Del West™

The World Leader in Titanium Valve Train Components

Titanium Valves and Lightweight Valve Train Components

Ready-to-Ship™ and Ready-to-Install™

What You Need, When You Need It

In 2008, Del West made the Ready-to-Ship™ commitment to keep in inventory the more than 100 most popular titanium intake and exhaust valves used by the vast majority of American engine builders. And we further committed to back-cut the most popular valves during manufacturing.

That accomplished three things. First, long ordering lead times became virtually a thing of the past. Second, back-cutting eliminated the need for engine builders to perform a critical machining operation, ensuring uniform quality and making our valves not only Ready-to-Shipi but Ready-to-Install™. And last but not least, by building our R-t-I/R-t-S inventory during seasonal low-volume periods, we reduced our costs, and passed the savings along to our customers.

Ready-to-Ship. We maintain a large inventory of the valves American engine builders want. So what you need is available when you need it. All valves are forged and chromium-nitride coated for maximum life between rebuilds, as proved by countless laps in Sprint Cars and similar applications.

Ready-to-Install. Del West valves are delivered with a precision-machined back-cut so they are ready to simply drop into your heads. No machining. No third-party coating. No added expense or time. No delay.

All Del West valves are completely CNC machined and precision-ground from domestically traceable MIL-spec Ti-6242 vacuum arc triple melt titanium. All critical dimensions of the valves are controlled 100% for dimensional accuracy to the most demanding specifications and for surface finish.

The lower mass of Del West titanium valves (approximately 40% compared to steel), combined with our matching titanium locks and spring retainers, allows the use of more aggressive cam profiles without loss of valve control. In turn, this provides broader torque curves with higher peak rpm and greater power.

Del West Forged Titanium Valves

Battle-Tested and Budget-Friendly

With the success of the Ready-to-Install program, Del West has moved on to phase two, converting our entire line to forged, fully coated titanium valves. This will increase performance and further contain costs for the engine builder.

Forged Titanium Valves

Final machining is still done in the way and to the exacting standards that established the Del West reputation for superiority. Forging allows us to provide full CrN-coated valves at the same prices as our previous Moly-coated, machined-from-solid valves.

Chromium-Nitride Coating

A two-year period of track testing on paved and dirt tracks with the country's leading Sprint Car engine builders proved that fully coating our valves with Chromium-Nitride lowered racer costs by significantly extending valve life, while maintaining the level of performance Del West customers have always expected.

Here's what Del West's conversion to fully-coated forged titanium valves mean for you:

- Chromium-Nitride is a thin yet extremely durable, low-friction coating, applied by plasma vapor-deposition to seats and stems. It has been competition-proved to reduce rebuild frequency over more than two years of dirt-track racing.
- There's no cost premium for a superior product -- prices are the same as with our machined-from-solid, Moly-coated valves
- Dimensional accuracy is to the same exacting standards that has always made Del West the valve of choice for leading engine builders from Late Model Stocks to NASCAR and Formula 1
- Still back-cut, ready to install without machining, and no undercut
- Durability and performance proved by countless laps over two seasons in all forms of Sprint Car racing

Other Coatings

Del West continues to offer other coatings, including DLC, Molybdenum and our proprietary Keronite. All are available special order, with appropriate lead times for manufacturing scheduling. Valve Application by Cylinder Head

Valve Application by Cylinder Head

All valves have radius grooves.
All valves available with 5/16" stem diameter.
* Red Part Numbers with asterisk are special order, NOT Ready-to-Ship. Allow for lead time.

