



# HINES INDUSTRIES, INC.

240 METTY DRIVE ■ ANN ARBOR, MICHIGAN 48103-9498 ■ PHONE: (734) 769-2300 ■ FAX: (734) 996-9192

## Reciprocating Mass Percentages

All figures are based on manufacturer's specifications for passenger car use. Racing applications may require different percentages. Contact the competition department of the engine manufacturer for more information. Balance percentages for racing applications may differ from passenger car specifications. Motorcycle engine bobweighting (designated by the "M" next to the manufacturer name) has not been proven by Hines Industries.

**IMPORTANT:** Normally, unless an engine is listed below, using 50% reciprocating and 100% rotating will suffice.

<b>Manufacturer</b>	<b>Engine Type</b>	<b>Engine Size (CID)</b>	<b>Throw Angle</b>	<b>Recip. Wt %</b>	<b>Rotating Wt %</b>	<b>Internal\ External Balance</b>
AJS (M)	1 cyl.			61%	100%	Not available
Acura	V6	3.2 L		44%	100%	
All In-Lines				NO BOB	WEIGHTS	REQUIRED
Auburn Speedster	V12			NO BOB	WEIGHTS	REQUIRED
Audi S4 2000	V6	2.7 L		50%	100%	
Audi	V6	2.8 L		44-46%	100%	
Audi	5 cylinder			50%	100%	
Benelli (M)				Symmetrical No bobweighting		
BMW (M)	Opposed twin (street)			60%	100%	
BMW (M)	Opposed twin (race)			50%	100%	
Briggs & Stratton	1 cyl.	Go Cart Racing		67%	100%	Use mini bobweights
Briggs & Stratton	1 cyl.	Stock		50%	100%	Use mini bobweights
Brush	1 cyl.			50%	100%	
BSA (M)	2 cyl.	650		80%	100%	
BSA	1 cyl.			61%	100%	
BSA (M)	Vertical twin (street)			60-70%	100%	
BSA (M)	Vertical twin (race)			50%	100%	
BSA (M)	3 cyl.			50%	100%	
Buick	V6	3.0 L (181)	90	36.60%	100%	External
Buick	V6	3.2 L (196)	90	36.60%	100%	External
Buick	V6 (race)	3.2 L (196)	90	50%	100%	External
<b>Manufacturer</b>	<b>Engine Type</b>	<b>Engine Size (CID)</b>	<b>Throw Angle</b>	<b>Recip. Wt %</b>	<b>Rotating Wt %</b>	<b>Internal\ External Balance</b>



