



2003 Machine Shop Market Profile

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The machine shop/custom engine rebuilder (CER) market during production year 2002 continued to feel the impact of multiple factors leading to decreases in demand for rebuilt engine blocks, cylinder heads and crankshafts.

Better quality OEM engines produced since the early '90s, ready availability of less expensive used engines, and over capacity of new vehicles accompanied by continued availability of low interest rates and new vehicle rebates and incentives are among the major factors contributing to continued overall decreases in demand for rebuilt engines and machine shop services.

These factors are primarily those impacting the typical passenger car/light truck engine aftermarket. As a consequence, we see more and more custom engine rebuilders exploring opportunities in various niche engine markets. Niche markets for engine rebuilders include everything from high performance, restoration and industrial, to those for subcompact diesel, marine and import engines.

Consolidation among both automotive machine shops/CERs, production engine remanufacturers (PERs) and their parts, equipment and service suppliers has continued for several years. For example, in the early '90s the Engine Rebuilders Association (AERA) had about 4,200 engine rebuilder members. Today there are about 3,000 machine shop members. In the late '90s the Production Engine Remanufacturers Association (PERA) had about 120 remanufacturer members. Today there are 71 remanufacturers that are members of PERA.

Engine rebuilders, parts and equipment suppliers and association representatives we spoke with all feel, for the most part, that there continues to be overcapacity in the market. Although many industry participants feel that much of the shakeout among engine

builders and their suppliers has already taken place, most agree that we have yet to reach the bottom. Most feel that there continues to be overcapacity, especially as it pertains to demand for machine work for typical passenger car and light truck engines.

Consequently, most feel that consolidation among engine rebuilders and their suppliers will continue during 2003, although at a reduced pace compared to the previous three to four years.

The data generated for this year's Machine Shop Market Profile was collected through survey questionnaires sent to the machine shop/custom engine rebuilding membership of the AERA. Four different questionnaires, consisting of four pages each, were developed to obtain the information contained in our profile.

Each questionnaire was mailed to one-quarter of AERA's rebuilding membership, selected on a random-start Nth-name basis. A total of 2,500 outgoing questionnaires were sent in late January. A follow-up mailing to non-respondents was made during the first week of March. A total of 507 completed questionnaires were returned resulting in a return rate of about 20%. Analysis of the data was completed by Babcox Market Research using Microsoft Excel.

The survey information reflects data for production year 2002. The same machine shop/CER population has been surveyed for more than two decades. Therefore information contained in the following charts yields the most reliable data for tracking trends in the production of engines, cylinder heads and crankshafts, as well as specific business data.

Part I of this two-part profile includes data on monthly production of blocks, heads and cranks, core sourcing, teardown and assembly labor hours, shop equipment ownership and purchasing, and labor hours spent in specific engine building areas.



Engine Production Data

The combined average monthly production of gas and diesel engines declined by 9.5% during 2002 compared to 2001. Nationally, the average machine shop produced 19 gas and diesel engines monthly last year compared to 21 units in 2001.

Gas engine production declined by 18% while diesel engine production increased 4%. In gas engines, 4- and 6-cylinder production was relatively unchanged. However, 8-cylinder gas engine production declined significantly from an average of 9.4 units monthly in 2001 to 7 units in 2002.

On the other hand, diesel engine production was relatively unchanged in 4-cylinder engines, but rose 5.5% and 103% respectively in 6- and 8-cylinder engines. Total monthly diesel engine production increased from 2.2 units in 2001 to 3.1 units in 2002.

Monthly gas and diesel engine production translates to annual production of 228 units during 2002 compared to annual production of 252 units during 2001 for the typical custom engine rebuilder – a decline of about 9.5%.

Projected onto a universe of 4,500-6,000 full service machine shops, it's estimated that CERs accounted for between 1.03 to 1.37 million gas and diesel engines built during production year 2002.

