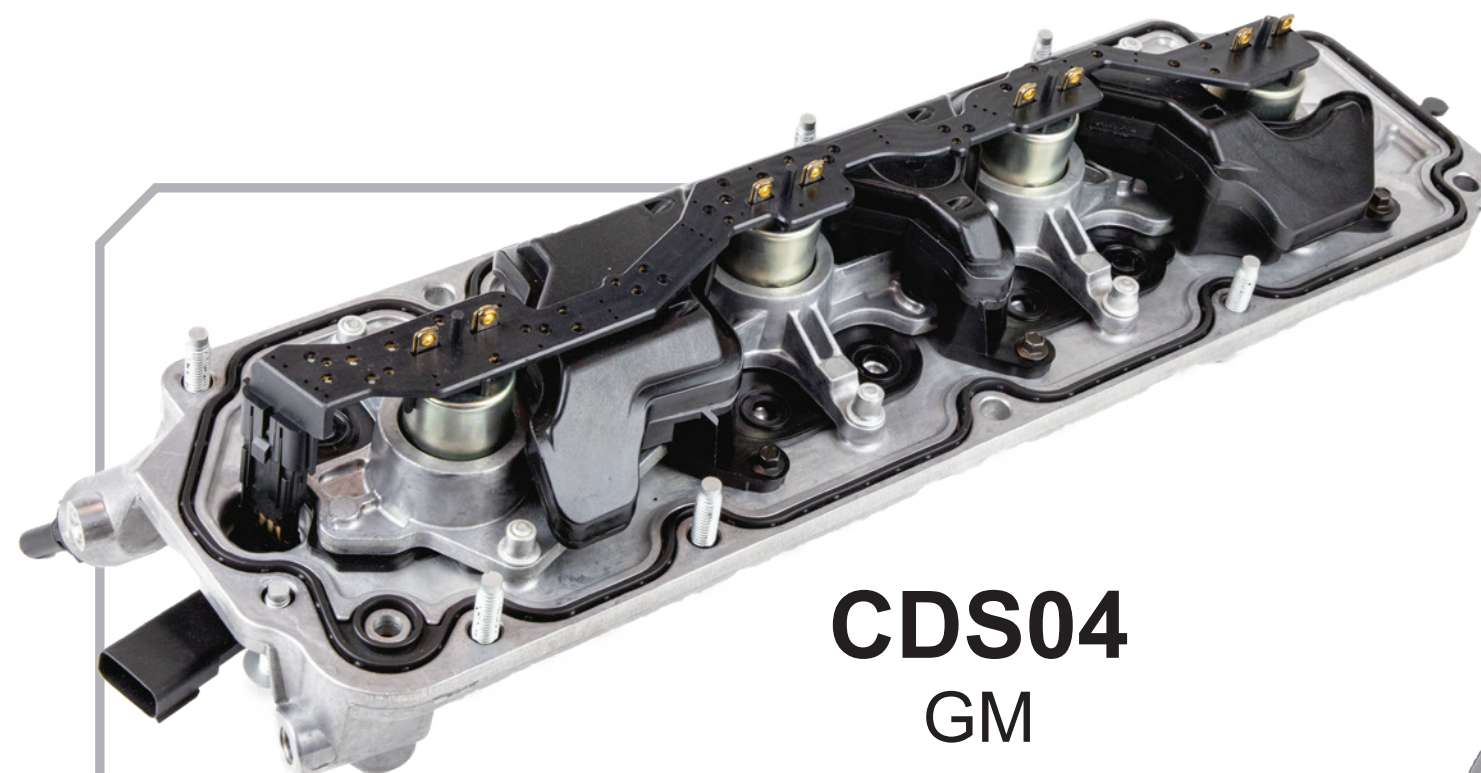
CDS02

Chrysler / Dodge / Jeep
Cars, Trucks & SUVs
(2009-05) VIO: 637K



CDS03

GM
Cars, Trucks & SUVs
(2015-05) VIO: 4M



CDS04

GM