Cylinder Head	Intake Valves			Exhaust Valves		
Air Flow Research - Chevrolet Small-Block						
215cc Raised Runner	IV-2100-2T			EV-1600-2T		
210cc & 220cc SBC Race	IV-2080-1T			EV-1600-1T		
227cc SBC Race	IV-2100-T			EV-1600-2T		
Air Flow Research - Ford Small-Block						
205cc SBF Race	IV-2080-1T			EV-1600-1T		
225cc SBF Race	IV-2080-1T			EV-1600-1T		
All Pro - Chevrolet Small-Block						
AP360SP-23	IV-2125-4T*	IV-2150-4T*		EV-1600-4T*	EV-1625-4T*	
AP220S & SP	IV-2100-2T			EV-1600-2T		
RR227SP-W	IV-2125-4T*			EV-1600-4T*		
RR245SP-23	IV-2180-6T			EV-1600-6T		
RR260SP-17	IV-2180-7T			EV-1600-7T		
R265RE-15	IV-2180-8T-310-50-37			EV-1625-8T		
R292RE-15	IV-2180-8T-310-50-37			EV-1625-8T		
RE-11 Ultra Series	IV-APRE-11-52	IV-APRE11-52-7MM		EV-APRE11-55		
RE-13 Ultra Series	IV-APRE13	IV-APRE13-2180	IV-APRE13-3412*	EV-APRE	EV-APRE-25	EV-APRE-1625-311
	IV-APRE52-2180	IV-APRE52-PR-7MM	IV-APRE52	EV-APRE-311	EV-APRE-1600	
Brodix - Ford Small-Block						
Track 1	IV-2055-1T	IV-2080-1T		EV-1600-1T		
BF 202	IV-2180-8T			EV-1600-7T		
BF 300	IV-2125-4T*			EV-1600-2T		
Brodix - Chevrolet Big-Block						
BB-1- BB-2	IV-2250-BB-1-2*	IV-BBC-2300		EV-1900-BBC		
BB-2X - BB-3 - BB-4	IV-BBC-2300	IV-BBC-2300-310	IV-BBC-2300-RR	EV-1900-BBC		
Brodix - Chevrolet Small-Block						
Track 1	IV-2080-2T	IV-2080-1T		EV-1600-2T	EV-1600-1T	
Track 1X	IV-2100-2T			EV-1600-2T		
8PRO to 11	IV-2080-2T			EV-1600-2T		
11STDX, 11SPX	IV-2080-2T			EV-1600-2T		
KC11SPX	IV-2100-2T			EV-1600-2T		
11XASCS	IV-2125-2T	IV-2100-2T	IV-2080-2T	EV-1600-2T		
10SPX-231	IV-2100-3T*			EV-1600-3T*		
10 SP RI, 10 SP	IV-2100-3T*	IV-2125-3T*		EV-1600-3T*		
13STD	IV-2180-7T			EV-1625-7T		
10 SP X AP	IV-2125-3T*			EV-1600-3T*		
18X	IV-2150-4T*			EV-1600-4T		
18C	IV-2180-6T			EV-1625-6T		
16º	IV-2150-7T*	IV-2180-7T	IV-2200-7T*	EV-1600-7T		
15STD 15SP	IV-2180-8T310-50-37			EV-1625-8T		
Dash 12º/15º	IV-2125-5T*	IV-2150-5T	IV-2200-5T*	EV-1600-5T*		
12 X 12 275cc	IV-2150-5T			EV-1600-5T*		
12 X 12 286cc & 296cc	IV-2180-6T			EV-1600-6T		
12 X 12 RP	IV-GB2000-310			EV-GB2000-1600		
GB2000	IV-GB2000-310			EV-GB2000-1600	EV-GB2000-310	
GB2300	IV-GB2300-310	IV-GB2300-310-52	IV-GB2300-310-52	EV-GB2300	EV-GB2300-310-625	
BD2000	IV-GB2000-310			EV-GB2000		
Dart Cylinder Heads - Chevrolet Big-Block						
Iron Eagle 345 cc	IV-BBC-2300	IV-BBC-2300-310		EV-1900-BBC		
Pro 1 CNC	IV-BBC-2300	IV-BBC-2300-310	IV-BBC-2300-RR	EV-1900-BBC		
Race Series 370cc	IV-BBC-2300	IV-BBC-2300-310	IV-BBC-2300-RR	EV-1900-BBC		
18º BBC	IV-DART18*					
Dart Chevrolet Small-Block						
Iron Eagle 215cc & 230cc	IV-2055-1T	IV-2080-1T		EV-1600-1T	EV-1625-1T*	
Pro 1	IV-2055-1T	IV-2080-1T		EV-1600-1T		
Race Series 13º 15º 16º 18º	IV-2150-6T	IV-2180-6T	IV-2180-7T	EV-1600-6T	EV-1625-6T	
Ford Racing (SVO)						
Yates C3	IV-2100-3TSVO*	IV-2125-3TSVO-310	IV-2125-4TSVO*	EV-1600-2T	EV-1600-3T*	
	IV-2150-3TSVO-310	IV-2150-4TSVO*	IV-2150-5TSVO*	EV-1600-4T*		
General Motors						
18º	IV-2150-6T	IV-2180-6T		EV-1625-6T	EV-1625-6T	
SB2	IV-2180-7T	IV-2180-8T	IV-2180-8T-310-50-37	EV-1625-6T	EV-1625-7T	EV-1600-6T
	IV-2180-9T-310*			EV-1625-7T	EV-1625-7T-310	EV-1625-8T

* Red Part Numbers with asterisk are special order, NOT Ready-to-Ship. Allow for lead time.

Titanium Valve Specifications

Intake Valves:

Part Number	Head Dia.	O/A Length	Stem Dia.	Back Cut	Seat	Margin Width	Profile Radius	Profile Angle	Tip Length w/ steel Insert	Dished Head
IV-2020-1T	2.020	5.040	0.3412	0.080@30º	0.060@45º	0.075	0.375	10º	0.290	
IV-2055-1T	2.055	5.040	0.3412	0.080@30º	0.060@45º	0.075	0.375	10º	0.290	
IV-2055-1T-310	2.055	5.040	0.3100	0.080@30º	0.060@45º	0.075	0.375	10º	0.290	
IV-2080-1T	2.080	5.040	0.3412	0.080@30º	0.060@45º	0.075	0.375	10º	0.290	
IV-2080-1T-310	2.080	5.040	0.3100	0.080@30º	0.060@45º	0.075	0.375	10º	0.290	
IV-2080-2T	2.080	5.140	0.3412	0.080@30º	0.060@45º	0.075	0.375	10º	0.290	
IV-2080-2T-310	2.080	5.140	0.3100	0.080@30º	0.060@45º	0.075	0.375	10º	0.290	
IV-2100-2T	2.100	5.140	0.3412	0.080@30º	0.060@45º	0.075	0.375	10º	0.290	
IV-2100-2T-310	2.100	5.140	0.3100	0.080@30º	0.060@45º	0.075	0.375	10º	0.290	
IV-2125-2T	2.125	5.140	0.3412	0.080@30º	0.060@45º	0.075	0.375	10º	0.290	
IV-2125-2T-310	2.125	5.140	0.3100	0.080@30º	0.060@45º	0.075	0.375	10º	0.290	
IV-2125-3TSVO-310	2.125	5.285	0.3100	0.080@30º	0.100@45º	0.075	0.375	12º	0.302	
IV-2150-5T	2.150	5.440	0.3412	0.080@30º	0.060@45º	0.075	0.375	12º	0.290	
IV-2150-6T	2.150	5.540	0.3412	0.080@30º	0.060@45º	0.075	0.375	12º	0.290	
IV-2150-6T-310	2.150	5.540	0.3100	0.080@30º	0.060@45º	0.075	0.375	12º	0.290	
IV-2180-6T	2.180	5.540	0.3412	0.080@30º	0.060@45º	0.075	0.375	12º	0.290	
IV-2180-6T-310	2.180	5.540	0.3100	0.080@30º	0.060@45º	0.075	0.375	12º	0.290	
IV-2180-7T	2.180	5.640	0.3412	0.080@30º	0.060@45º	0.075	0.375	12º	0.290	
IV-2180-7T-310	2.180	5.640	0.3100	0.080@30º	0.060@45º	0.075	0.375	12º	0.290	Yes
IV-2180-7T-310-50	2.180	5.640	0.3100	0.080@33º	0.060@50º	0.075	0.375	12º	0.300	
IV-2180-8T-310-50-37	2.180	5.740	0.3100	0.080@37º	0.060@50º	0.075	0.375	12º	0.290	
IV-2200-7T	2.200	5.640	0.3412	0.080@30º	0.060@45º	0.075	0.375	12º	0.290	
IV-2200-7T-310	2.200	5.640	0.3100	0.080@30º	0.060@45º	0.075	0.375	12º	0.290	
IV-APRE11-52	2.200	6.080	0.3110	0.080@35º	0.060@52º	0.080	0.375	12º	0.313	
IV-APRE11-52-7mm	2.200	6.000	0.2754	0.080@35º	0.060@52º	0.060	0.375	12º	0.250	
IV-APRE13	2.200	5.950	0.3110	0.080@33º	0.060@45º	0.080	0.375	10º	0.290	
IV-APRE13-2180	2.180	5.950	0.3110	0.080@33º	0.060@45º	0.080	0.375	10º	0.290	
IV-APRE52	2.200	5.950	0.3110	0.080@35º	0.060@52º	0.080	0.375	12º	0.290	
IV-APRE52-2180	2.180	5.950	0.3110	0.080@35º	0.060@52º	0.080	0.375	12º	0.290	
IV-APRE52-2180-7mm	2.180	5.850	0.2754	0.080@35º	0.060@52º	0.060	0.375	12º	0.216	Yes
IV-APRE52-7mm	2.200	5.850	0.2754	0.080@35º	0.060@52º	0.060	0.375	12º	0.216	Yes
IV-GB2000-310	2.200	6.090	0.3100	0.080@33º	0.065@45º	0.070	0.375	10º	0.300	
IV-GB2300-310	2.200	6.250	0.3100	0.080@33º	0.065@45º	0.070	0.375	10º	0.300	
IV-GB2300-310-52	2.230	6.250	0.3100	0.080@35º	0.060@52º	0.080	0.438	12º	0.300	
IV-BBC-2250-310	2.250	5.540	0.3100	0.080@32º	0.080@45º	0.075	0.375	10º	0.290	
IV-BBC-2300	2.300	5.540	0.3412	0.080@32º	0.080@45º	0.075	0.375	10º	0.290	
IV-BBC-2300-310	2.300	5.540	0.3100	0.080@32º	0.080@45º	0.075	0.375	10º	0.290	
IV-BBC-2300-RR	2.300	5.600	0.3412	0.080@32º	0.080@45º	0.075	0.375	10º	0.290	

Titanium Valve Specifications

Exhaust Valves:

Part Number	Head Dia.	O/A Length	Stem Dia.	Back Cut	Seat	Margin Width	Profile Radius	Profile Angle	Tip Length w/ steel Insert	Dished Head
EV-1600-1T	1.600	5.040	0.3412	0.080@31°	0.070@45°	0.080	0.500	20°	0.290	
EV-1600-1T-310	1.600	5.040	0.3100	0.080@31°	0.070@45°	0.080	0.500	20°	0.290	
EV-1600-2T	1.600	5.140	0.3412	0.080@31°	0.070@45°	0.080	0.500	20°	0.290	
EV-1600-2T-310	1.600	5.140	0.3100	0.080@31°	0.070@45°	0.080	0.500	20°	0.290	
EV-1600-4T	1.600	5.340	0.3412	0.080@31°	0.070@45°	0.080	0.500	20°	0.290	
EV-1600-6T	1.600	5.540	0.3412	0.080@31°	0.070@45°	0.080	0.500	20°	0.290	
EV-1600-6T25	1.600	5.540	0.3412	0.080@31°	0.070@45°	0.080	0.625	25°	0.290	
EV-1600-6T-310	1.600	5.540	0.3100	0.080@31°	0.070@45°	0.080	0.500	20°	0.290	
EV-1600-7T	1.600	5.640	0.3412	0.080@31°	0.070@45°	0.080	0.500	20°	0.290	
EV-1625-5T	1.625	5.440	0.3412	0.080@31°	0.070@45°	0.080	0.500	20°	0.290	
EV-1625-6T	1.625	5.540	0.3412	0.080@31°	0.070@45°	0.080	0.500	20°	0.290	
EV-1625-6T25	1.625	5.540	0.3412	0.080@31°	0.070@45°	0.080	0.625	25°	0.290	
EV-1625-6T-310	1.625	5.540	0.3100	0.080@31°	0.070@45°	0.080	0.500	20°	0.290	
EV-1625-7T	1.625	5.640	0.3412	0.080@31°	0.070@45°	0.080	0.500	20°	0.290	
EV-1625-7T25-310	1.625	5.640	0.3100	0.080@31°	0.070@45°	0.080	0.625	25°	0.290	
EV-1625-8T25	1.625	5.740	0.3412	0.080@31°	0.070@45°	0.080	0.625	25°	0.290	
EV-1900-BBC	1.900	5.480	0.3412	No	0.080@45°	0.090	0.625	31°	0.294	
EV-APRE	1.625	5.950	0.3412	No	0.085@45°	0.080	0.750	20°	0.290	
EV-APRE-25	1.625	5.950	0.3412	No	0.085@45°	0.080	0.750	25°	0.290	
EV-APRE-1625-311	1.625	5.950	0.3110	No	0.085@45°	0.080	0.750	20°	0.290	
EV-APRE-1580-311	1.580	5.950	0.3110	No	0.090@55°	0.100	0.750	20°	0.290	
EV-APRE-1600	1.600	5.950	0.3412	No	0.085@45°	0.080	0.750	20°	0.290	
EV-APRE-311	1.600	5.950	0.3110	No	0.085@45°	0.080	0.750	20°	0.290	
EV-APRE-311-55	1.600	5.950	0.3110	No	0.085@55°	0.080	0.750	20°	0.290	
EV-APRE 11-55	1.600	6.085	0.3110	No	0.085@55°	0.080	0.750	20°	0.300	
EV-GB2000-1600	1.600	6.090	0.3412	0.090@31°	0.060@45°	0.080	0.438	20°	0.300	
EV-GB2000-310	1.600	6.090	0.3110	0.090@31°	0.060@45°	0.080	0.500	20°	0.300	
EV-GB2300	1.600	6.250	0.3412	0.090@31°	0.060@45°	0.080	0.438	20°	0.290	
EV-GB2300-310-625	1.600	6.250	0.3100	0.090@31°	0.060@45°	0.080	0.625	20°	0.300	