AVERAGE NUMBER OF GAS/DIESEL ENGINES REBUILT PER MONTH IN 2002

	2002	2001	2000	1999
GAS ENGINES				
4 CYLINDER	4.4	4.4	4.9	4.5
6 CYLINDER	4.2	4.8	4.7	4.1
8 CYLINDER	7.1	9.4	8.7	8.4
OTHER	0.2	0.8	0.7	0.3
TOTAL	15.9	19.4	18.3	17.3
DIESEL ENGINES				
4 CYLINDER	0.82	0.88	0.74	0.46
6 CYLINDER	0.90	0.58	0.57	0.47
8 CYLINDER	1.30	0.64	1.01	0.56
OTHER	0.04	0.07	0.06	0.02
TOTAL	3.1	2.2	2.4	1.5
TOTAL NUMBER OF ENGINES				
4 CYLINDER	5.26	5.28	5.64	4.96
6 CYLINDER	5.10	5.38	5.37	4.57
8 CYLINDER	8.40	9.47	10.2	8.96
OTHER	0.24	0.87	0.76	0.32
TOTAL	19.0	21.0	21.4	18.8

ENGINE PRODUCTION INCREASES/DECREASES

RESPONSE	2002	2001	2000	1999
INCREASED	23.1%	25.0%	22.4%	30.2%
REMAINED THE SAME	56.7%	53.0%	57.1%	52.8%
DECREASED	20.2%	22.0%	20.5%	17.0%
TOTAL	100%	100%	100%	100%
AVERAGE INCREASE	17.8%	13.4%	14.4%	12.3%
AVERAGE DECREASE	15.4%	19.2%	17.7%	16.4%

REBUILT ENGINE SALES – DOMESTIC AND IMPORT

GAS	2002	2001	2000	1999
DOMESTIC	75.7%	74.5%	78.9%	76.7%
IMPORT	24.3%	25.5%	21.1%	23.3%
TOTAL	100%	100%	100%	100%
DIESEL	2002	2001	2000	1999
DOMESTIC	82.0%	88.3%	89.7%	85.5%
IMPORT	18.0%	19.7%	10.3%	14.5%
TOTAL	100%	100%	100%	100%



Engine Production Data

PERCENTAGE OF ENGINE REBUILDING FALLING INTO THE FOLLOWING CATEGORIES

	2002	2001	2000
AUTOMOTIVE GASOLINE	56.3%	68.2%	64.8%
AUTOMOTIVE DIESEL	4.0%	3.5%	3.4%
MEDIUM-DUTY DIESEL	3.9%	4.7%	5.5%
HEAVY-DUTY DIESEL	4.8%	5.6%	5.3%
INDUSTRIAL ENGINES	4.8%	5.8%	8.5%
MARINE ENGINES	5.1%	5.9%	5.3%
MOTORCYCLE/MOWER/OTHER SMALL	2.4%	3.3%	3.1%
PERFORMANCE	17.3%	N/A	N/A
OTHER TYPES	1.4%	3.0%	4.1%
TOTAL	100%	100%	100%

PERCENTAGE OF SHOPS THAT REBUILD THE FOLLOWING CATEGORIES

	2002	2001	2000
AUTOMOTIVE GASOLINE	96.3%	98.1%	92.7%
AUTOMOTIVE DIESEL	53.3%	51.0%	47.9%
MEDIUM-DUTY DIESEL	47.7%	51.0%	47.9%
HEAVY-DUTY DIESEL	37.4%	37.5%	38.5%
INDUSTRIAL ENGINES	57.0%	64.4%	67.7%
MARINE ENGINES	53.3%	59.6%	53.1%
MOTORCYCLE/MOWER/OTHER SMALL	41.1%	48.1%	41.7%
PERFORMANCE	81.3%	N/A	N/A
OTHER TYPES	12.2%	24.0%	16.7%

PERCENTAGE OF TOTAL REBUILT ENGINE SALES RETURNED AS WARRANTY

	2002	2001	2000	1999
Returned	2.8%	2.7%	2.5%	1.7%

PERCENTAGE OF WARRANTY RETURNS WHICH ARE ACTUALLY CUSTOMER INSTALLATION OR DIAGNOSTIC PROBLEMS

	2002	2001	2000	1999
Returned	66.3%	68.7%	63.8%	63.1%
Percent change	3.5%	4.7%	1.1%	-11.0%

This represents a decline of between 8% and 9.1% compared to the 1.13 million to 1.5 million gas and diesel engines built by machine shops/CERs during production year 2001.