# HINES INDUSTRIES, INC.

240 METTY DRIVE ■ ANN ARBOR, MICHIGAN 48103-9498 ■ PHONE: (734) 769-2300 ■ FAX: (734) 996-9192

Buick	V6	3.7 L (225)		44%	100%	External
Buick	V6	3.8 L (231)	90	36.60%	100%	External
Buick	V6 (race)	3.8 L (231)	90	50%	100%	External
Buick	350	5.7 L		50%	100%	External
Cadillac	V6	4.1 L	90	50%	100%	External
Cadillac '42-'45	V8 Flat head	1942-45		50%	100%	
Cadillac	V12	(386)		NO BOB	WEIGHTS	REQUIRED
Capri	V6	2.8 L	60	50%	100%	Internal
Capri	V6	3.8 L	90	39%	100%	
Chevy <sup>1</sup>	V6 <sup>3</sup>	2.3 L (140)	90	NO BOB	WEIGHTS	REQUIRED
Chevy	V6	3.3 L (200)		46%	100%	Internal
Chevy	V6	2.8 L	60	50%	100%	External <sup>2</sup>
Chevy	V6	3.4 L	60	50%	100%	External
Chevy	V6	3.8 L (229)		46%	100%	Internal
Chevy	V6 <sup>4</sup>	4.3 L (262) split pin		40% with balance shaft	100%	Internal
Chevy	V6 <sup>4</sup>	4.3 L (262) split pin		50% without balance shaft	100%	Internal
Chevy	V6 <sup>4</sup> (race)	4.3 L (262) split pin		50%	100%	Internal
Chevy	V6	Super 6	60	50%	100%	
Chevy	V6	Super 6	60	50%	100%	
Chevy	V6	5.8 L (351)	60	50%	100%	
Chevy	V8	265-400 small block	90	50%	100%	
Chevy 1950-1962	V6	235		NO BOB In Line	WEIGHTS Mains	REQUIRED Different
Chevy	V8	327		50%	100%	
Chevy	LSI			50%	100%	
Chevrolet	V8	6.5 Diesel				
Chrysler	Old Hemi	392		50%	100%	Internal
Chrysler '89-2003		3.9 L split pin		50%	100%	
Corvair	V6	3-throw odd fire		50%	100% <sup>3</sup>	
Corvair	V6	6 journals		50%	100%	Internal
Corvair	V8	396-502	90	50%	100%	
Dodge/Chrysler	V6	3.3 L	90	50%	100%	Internal
<b>Manufacturer</b>	<b>Engine Type</b>	<b>Engine Size (CID)</b>	<b>Throw Angle</b>	<b>Recip. Wt %</b>	<b>Rotating Wt %</b>	<b>Internal \ External Balance</b>



# HINES INDUSTRIES, INC.

240 METTY DRIVE ■ ANN ARBOR, MICHIGAN 48103-9498 ■ PHONE: (734) 769-2300 ■ FAX: (734) 996-9192

Dodge/Chrysler	Sm blk <sup>11,12</sup>		90	50%	100%	
Dodge/Chrysler	Big blk <sup>11,13</sup>		80	50%	100%	
DDC	V53	5.2 L (318)		200%	200%	
DDC	V71	7.0L (426)		200%	200%	
DDC	V92	9.0 L (552)		200%	200%	
DDC	V6	3.9 L	90	50%	100%	Internal
DDC	V10	8.0 L	90	50%	100%	
Ferrari		275 CID	60	NO BOB	WEIGHTS	REQUIRED
Ferrari	V6 (Dino)	High Performance		36-44%	100%	
Fiat	V12		60	NO BOB	WEIGHTS	REQUIRED
Fiat	Dino		56	50%	100%	
Ford	V-4	1.7 L	60	50%	100%	
Ford	V6	2.8L	60	50%	100%	Internal
Ford Ranger		2.9 L		50%	100%	Internal
Ford Taurus, Sable		3.0 L		50%	100%	Internal
Ford	V6	3.0 L		50%	100%	
Ford	V6 <sup>4</sup>	3.8 L		39.4%	100% <sup>5</sup>	External
Ford	V6	4.2 L		50%	100%	
Ford	Flat head	239		50%	100%	Internal
Ford		3.8 L (steel crank)		50%	100%	Internal
Ford	V6	4.0L split pin		50%	100%	w/ counter balance
Ford	V6	4.0 L		44%	100%	w/o counter balance
Ford	V8	4.6 L (281)	90	50%	100%	Internal
Ford	V8	5.4 L (330)	90	50%	100%	Internal
Ford	V8	302		50%	100%	External (28oz/50oz)
Ford	V8	221-351 small block	90	50%	100%	External
Ford	V8 <sup>14,15</sup>	332-428 big block (FE)	90	50%	100%	
Ford	V8 <sup>14,15</sup>	370-460 big block (385)	90	50%	100%	
Ford	Diesel	201		0%	50%	
Ford	Diesel	7.3 L		50%	100%	
<b>Manufacturer</b>	<b>Engine Type</b>	<b>Engine Size (CID)</b>	<b>Throw Angle</b>	<b>Recip. Wt %</b>	<b>Rotating Wt %</b>	<b>Internal\ External Balance</b>