Titanium Locks

Del West CNC-machined titanium valve locks are precision machined to produce a 0.0007" interference fit to eliminate relative motion between the lock, retainer and valve stem..

Del West Ready-to-Ship (R-t-S) Titanium Locks are available for the valve stem diameters listed in standard, +0.050" and -0.050" heights, providing maximum flexibility in adjusting valve spring installed heights. Custom locks are available for any practical stem diameter. Standard locks are available R-t-S for 7mm, 5/16" and 11/32" stem diameters.

Regardless of style, Del West locks assure:

- Superior resistance to galling and wear
- A typical weight savings of about four grams per pair
- Superior fit due to exceptional manufacturing tolerances
- Reduced wear and increased durability resulting from the superior fit and high coefficient of friction.

Standard Super 7 and Super 7 Shoulder Locks

Del West pioneered the Super 7 Lock design, now the industry standard. Super 7 locks are actually 8-degree locks, and we created them to offer the best balance between the durability and strength of 10-degree locks and the lower weight of 7 degree locks. Super 7 Locks are available in standard and shoulder design, for 5/16" and 11/32" valve stem diameters.

Top Locks

Del West Top Locks position the clamping portion of the lock completely below the valve-stem keeper groove, achieving several key benefits:

Increases contact area for greater durability

- Eliminates the possibility of failure from contact between the lock and valve stem tip
- Reduces lock profile to conforms to dimensional changes in the valve stem caused by repeated thermal cycling
- Allows much smaller retainer and valve spring assemblies for a significant weight reduction.

Top Locks are available R-t-S for 6mm, 7mm, 5/16" and 11/32" stem diameters. Matching retainers required.

Cap Relief Locks

Used with lash caps for valves without steel tip insert protection.

Super 7 Standard Locks

Stem Dia.	Install Height	Style	Cone	Part Number
7mm	-0.050	Radius	Super 7º	DW679C
7mm	Standard	Radius	Super 7º	DW680
7mm	Standard	Radius	Super 7º	DW680C-CR-PS
7mm	+0.050	Radius	Super 7º	DW681C
7mm	+0.050	Radius	Super 7º	DW681C-CR-PS
5/16	-0.050	Radius	Super 7º	DW692C
5/16	Standard	Radius	Super 7º	DW693C
5/16	+0.050	Radius	Super 7º	DW694C
5/16	+0.050	Radius	Super 7º	DW694C-CR-310-PS
5/16+0.001	+0.050	Radius	Super 7º	DW694C-CR-311-PS
11/32	-0.050	Radius	Super 7º	DW689C
11/32	Standard	Radius	Super 7º	DW690C
11/32	+0.050	Radius	Super 7º	DW691C

Super 7 Shoulder Locks

Stem Dia.	Install Height	Style	Cone	Part Number
5/16	-0.050	Radius	Super 7º	DW792C
5/16	Standard	Radius	Super 7º	DW793C
5/16	+0.050	Radius	Super 7º	DW794C
11/32	-0.050	Radius	Super 7º	DW789C
11/32	Standard	Radius	Super 7º	DW790C
11/32	+0.050	Radius	Super 7º	DW791C

Top Locks

Stem Dia.	Install Height	Style	Cone	Part Number
6mm	N/A	Radius	7°	DW809C
6mm	N/A	Radius	7°	DW809L
7mm	N/A	Radius	7°	DW814C
7mm	N/A	Radius	8°	DW810C
5/16	N/A	Radius	8°	DW811C
5/16+.001	N/A	Radius	8°	DW811C-311
11/32	N/A	Radius	8°	DW812C

Cap Relief Locks (for use with lash cap)

Stem Dia.	Install Height	Style	Cone	Part Number
5/16	Standard	Radius	10º	DW1093C-CR
5/16	+0.050	Radius	10º	DW1094C-CR

Spring Retainers

Del West Super 7° Titanium Retainers are CNC-machined from mil-spec billet titanium, fully heat treated, and engineered for optimum strength and weight. Del West titanium retainers are available in the standard design or the new LTW lightweight design.