If you take the estimated 800,000 engines remanufactured annually by production engine remanufacturers (PERs), that would place the combined total number of engines rebuilt in 2002 by CERs and PERs at 1.83 million to 2.17 million.

The Motor Equipment Manufacturers Association (MEMA) recently surveyed 200,000 households and found that based on 218 million vehicles in use, 3.2 million engines were either replaced or overhauled by consumers during 2002.

That represents a difference of about 1.03 million to 1.37 million engines rebuilt by CERs and PERs, compared to engines replaced or overhauled by consumers. The majority of the difference likely lies primarily in the installation of used engines, OEM new, and overhauls not including major machine work.

Although you may take issue with the estimates for rebuilt engines or with MEMA's data for replaced or overhauled engines by consumers, all engine rebuilders and suppliers that we spoke with cite used engines as a major competitor to a rebuilt engine in today's market.



Engine Production Data

PERCENTAGE OF TOTAL REBUILDING BUSINESS IN GAS ENGINE PRODUCTION FOR FOLLOWING CATEGORIES

	2002	2001
SHORT BLOCKS	11.5%	11.1%
LONG BLOCKS	19.4%	17.7%
COMPLETE ENGINES	18.8%	20.6%
HEADS*	40.0%	42.6%
CRANKS	10.3%	8.0%

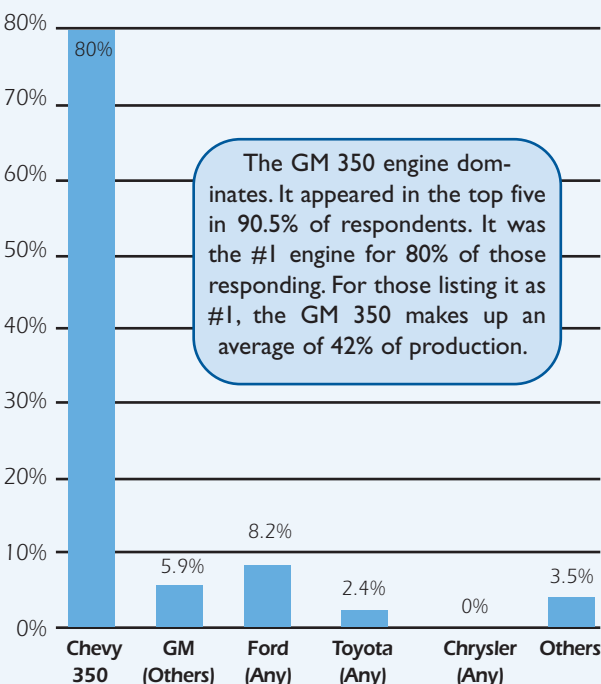
PERCENTAGE OF TOTAL DIESEL ENGINE REBUILDING PRODUCTION IN FOLLOWING CATEGORIES

	2002	2001
SHORT BLOCKS	6.5%	6.5%
LONG BLOCKS	14.5%	15.1%
COMPLETE ENGINES	19.4%	25.9%
HEADS*	45.8%	44.6%
CRANKS	13.8%	7.9%

PERCENTAGE OF TOTAL ENGINE PRODUCTION THAT IS PERFORMANCE RELATED

	PERCENTAGE OF RESPONDENTS
One to 10%	34.9%
11% to 20%	13.9%
21% to 30%	5.4%
31% to 40%	4.7%
41% to 50%	4.1%
51% to 70%	5.8%
More than 70%	8.1%
None/no answer	23.1%

PERCENTAGE RANKING AS #1 ENGINE REBUILT



The percentage of engines falling into various categories changed significantly as this year we added the specific category of high performance. This certainly impacted the percentage of engine rebuilding in the automotive gasoline category which dropped from a little more than 68% in 2001 to just over 56% in 2002. Much of this decline is likely the reclassification of these engines into the high performance category. Except for automotive diesel, the percentage of engine rebuilding in all other categories declined.