# HINES INDUSTRIES, INC.

240 METTY DRIVE ■ ANN ARBOR, MICHIGAN 48103-9498 ■ PHONE: (734) 769-2300 ■ FAX: (734) 996-9192

GM	V6	2.5 L		50%	100%	External
GM	V6	2.8 L	60	50%	100%	External <sup>7</sup>
GM	V6	3.0 L		50%	100%	Internal
GM	V6	3.1 L		44%	100%	
GM	V6 '91-'97	3.4 L dbl overhead cam		44%	100%	
GM Duramax	V8 diesel	6.6 L		50%	100%	External
GM	V8 Cadillac	4.1 L		50%	100%	
GM		3.8 L w/ shared journal		50%	100%	External
GM	Olds Ever-fire diesel	4.3 L diesel		35.2%	100%	External
GMC	53 series					
GMC	71 series					
GMC	92 series					
GMC		4.3 L	90	50% w/ balance shaft	100%	External
GMC		4.3 L	90	40% w/o balance shaft	100%	External
GMC		4.3 L	90	50%	100%	
Harley Davidson, Indian (M)	V-twin (street)			52%	100%	
Harley Davidson, Indian (M)	V-twin (3-4000 RPM)			57%	100%	
Harley Davidson, Indian (M)	V-twin (race)			66%	100%	
Honda (M)	V4			50%	100%	
Honda (M)	4 cyl.			NO BOB	WEIGHTS	REQUIRED
Honda (M)	2.5 cyl.		90	50%	100%	
Honda	6 cyl.			NO BOB	WEIGHTS	REQUIRED
International Navistar		7.3 L		50%	100%	
Isuzu		3.2 L		50.4%	100%	
Jaguar	Straight 6	4.3 L				
Kawaski	4 cyl.			NO BOB	WEIGHTS	REQUIRED
Kawaski	6 cyl.			NO BOB	WEIGHTS	REQUIRED
Kawaski	L4			NO BOB	WEIGHTS	REQUIRED
Kawaski	L6			NO BOB	WEIGHTS	REQUIRED
<b>Manufacturer</b>	<b>Engine Type</b>	<b>Engine Size (CID)</b>	<b>Throw Angle</b>	<b>Recip. Wt %</b>	<b>Rotating Wt %</b>	<b>Internal \ External Balance</b>
Kawaski KFX 700	VL Common rod		90			



# HINES INDUSTRIES, INC.

240 METTY DRIVE ■ ANN ARBOR, MICHIGAN 48103-9498 ■ PHONE: (734) 769-2300 ■ FAX: (734) 996-9192

Koehler	1 cyl.			50%	100%	
Koehler	1 cyl.			Racing 60%	100%	
Lamborghini	V12		120	NO BOB	WEIGHTS	REQUIRED
Lincoln	V12 H series 1941			50%	100%	
Matchless (M)	1 cyl.			61%	100%	
Mazda	MX6 Dual overhead cam	2.5 L		44-50%	100%	
Mercury	V6 outboard	2.5 L		30%	100%	
Mercury	V6 outboard	2.5 L (race)		50%	100%	
Mitsubishi	V6 3000GT	3.0 L		50%	100%	
Nissan	V6	2.8 / 3.0 L	60	50%	100%	
Nissan	V6	3.5 L		50%	100%	
Packard	V8 (straight)			NO BOB	WEIGHTS	REQUIRED
Pantara		351		50%	100%	
Perkins (gas and diesel)	3 cyl.			0%	50%	
Peugeot	V6			50%	100%	
Peugeot	V6			50%	100%	Internal
Pontiac	V6	3.1 L		44%	100%	
Pontiac	V8 <sup>8</sup>	(389)		50%	100%	External most are heavy flywheel
Pontiac		400				External
Pontiac		455 big block		50%	100%	External
Renault	V6			50%	100%	
Saab	V4	1.7 L		50%	100%	
Suzuki	3 cyl.			0%	100%	
Suzuki	4 cyl.			NO BOB	WEIGHTS	REQUIRED
Tecumseh	1-cyl. 8 HP go cart			60%	100%	
Tecumseh	1 cyl. garden tractor			50%	100%	
Tecumseh	1 cyl. go cart, 7,500-10,000 RPM			70%	100%	
<b>Manufacturer</b>	<b>Engine Type</b>	<b>Engine Size (CID)</b>	<b>Throw Angle</b>	<b>Recip. Wt %</b>	<b>Rotating Wt %</b>	<b>Internal\ External Balance</b>
Tecumseh	2 cyl, high- RPM (10,000+)			81%	100%	