Del West LTW Retainers incorporate a unique compound radius that removes material from the inner part of the retainer to minimize weight without compromising strength. Examine the finish, machining tolerances, and overall quality of genuine Del West Titanium Retainers, and you'll see why professional engine builders demand Del West.

Steel Retainers

For those who value durability over weight, Del West also offers two nitrided steel retainers, P/N DW515-S3 and DW1802-S1.

O.D.	Step	Step	I.D.	Type	Description	Pt. No.
1.350	1.065	0.775		Dual	Lightweight	DW526-LTW
1.375	1.085	0.795		Dual	Lightweight	DW540-LTW
1.420	1.146	0.828		Dual	Lightweight	DW535-LTW
1.430	1.1475	0.7425		Dual	Nitrided Steel	DW515-S3
1.437	1.178	0.870	0.639	Triple	Standard	DW565-10
1.450	1.090	0.695		Dual	Nitrided Steel	DW1802-S1
1.450	1.110	0.715		Dual	Lightweight	DW1802-LTW
1.450	1.120	0.730		Dual	Lightweight	DW510-LTW
1.450	1.140	0.745		Dual	Lightweight	DW515-LTW
1.450	1.146	0.828		Dual	Standard	DW535
1.450	1.155	0.765		Dual	Lightweight	DW529D-LTW
1.450	1.155	0.835		Dual	Lightweight	DW530B-LTW
1.450	1.155	0.835		Dual	Lightweight	DW542-LTW
1.450	1.155	0.835		Dual	Lightweight/+0.030"	DW544-LTW
1.450	1.180	0.775		Dual	Lightweight	DW550B-LTW
1.450	1.185	0.860	0.620	Triple	Pro Stock/Top Lock	DW447M-PS-TL
1.450	1.185	0.870	0.635	Triple	Lightweight	DW565-LTW
1.450	1.185	0.870	0.635	Triple	Pro Stock	DW565-PS
1.495	1.130	0.820		Dual	Standard	DW541
1.495	1.155	0.835		Dual	Standard	DW530B
1.495	1.155	0.835		Dual	Standard	DW542
1.495	1.175	0.765		Dual	Standard	DW599
1.500	1.140	0.745		Dual	Standard	DW515

Lash Caps

Del West precision-hardened Steel Lash Caps are available for valves with 6mm, 7mm, 5/16" or 11/32" stems. CNC-machined from the same material utilized for our steel valve-tip inserts, these lash caps are designed for Del West titanium valve stem diameters. Lash caps are intended for use on titanium valves without steel tip insert protection.

NOTE: All Del West Lash Caps have a 0.110" tall skirt with a 0.060" thickness ceiling for an overall height of 0.170". Standard ceiling thickness is 0.060". Custom ceiling thickness lash caps are available for adjusting valve lash. Lash caps must not be used in conjunction with steel tip inserts. Contact our engineering or sales staff for additional information.

Description	Part Number
6mm Lash Cap	DW-LC-2356
7mm Lash Cap	DW-LC-2754
5/16 Lash Cap	DW-LC-3100
11/32 Lash Cap	DW-LC-3412

Spring Seats

Del West Spring Seats are machined from the same proprietary alloy we use in manufacturing our intake valve seats. Precision CNC-machined to deliver parallelism of 0.001". Our spring seats provide greater wear resistance and higher heat transfer, prolonging spring life. Custom sizes available.

Valve Train and Engine Products

Del West offers a broad range of additional valve train and engine parts, all manufactured to the same precision standards as our valves and other products. Shown, left to right, are Lifters, Piston Pins, Valve Seats and a Pneumatic Valve Actuation Cylinder (proven complete system design and manufacture available). Custom design and manufacturing available on request for quote.

Getting the Most From Your Valve Train

From the highly developed pushrod V8s of American short tracks and NASCAR to the pure racing V8s of Formula One, engine builders and designers agree that major increases in engine performance are most likely to come from advances in the valve train.

No other system in a racing engine is as critical to performance, or as sensitive to what would be considered minor changes as the valve train.

The world's best racing engine builders and designers also agree that, while the valve train is a combination of parts, it cannot be considered in such simple terms. From the camshaft to the valve, all the parts make up a system. Unless all the parts work together in a balanced and harmonious way, maximum performance cannot be achieved.

The importance of the 'system approach' cannot be stressed enough, and applies to the entire engine, as well as to sub-systems such as the valve train. Simply changing one aspect, like carburetion, can actually reduce performance, unless valve size, valve timing, ignition timing, intake manifold design and exhaust system capacity are also modified to maintain the balance between the systems.

It is a better understanding of this systems approach which separates the great engine builders and designers from the good ones. Our purpose here is to provide information which will lead to a better understanding of the system approach to valve train design and modification.

The Valve Train

The valve train system is complex, and composed of many parts, including valves, retainers, locks, valve springs, rocker arms, rocker bars or stands, pushrods and lifters. It also includes the camshaft and the drive belt or chain. Each affects the others, and the resulting system is only as strong as its weakest part.