Cars, Trucks & SUVs
(2022-14) VIO: 5.1M

**AFTERMARKET
EXCLUSIVE** *

*as of August 2025



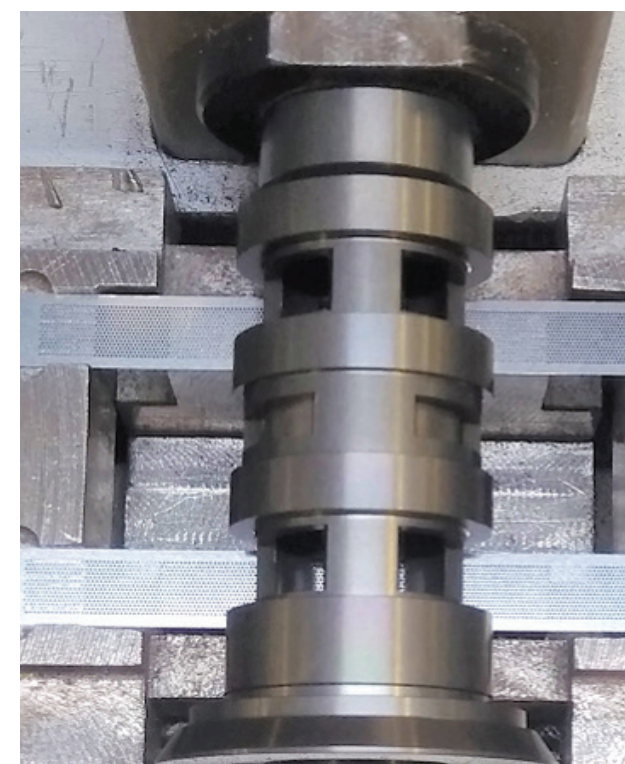
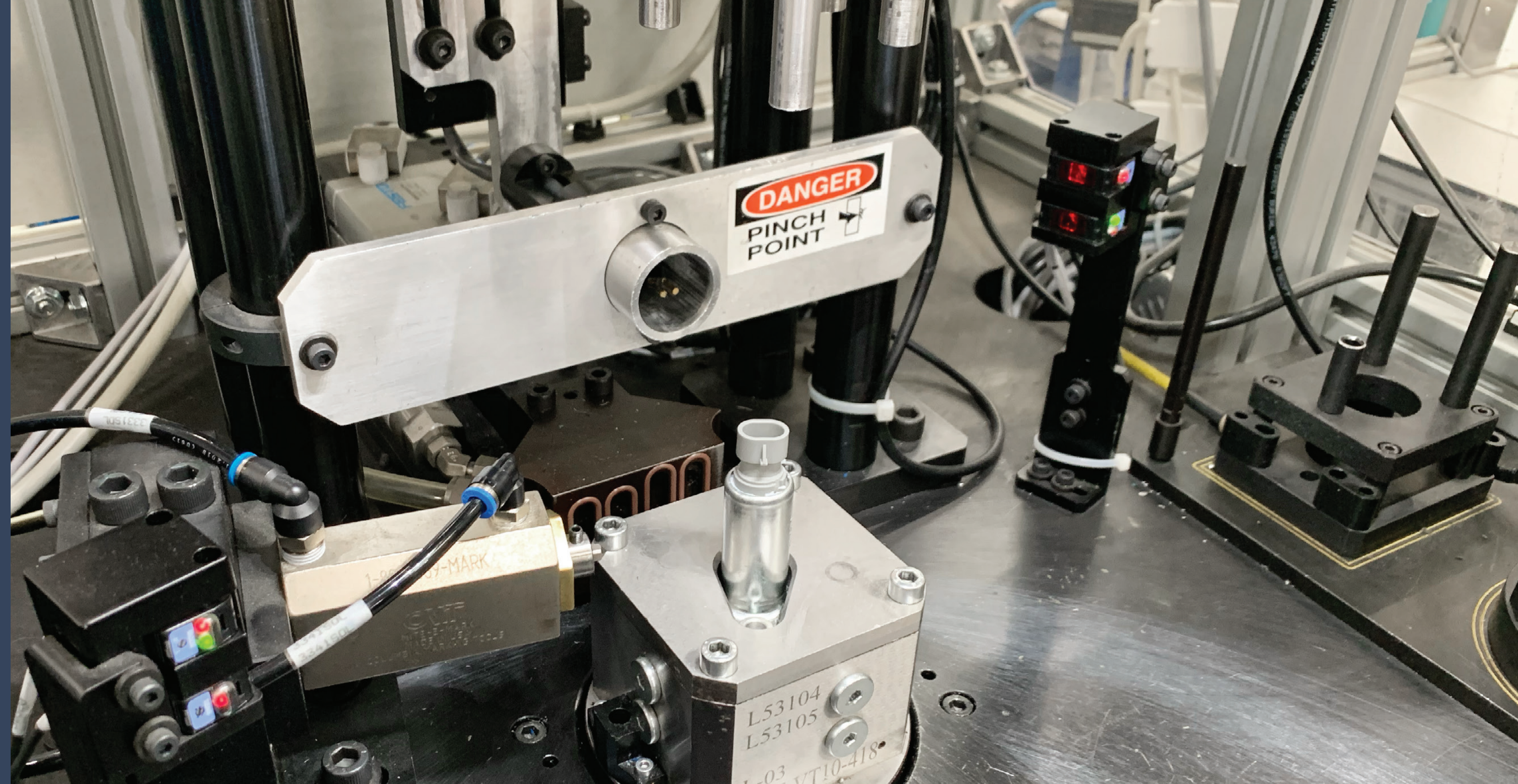
VVT Components