On average, high performance engines accounted for a little more than 17% of the total engine rebuilding performed during 2002 by the typical custom engine builder. And perhaps even more significantly, just over 81% of shops nationally say they are involved in building high performance engines.

Nearly 49% of shops report high performance engine work accounts for between one to 20% of all engines built; 13.5% reported high performance machine work represented 51% or more of all engine work. There is no question that there are many niches within the high performance engine market and most shops are involved in building for one or more of them.

Drilling down a little deeper we find that engine block work – short, long and completes – represent nearly 50% of the total production work undertaken by shops. Cylinder head work accounts for 40% of total production, while crankshaft rebuilding represents a little more than 10%.

The GM 350 is the most popular engine seen in shops. It was ranked among the top five engines by 90.5% of shops. It was the number one engine overall for 80% of custom engine builders responding to our survey. Other GM motors accounted for another 6% of the total engine work performed by the typical CER.



Cylinder Head Production Data

AVERAGE NUMBER OF GAS/DIESEL CYLINDER HEADS REBUILT PER MONTH IN 2002

	2002	2001	2000
GAS CYLINDER HEADS			
4 CYLINDER	18.3	17.5	17.7
6 CYLINDER	12.4	12.8	11.6
8 CYLINDER	19.7	23.8	19.7
OTHER	0.45	1.6	1.3
TOTAL	50.9	55.7	50.3
DIESEL CYLINDER HEADS			
4 CYLINDER	2.0	2.5	2.1
6 CYLINDER	2.1	2.6	2.2
8 CYLINDER	1.8	2.0	2.5
OTHER	0.45	0.33	0.13
TOTAL	6.35	7.43	6.93
TOTAL NUMBER OF CYLINDER HEADS			
4 CYLINDER	20.3	20	19.8
6 CYLINDER	14.5	15.4	13.8
8 CYLINDER	21.5	25.8	22.2
OTHER	0.90	1.93	1.43
TOTAL	57.2	63.1	57.2

Overall, combined gas and diesel cylinder head production declined 9.5% going from a total of 63 units rebuilt monthly in 2001 to just over 57 units built monthly in 2002.

Gas head production dropped 8.4% going from 55.7 units monthly in 2001 to about 51 units produced last year. Four- and 6-cylinder head production saw modest changes while 8-cylinder head production declined significantly from nearly 24 heads rebuilt monthly in 2001 to just 19.7 units in 2002.

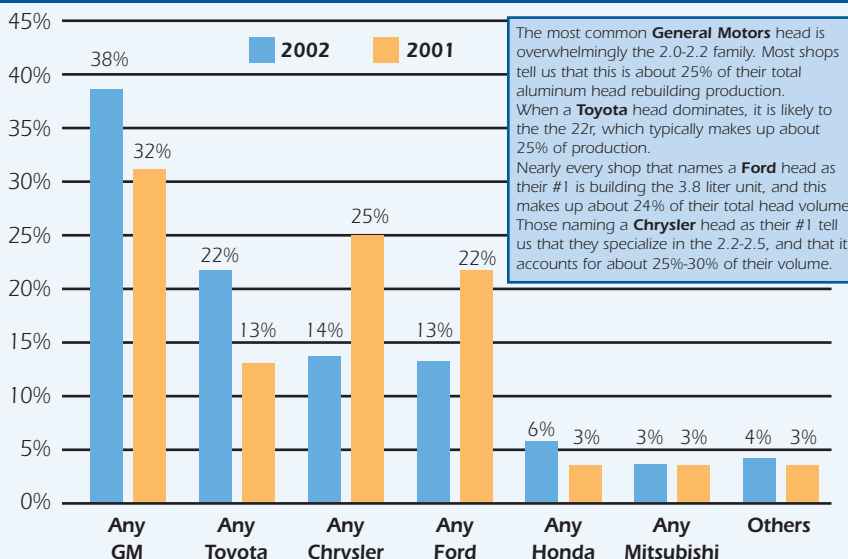
Diesel heads rebuilt monthly averaged 7.43 units in 2001, but declined to 6.35 units last year. Shops reported modest decreases in 4-, 6- and 8-cylinder diesel heads but a modest increase in the "other" diesel head category.