Valve Float

One of the most important considerations in selecting valve train components is to keep the valves accurately producing the timing designed into the cam profile. At higher rpms, failure to follow the cam profile results in valve float or bounce, in which the valve rebounds off the seat one or more times after initially closing.

Valve float allows cylinder pressure to 'leak' past the valve at each bounce. This reduces cylinder pressure, which in turn reduces power. Intake valve bounce causes pressure waves to flow back up the intake tract, and in some cases can lead to valve failure. Lighter valve train components, including titanium valves, tend to minimize valve bounce.

Rigidity

The most common cause of valve float is a lack of rigidity in the valve train. Rigidity is the ability of a structure to maintain a constant distance between two points under load, and is critical in three aspects.

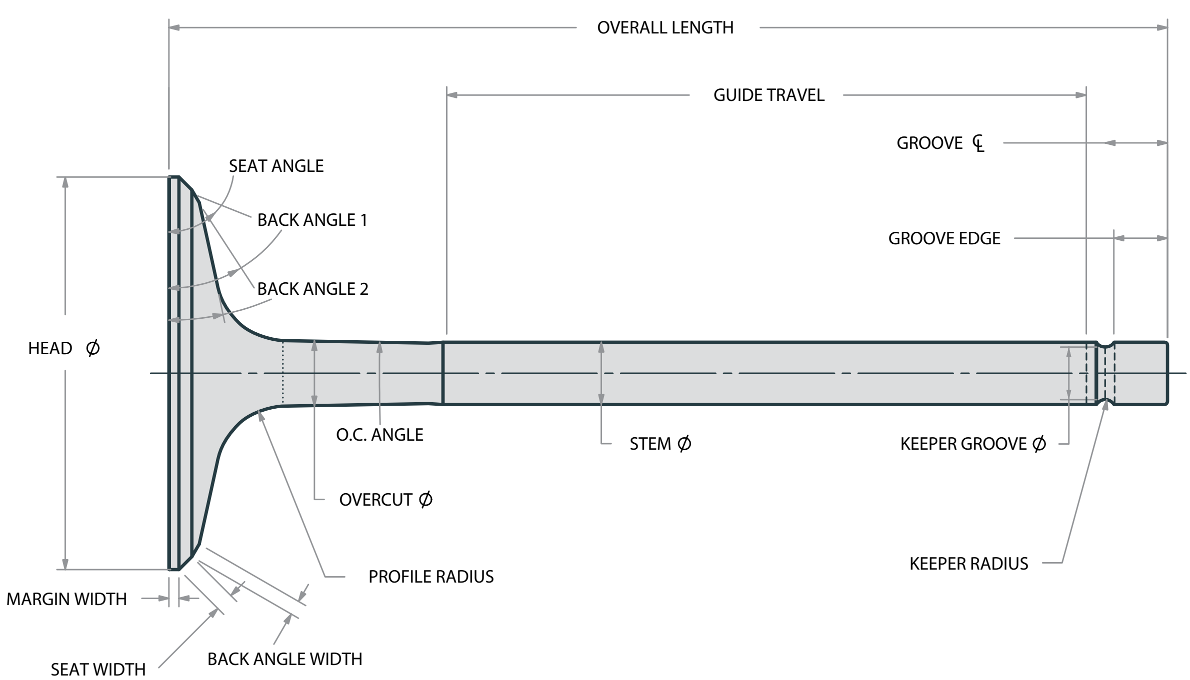
The first two points are the ends of the pushrod. The second pair are the pivot point of the rocker arm and the point where the rocker arm and pushrod meet. The third pair are the rocker arm pivot point and the junction of the rocker arm and valve stem tip.

Only if the distances between those points remains constant and the valve stem itself does not flex will the actual valve timing match the timing designed into the cam lobes.

More simply put, when the pushrod, rocker arm or valve stem flexes, valve timing can be dictated as much by the flex as it is by the cam design.

Even without encountering valve float, if either the pushrod, valve stem or the rocker arm flex, valve lift will be reduced. Reduced valve lift results in less filling of the cylinder and reduced cylinder pressure, and cylinder pressure is directly proportional to horsepower. The negative effect of flexing pushrods and rocker arms increases with rpm.

When a rigid pushrod is employed, it can also have an effect on low-lift duration because a rigid pushrod will more accurately transfer lobe duration to the valve. It is therefore sometimes necessary to reduce duration at low lift to recover lost cylinder pressure.



Pushrod, Valve Stem and Rocker Arm Flex

The pushrod is more likely to flex than the rocker arm. In order to make the pushrod more rigid, the outside diameter can be increased. The available clearance in the cylinder head can, however, limit pushrod thickness. The alternative solution is a pushrod with greater wall thickness. Only trial and error will produce the lightest pushrod possible without encountering flex.

A rigid pushrod transfers all the forces from the cam to the rocker arm, so a more rigid pushrod can cause rocker arm flexing. As with pushrods, reducing rocker arm weight through selection of material or design will increase rpm and power. However, weight can be reduced to the point where the flex alters valve timing. Excessive weight reduction can even cause valve float.

In both pushrods and rocker arms, a balance therefore has to be found between light weight and rigidity, and if the balance is going to be off, it needs to favor rigidity at the expense of added weight.

As discussed above, a similar compromise must be made between weight and rigidity in the case of the valve stem. Hollow stem valves allow for increased rigidity while restraining valve weight

Rocker Stand or Bar

The stand or rocker bar must also be rigid, for the same reasons that pushrods and rocker arms cannot flex or bend. In most cases, the way the stand is mounted to the head is critical, and a stud is often the best way to secure the bar to the cylinder head.