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Precision Manufacturing

Standard® and Blue Streak® VVT components are designed and manufactured at our IATF 16949-certified facility in Bialystok, Poland. This facility is equipped with the most high-tech manufacturing equipment available to produce our VVT Solenoid housings.

Controlling the entire manufacturing process offers significant advantages, resulting in consistent, high-quality outputs, minimized errors and defects, improved customer satisfaction, and enhanced Standard® brand reputation.



Commitment to Continuous Improvement

Our dedication to continuous improvement practices in design, engineering and manufacturing allows us to make enhancements to the OE design while maintaining complete control over each Standard® and Blue Streak® VVT component.



VVT Sprockets

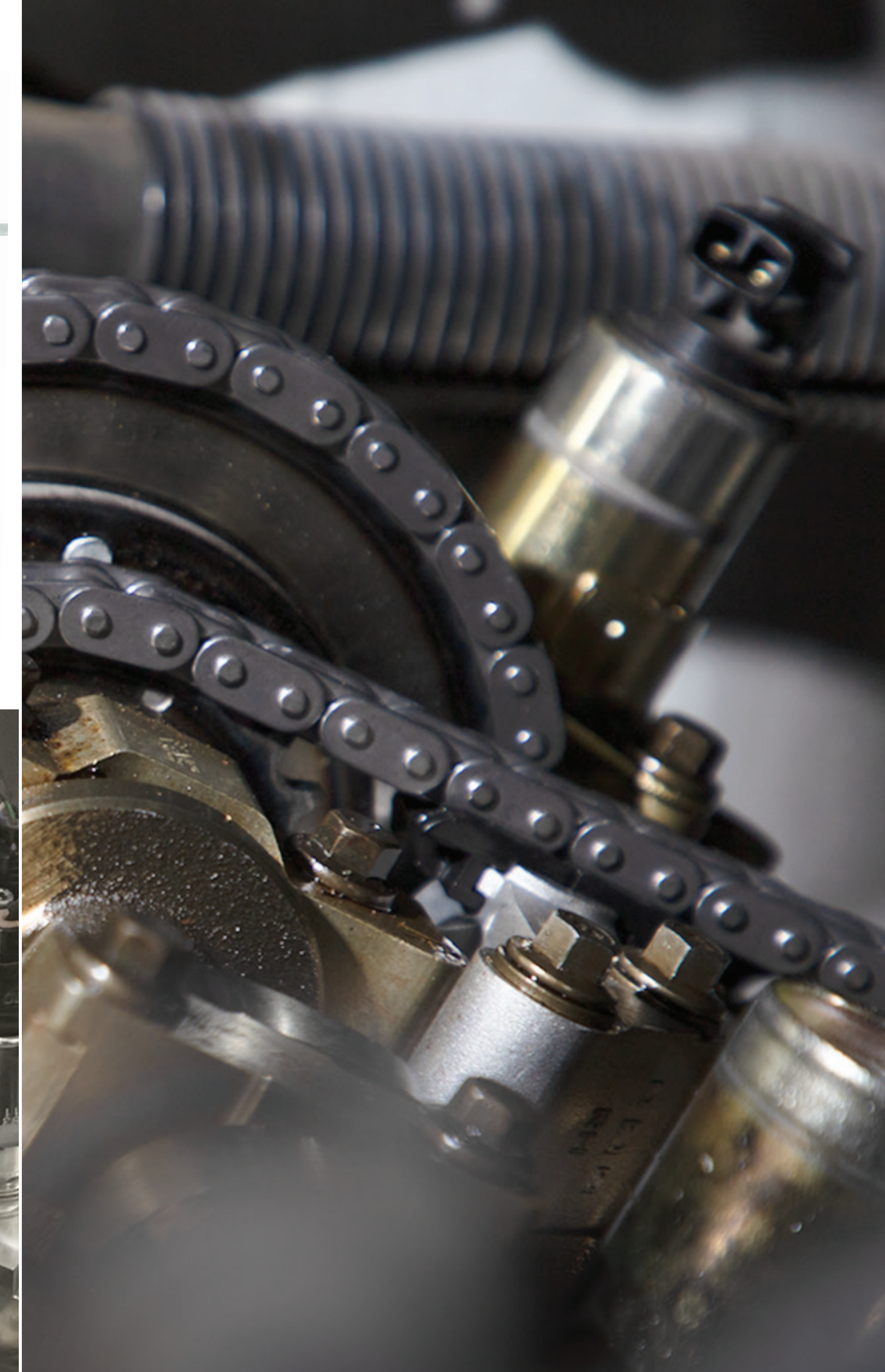
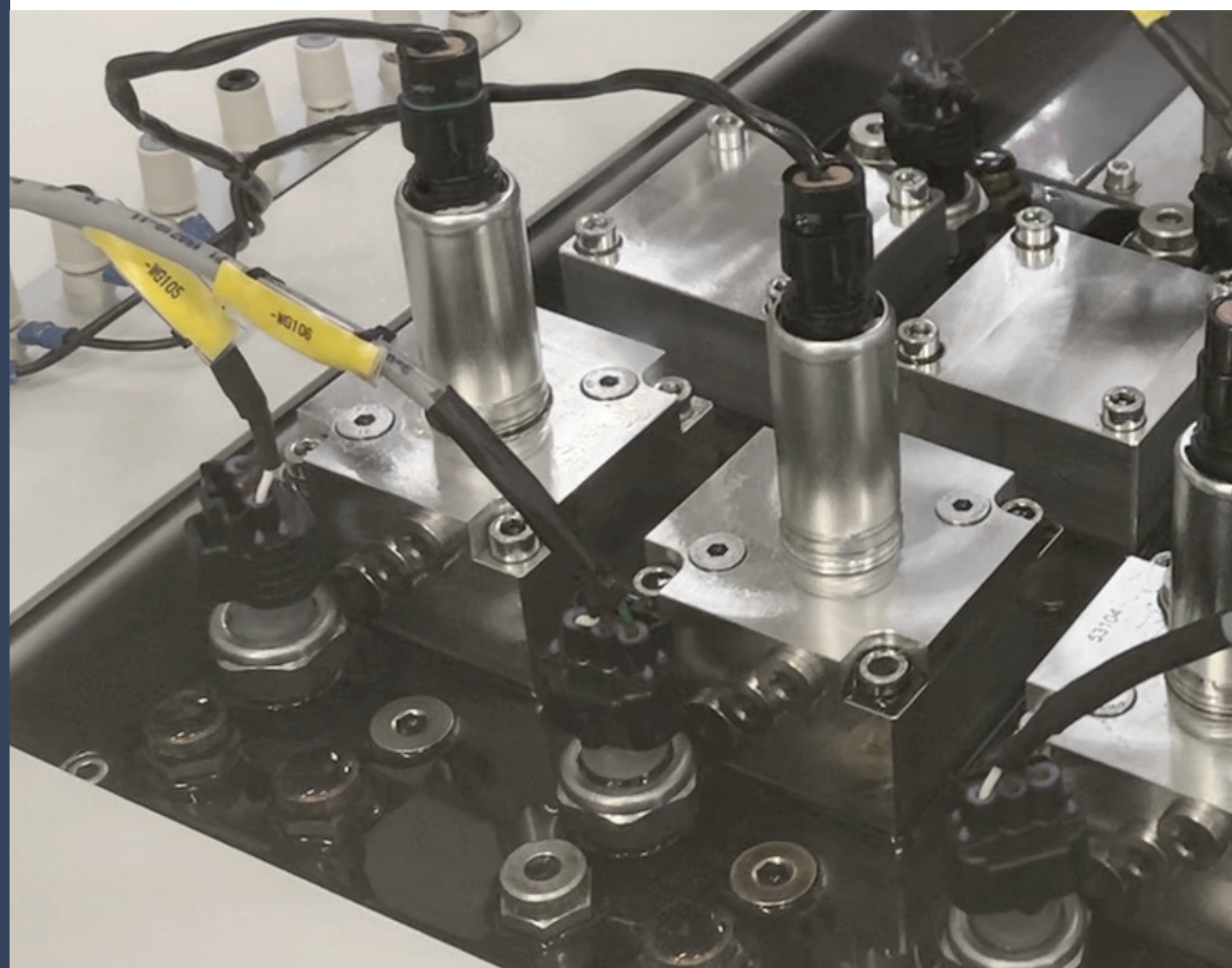
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Testing and Validation