When asked what the number one aluminum head rebuilt in their shop is, 38% of survey respondents named a General Motors product. For those naming a GM head, the 2.0L-2.2L head represented 25% of their total aluminum head work.

Chrysler heads were named as the number one head rebuilt by 25% of shops with the 2.2L-2.5L representing 25% to 30% of total head production.

Ford and Toyota heads were ranked number one by 22% of shop owners.

PERCENT NAMING AS NUMBER ONE ALUMINUM CYLINDER HEAD REBUILT



PERCENT OF CYLINDER HEAD REBUILDING THAT IS ALUMINUM

Average 2002 48.3%

Average 2001 47.3%



Cylinder Head Production Data

CYLINDER HEAD PRODUCTION INCREASES/DECREASES

RESPONSE	2002	2001	2000	1999
INCREASED	33.3%	39.4%	32.2%	47.7%
REMAINED THE SAME	55.2%	40.4%	52.5%	45.8%
DECREASED	11.5%	20.0%	15.3%	6.5%
TOTAL	100%	100%	100%	100%
AVERAGE INCREASE	16.5%	13.4%	17.4%	14.1%
AVERAGE DECREASE	17.0%	15.5%	18.5%	7.2%

CRACK REPAIR ON ALUMINUM CYLINDER HEADS

REPAIR ALTERNATIVE	2002	2001	2000
DO REPAIRS OURSELVES	39.0%	50.0%	47.3%
SEND OUT FOR REPAIR	61.0%	50.0%	61.1%

PERCENTAGE OF CYLINDER HEADS SCRAPPED VERSUS REPAIRED IN 2002

SCRAP 25.9%

REPAIRED 74.1%

PERCENTAGE OF CRACKS WELDED VERSUS PINNED

REPAIR ALTERNATIVE	2002	2001	2000
WELD THE CRACK	79.0%	80.1%	87.8%
PIN THE CRACK	21.0%	19.9%	12.2%

PERCENTAGE OF TOTAL CYLINDER HEAD PRODUCTION THAT IS PERFORMANCE RELATED

PERCENTAGE OF RESPONDENTS

One to 10%	37.6%
11% to 20%	12.5%
21% to 30%	8.1%
31% to 40%	4.7%
41% to 50%	5.1%
51% to 70%	5.1%
More than 70%	5.8%
None/no answer	21.1%

The total number of cylinder heads rebuilt which are aluminum continues to rise, reflecting the fact that most, if not all, later model domestic and import engines have been equipped with aluminum heads.

Aluminum heads scrapped versus repaired remained unchanged. Nearly 26% of heads today are scrapped versus 74% which are repaired. Those scrapped are either replaced with a better core or a new casting. There are numerous sources for new replacement castings for the more popular cylinder heads, and usually at very reasonable pricing. Repair of cracked heads probably remains high due to the fact that a better core is often not available or that new castings are still primarily only available for the most "in-demand" cylinder heads.

But, when it comes to repair, there was a significant drop in the number of shops that repaired cracks in aluminum heads versus sending the head out to a crack repair specialist. In 2001, 50% of shops made repairs to aluminum heads themselves while in production year 2002 just 39% of shops reported doing so.

High performance is also a big part of head work. About 50% of shops report that 1-20% of head work is performance; 16% report that 41% or more of all head rebuilding is for high performance applications.