Valve Springs

Valve springs appear simple, but their operation is not, and their impact on the system is great. Although there are many springs available that will provide the same pressure both on the seat and at maximum valve lift, Horsepower will vary signifi cantly from spring to spring.

The factors that influence the performance with a given spring are its mass (weight), stiff ness and frequency.

Frequency is the number of events (actually cycles) that happen within a given time period (usually cycles per minute). The higher the rpm, the greater the spring's opening and closing frequency. The spring must be matched to the rpm range (and therefore the frequency) in which it operates, and spring manufacturers recommend specific springs on that basis.

The combined mass of the valve, retainer and locks also affects valve spring selection. The lighter the valve assembly, the less spring pressure is required to close the valve.

Excessive spring pressure creates friction and decreases power. Too little pressure prevents the valve, rocker and pushrod from following the cam profile during valve closing.

Vibration

In addition to the operating frequency, valve train components have what are called natural frequencies, or harmonics. A harmonic is defi ned as a narrow range of RPM where the amplitude or size of the vibration goes through a maximum or becomes very large. On either side of this vibration peak the size of the vibration is quite small.

As rpm increases, valve train components can experience one or more harmonics. The greater the RPM range of engine operation, the greater the number of harmonic vibrations that will occur. If all the parts except the spring are rigid, the shape of the cam lobe determines the rate and speed at which the valve opens and closes. How often the cycle is repeated in a given time period is determined by the rpm.

Harmonics can occur at different points across the engine's operating range, and can cause loss of valve control at surprisingly low rpm. It is not unusual to see a power curve with a dip in the middle, this "McDonald's arches" effect being caused by harmonic spring vibration.

To reduce, if not eliminate this harmonic problem, the parts need to be selected to work together, as part of a system. It is even possible for diff erent natural frequencies in the various valve train components to allow one part in the system to act as a damper for another, just as a shock absorber dampens the oscillations of a suspension spring.

How can valve train components be made to work in harmony? Lacking very expensive testing equipment such as Del West employs, that is accomplished by following the basics of smart engine building.

Reduce Mass

One of the first things to look at is the combined mass (weight) of the valves, retainers and locks. Replacing steel valves with titanium gives a reduction in mass of approximately 40 percent.

The same reduction is achieved with titanium retainers and locks. Reducing the mass allows higher rpm and a broader torque curve, and it also reduces the loads on valve seats, springs and the camshaft, increasing engine durability. Reducing mass also shifts harmonics to higher RPM.

Spring Height

The installed height of the spring is critical. Coil bind occurs when adjacent spring coils contact each other. Coil bind is a function of the relationship between valve lift and the installed height of the valve spring, and must be avoided.

Because valve springs are the only intentionally flexible component in the system, they are the most prone to harmonics.

A spring that is installed at a height that leaves too much gap between coils at full lift (maximum spring compression) tends to promote the occurrence of harmonics. Too much free play between the coils at maximum valve lift can lead to lack of valve control.

Place the spring in a spring rater at the correct installed height, then compress it to full lift. Continue compressing the spring until coil bind is achieved. Please follow the spring manufacturers recommended "to bind" specification.

Rocker Arms

If pushrod improvements don't eliminate deflection, look at the rocker arm design the same way you'd look at a chassis. If you suspect the design might be subject to flexing or bending, see what other rocker arms are available for your engine. Remember, the mass of the rocker is not as critical as the stiffness.

With the advent of advanced rocker systems, stud girdles are now less commonly used to create more rigidity in the system, but stud girdles can solve rocker arm deflection problems when a more rigid rocker arm is not available.

Pushrod offset is not desirable, but in today's cylinder heads, restricted pushrod clearance may necessitate some offset. If an engine requires offset, it is more desirable to achieve it through lifter design than in the design of the rocker arm.

Camshafts

The camshaft lobe profiles have the greatest effect on torque and horsepower. Matching valve train components to the camshaft is extremely important. To make use of the various profiles available today with confidence that the engine will survive the laps desired requires more than just guessing. Testing both on the dyno and on the track will verify your choice. This is where your camshaft company's tech support line can be useful.

The Methodical Approach

If what you have is working, then fine tuning is probably all that is required to get the most out of your valve train. Whether making minor or major changes, always change only one thing at a time. Making two changes at the same time makes it difficult to determine which caused the result, whether it was good or bad.

Power Band

Creating a broad band of lower-rpm power for the run off the corner has the greatest impact on lap times, and represents the largest challenge to engine builders.

However, whether the goal is maximum peak power or the broadest possible torque curve, titanium valves and other lightweight valve train components give the engine builder greater freedom in choosing camshaft profiles. The lighter mass also promotes faster valve acceleration from any rpm, again giving the engine builder and cam designer more flexibility. The additional benefits of lighter valves, retainers and locks is that they can push valve float to levels of RPM above which you intend to operate the engine.

Increasing Demands

Each new generation of cylinder head design has increased airflow, but frequently the result is a sacrifice in throttle response. In order to give the driver a feel for throttle response, peak engine speeds have had to be increased.

The continual increase in rpm has in turn made the design and matching of valve train components progressively more critical to performance, and to the number of laps between rebuilds.

At Del West, we have responded with hollow-stem valve technology, improved solid-stem valve designs, better retainers and our Top Lock system. In addition, we've developed specialized coatings that reduce the wear and increase the durability of our components, particularly in the harsh environment presented by dirt tracks.