Standard®-manufactured VVT Solenoids and Sprockets undergo extensive measurement and life testing, plus a full spectrum of environmental analysis. This regimen includes thermal shock, thermal cycling, salt spray, vibration, storage tests, dirty oil tests, and more.

Additionally, our VVT components are tested on vehicles at our Testing Center in Texas to ensure proper fit and performance.

The result is a line of premium VVT components that perform flawlessly and stand up to real-life conditions.



VVT Components

StandardBrand.com

Standard® Pro Training Tech Tips

As experienced ASE-certified automotive technicians themselves, Standard® Pro Trainers are experts in VVT system technology. Here's what they say to look out for during a VVT component install.



Always test engine oil pressure at warm idle to ensure it is within spec. Low oil pressure will result in VVT components not operating as expected



If one solenoid or sprocket fails, it's likely the other VVT components are nearing the end of their service life too. It's suggested to replace both solenoids and sprockets at the same time and inspect/replace all related timing chain components in the VVT system



Always change the engine oil and filter when replacing a VVT solenoid or sprocket



Standard® Professional Training

Award-Winning In-Person, Live Virtual, and Online Learning

Standard® Pro Training delivers accredited classes that educate technicians in the latest automotive repair technologies, and techs can earn CEU credits.

An extension of Standard® training, our extensive YouTube video library has over 700 technical and installation videos.



Available Classes

ASE Test Prep - A1 Engine Repair
ASE Test Prep - A8 Engine Performance
Diagnosing GM Variable Cam Timing
Domestic VVT Diagnosis
Ford Variable Valve Timing
Modern Valvetrains
Nissan VVT Diagnostics
Variable Valve Timing Fundamentals

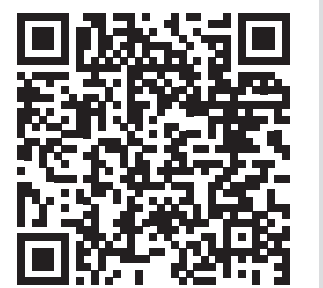


Available Classes

Advanced Drivability Diagnostics
Advanced VVT Systems: Theory, Troubleshooting, and Repair
Ford EcoBoost
Ignition and Cam / Crank Synchronization
Labscope Power-User
Unleash The Power of Your Scan Tool



For information on replacing VVT and components, search “VVT” on the **Standard Brand** YouTube channel or scan the QR code for the [VVT playlist](#)



VVT Components

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