Crankshaft Production Data

AVERAGE NUMBER OF GAS AND AVERAGE NUMBER OF DIESEL CRANKSHAFTS GROUND PER MONTH IN 2002

	2002	2001	2000	1999
GAS CRANKSHAFTS				
4 CYLINDER	4.5	5.1	5.1	4.5
6 CYLINDER	4.0	4.3	4.2	4.3
8 CYLINDER	8.7	9.2	8.8	8.2
OTHER	0.3	0.4	0.4	0.4
TOTAL	17.5	19.0	18.5	17.3
DIESEL CRANKSHAFTS				
4 CYLINDER	0.77	0.77	0.67	0.7
6 CYLINDER	1.32	1.05	0.73	0.8
8 CYLINDER	0.50	0.73	0.49	0.5
OTHER	0.08	0.17	0.06	0.01
TOTAL	2.7	2.7	2.0	2.0

TOTAL AVERAGE NUMBER OF GAS AND DIESEL CRANKSHAFTS GROUND PER MONTH

	2002	2001	2000	1999
TOTAL NUMBER OF CRANKSHAFTS				
4 CYLINDER	5.3	5.9	5.8	5.2
6 CYLINDER	5.3	5.4	4.9	5.1
8 CYLINDER	9.2	9.9	9.3	8.7
OTHER	0.38	0.57	0.5	0.4
TOTAL	20.2	21.8	20.5	19.4

CRANKSHAFT PRODUCTION INCREASES/DECREASES

RESPONSE	2002	2001	2000	1999
INCREASED	18.5%	16.7%	17.4%	14.6%
REMAINED THE SAME	59.3%	69.0%	66.3%	70.7%
DECREASED	22.2%	14.3%	16.3%	14.6%
TOTAL	100%	100%	100%	100%
AVERAGE INCREASE	11.8%	12.8%	16.3%	10.2%
AVERAGE DECREASE	22.5%	32.8%	20.2%	25.2%

The number of crankshafts ground monthly declined 7.9% for gas engines going from 19 units monthly in 2001 to 17.5 units monthly in 2002. There were modest decreases in all categories – 4-, 6-, and 8-cylinder engine units.

Diesel crankshaft rebuilding, however, was unchanged compared to the prior year. Custom engine rebuilders reground the same “total” number of diesel 4-, 6- and 8-cylinder engine cranks in 2002 as in 2001 – an average of 2.7.

Combined gas and diesel crankshafts reground declined 7.3% going from 21.8 units in 2001 to 20.2 units in production year 2002. There may be several reasons for the flat to slight decline in reground crankshafts including some that mirror the same factors influencing the reduced number of rebuilt engines produced in 2002.

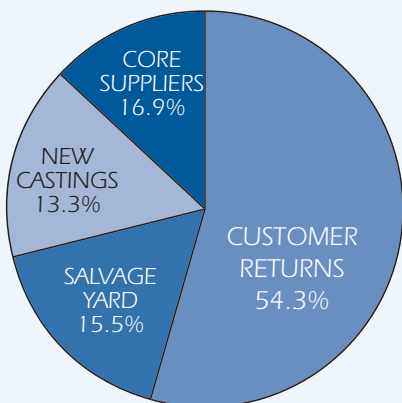
Engines today are built to last 150,000 to 200,000 miles with proper operation and maintenance. Except for a few specific engine models, today’s engines are far superior to those produced in the ’80s. Silicon rod and main bearings, introduced in the early ’90s by OEMs, have also proved to be very wear resistant.

However, issues involving the cost and mainte-



Core Data

WHERE CYLINDER HEAD CORES ARE ACQUIRED



nance of crankshaft grinding and polishing equipment, along with warranty and cost to purchase versus cost to regrind a crank may also be playing a role in the CER's flat to declining involvement in crankshaft regrinding.

Large national crankshaft rebuilders are able to sell to both traditional engine hard parts WDs as well as retailers reground crankshafts complete with rod and main bearings often at prices cheaper than a small CER could produce and then sell them.

One of these major crankshaft suppliers we spoke with told us that they have seen a noticeable increase in the drop shipments of crankshafts to automotive machine shops which purchased one of their cranks from a local retailer.