General Terms & Policies

Prices

All prices and specifications are subject to change without notice. Del West reserves the right to amend the availability or design of products at any time. Except as noted otherwise, the products contained within this catalog may not be legal for sale or use in pollution-controlled motor vehicles, and are intended for off road or off highway use only.

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Cash, cashier's or certified checks, or money order accepted via UPSCOD. Del West also accepts Visa and Mastercard, as well as electronic wire transfers. Company checks only to approved accounts. A $30.00 service charge will apply to all returned checks. A service charge of 1 1⁄2% (18% per annum) may be accessed to any past due account.

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Items not shown within this catalog are considered custom components, and are available at additional cost. Standard delivery schedule for custom components is 45 days. Expedited custom orders will be accommodated in our quick cell prototype service facility, typically within ten (10) business days, and are subject to additional service fees of $7.00 - $12.00 per item. Prices for custom components include all engineering and setup costs, but may vary depending upon specific purchaser requirements and specifications.

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All returns must be authorized by Del West in advance, and include a copy of the original invoice and return authorization form. No returns accepted after thirty (30) days, or on custom orders. Returns are subject to a 20% restocking fee.

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All backordered items will be shipped freight prepaid by Del West as soon as they become available unless the purchaser has requested otherwise. Requests to cancel backordered items must be made in writing, and will not be subject to cancellation charges provided the cancellation request is received prior to order processing.

Freight

Unless specifically requested otherwise by the purchaser, Del West will select the most cost effective surface shipping method possible. Alternate carriers or shipping methods specified by the purchaser will be accommodated, although any additional costs will be added to the invoice. Air freight priority shipping requests confirmed prior to 3:00 pm Pacific Standard Time will be shipped the same day. Air freight priority shipping requests confirmed after 3:00 pm Pacific Standard Time will be shipped the next business day.

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All shipments are F.O.B. Valencia, California. Title passes from Del West to the purchaser at the time of shipment. Package shortages or damage claims should be made directly against the carrier at the time of delivery. Shortages within a package must be reported in writing to Del West within five (5) business days in order to be honored. Claims must reference the order number, invoice number, date of invoice, date of shipment, part number, as well as a description of the shortage

Warranty

Del West warrants to original purchaser only that the products purchased pursuant to this agreement shall be free from metallurgical or coating defects and to meet the dimensional specifications provided in this catalog or in engineering drawings which Del West may provide to the customer as of the date such products are delivered to purchaser. Any claim that a products fails to conform to this warranty must be made within ninety (90) days. In the event of any claim that any product does not conform to this warranty, original purchaser shall provide written notice to Del West describing the alleged nonconformity and setting forth Del West's shipment and invoice numbers applicable to such products. Purchaser shall retain such allegedly defective products for inspection by an authorized representative of Del West. No products are to be returned to Del West by purchaser under any circumstances in the absence of Del West's specific written instructions and issuance of a return authorization. If products are found by Del West to fail to conform to this warranty, Del West will, at its option, agree to replace such products or issue a credit for the purchase price paid by the original purchaser. THE ABOVE WARRANTY IS THE ONLY WARRANTY MADE BY DEL WEST WITH RESPECT TO PRODUCTS AND IS IN LIEU OF ALL OBLIGATIONS OR LIABILITIES ON THE PART OF DEL WEST FOR DAMAGES, INCLUDING BUT NOT LIMITED TO SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, ARISING OUT OF OR IN CONNECTION WITH THE SALE, USE, FAILURE, OR PERFORMANCE OF PRODUCTS. Purchaser is not relying upon any representation, statement, or other assertion with respect to the nature or quality of products and acknowledges that all products are intended for off-road use only. The only other warranties made by Del West that shall be applicable to products (or any component thereof) shall be such written warranties, if any, as may be made and furnished by Del West to the retail purchasers or end-users thereof. Del West shall incur no obligation whatsoever to purchaser in respect of any such written warranties. DEL WEST DISCLAIMS ALL OTHER WARRANTIES WITH REGARD TO PRODUCTS SOLD, INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR USE. ALL PRODUCTS SOLD BY DEL WEST ARE FOR OFF ROAD OR OFF HIGHWAY USE ONLY.

Del West Engineering

Formed in 1973, Del West has been the world's largest and most respected titanium valve and lightweight valve train component manufacturer for more than 30 years. World-wide, our products have established the standard for performance and reliability in competition.

Del West's undisputed leadership is the result of continually expanding the boundaries of technology in materials, coatings, design concepts and manufacturing precision.

Our lightweight valve train components and pneumatic valve control systems are the key to sustained engine speeds up to 18,000 rpm, and provide engine designers with greater flexibility in balancing the often mutually exclusive requirements for peak power and a broad torque curve.

Our design and manufacturing expertise, and our continual research in metallurgy, coatings, manufacturing processes and design provide remarkable durability, delivering more miles per dollar.

Del West remains at the forefront of valve train design and manufacturing. Alone among valve train component manufacturers, we have:

- Designed and manufactured a complete pneumatic valve return system for a road-going engine.
- Designed and manufactured cylinder heads for specific racing applications
- Applied Formula 1-type valve train technology to small-displacement racing engines
- Redesigned complete valve train systems, producing increased peak engine speed and power
- Correlated computer model calculations to actual valve train performance
- Produced the first titanium valve for a low-volume road-going high performance U.S. sports car.

Del West's success in providing a broad range of engineering services and innovative solutions results from combining basic principles of engine design with our unequaled experience in everything from metals to finished components. That's why we've been chosen repeatedly to work with so many of the most renowned racing engine designers in the field today.

Del West

The World Leader in Titanium Valve Train Components

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