# HINES INDUSTRIES, INC.

240 METTY DRIVE ■ ANN ARBOR, MICHIGAN 48103-9498 ■ PHONE: (734) 769-2300 ■ FAX: (734) 996-9192

Toyota	V6	3.0 L		50%	100%	Internal
Toyota	V6	3.4 L		50%	100%	
Triumph (M)	1 cyl.			61%	100%	
Triumph (M)	Vertical twin (street)			60-70%	100%	
Triumph (M)	Vertical twin (race)			50%	100%	
Triumph (M)	3-cyl			50%	100%	
Viper	V10 Series			50%	100%	
Volkswagen	V6	2.8 L (170)	18	50%	100%	
Volkswagen	VR6		18	32-36%	100%	
Volvo	V4			50%	100%	
Volvo	V6			50%	100%	
Volvo	V8 XC90 vehicle		60 <sup>0</sup> balance shaft		100%	
Wisconsin	VH 4D	(180)	60	36%	100%	
Wisconsin	4 cyl. VG4D	2.5 L (154)	90	20%	100%	
Yamaha (M)	1 cyl.			61%	100%	
Yamaha (M)	75 <sup>0</sup> twin (street)			55-60%	100%	
Yamaha (M)	75 <sup>0</sup> twin (race)			60-70%	100%	
Yamaha (M)	3 cyl.			50%	100%	
Yamaha (M)	4 cyl.			NO BOB	WEIGHTS	REQUIRED
Yamaha (M)	'82 Y Z550			Uses gear driven balancer		
Yamaha (M)	V6 200 HP outboard (racing)			50%	100%	
Yamaha (M)	V6 200 HP outboard (not racing)			36%	100%	
Misc.	3-throw V6 (odd-fire)			50%	100%	

## Legend

(G) denotes German-made version of Ford engines

(M) denotes motorcycle engine manufacturer

1. Chevrolet racing engines utilizing common-pin crankshafts (made from forging p/n 14044838) require 50% reciprocating weight and 100% rotating weight.

2. Externally balanced on flywheel only. Some flywheels might not be externally



## HINES INDUSTRIES, INC.

240 METTY DRIVE ■ ANN ARBOR, MICHIGAN 48103-9498 ■ PHONE: (734) 769-2300 ■ FAX: (734) 996-9192

counterweighted.

CHECK TO BE SURE.

3. This includes the Corvair crankshaft.

4. Split-pin design.

5. Truck and Continental engines require 39.4% reciprocating and 100% rotating plus the addition of 3 oz-in at the v-damper end of the crank. The weight must be added at the centerline of the counter-weight at the v-damper.

6. There is less weight on the counterweight in this design.

7. Externally balanced on flywheel end only.

8. 389 cu. in. engines externally balanced on the flywheel end of the engine only.

9. Externally balanced 400 cu. in. engine.

10. Externally balanced flywheel end of 350 cu. in. 1986 and up with one-piece rear main seal.

11. Externally balanced counterweight welded on the torque converter.

12. Cast crank only.

13. 440 cu. in. 6-pack externally balanced.

14. Steel 427 cu. in. and 429 cu. in. boss cranks with oil galleys in hollow rod pins, add 15 grams.

If not hollow rod pins, use 4 grams.

15. Externally balanced on 410/428 cu. in. engine.

16. 1979 and up is external and uses a slide-on counterweight behind damper.

---