"There's no question that retailers have increased the priority of doing business with commercial accounts on

this product line with custom engine rebuilders," a national crankshaft supplier to retailers and traditional WDs told us. The CER can purchase the crank, complete with rod and main bearings cheaper than he can rebuild it and buy the bearings separately due to the purchasing power of large retailers and WD groups. The CER usually gets relieved of any warranty problems and doesn't have to spend \$25,000-\$100,000 on a used or new grinder.

Surface finishes on crankshaft journal surfaces, especially on late model units, if not micropolished, can also cause warranty returns. Less expensive micropolishing equipment has been introduced into the market, and meeting OEM specifications is critical to avoid failures. Those shops unwilling to invest in equipment technology necessary to meet specs may be purchasing cranks rather than trying to regrind them.

WHERE ENGINE CORES ARE ACQUIRED

SOURCE	2002	2001	2000	1999
CUSTOMER RETURNS	59.5%	63.5%	68.5%	64.1%
CORE SUPPLIERS	15.8%	10.3%	12.6%	14.0%
SALVAGE YARD	16.2%	18.9%	18.9%	21.9%
NEW CASTING	8.5%	7.4	N/A	N/A
TOTAL	100%	100%	100%	100%

AVERAGE TIME SPENT DISASSEMBLING AN ENGINE CORE (DOES NOT INCLUDE CLEANING)

TIME (IN HOURS)	2002	2001	2000	1999
8 CYLINDER	1.8	1.8	1.9	1.7
6 CYLINDER	1.6	1.5	1.6	1.5
4 CYLINDER	1.3	1.4	1.4	1.2

AVERAGE TO REBUILD A LONG BLOCK FROM CORE TEAR DOWN, THROUGH CLEANING, MACHINING AND FINAL ASSEMBLY

TIME (IN HOURS)	2002	2000	1999	1998
8 CYLINDER	16.1	16.5	16.0	16.7
6 CYLINDER	14.7	15.2	14.4	15.6
4 CYLINDER	12.6	14.1	12.4	13.6

PERCENT OF ENGINE REBUILD PROCESS THAT IS DISASSEMBLY OF ENGINE CORE

TIME (IN HOURS)	2002	2001	2000	1999
8 CYLINDER	11.1%	10.9%	11.9%	10.2%
6 CYLINDER	10.9%	9.9%	11.1%	9.6%
4 CYLINDER	10.3%	9.9%	11.3%	8.8%



Shop Equipment Data

SHOP EQUIPMENT PROFILE

TYPE OF EQUIPMENT	% OF SHOPS	AVG. NO.	AVG. AGE	% LIKELY TO PURCHASE	% WHO PURCHASED LAST YR.
	WHO OWN	OWNED	AGE	PURCHASE	LAST YR.
Aqueous Cleaning	59.8%	1.5	10.9	5.0%	5.0%
Ultrasonic Cleaning	9.0%	1.1	4.3	1.0%	1.6%
Solvent Cleaning	71.3%	1.5	10.4	1.0%	2.5%
Aluminum Head Welding	37.7%	1.1	8.7	4.9%	1.0%
Blasting Equipment	88.5%	1.3	10.7	1.6%	3.3%
Cam Grinder	4.9%	1.7	12.3	0.0%	0.0%
Crack Detection	90.2%	1.6	12.8	3.3%	4.1%
Crankshaft Grinder	50.8%	1.7	16.3	1.6%	1.0%
Crankshaft Polisher	72.1%	1.2	12.7	0.0%	1.6%
Crankshaft Straightener	39.3%	1.1	13.1	1.6%	0.0%
Crankshaft Welder	37.0%	1.2	14.1	0.0%	1.0%
Cylinder Boring Bar	89.3%	1.6	15.5	4.1%	4.9%
Cylinder Honing Machine	82.0%	1.1	11.8	4.1%	5.7%
Electrical Testers	19.7%	1.5	8.7	0.0%	2.5%
Engine Balancing	41.0%	1.1	11.5	4.9%	4.1%
Flywheel Grinder	68.0%	1.2	12.0	1.6%	1.0%
Head/Block Resurfacers	91.0%	1.4	13.7	8.2%	4.1%
Heat Cleaning	48.4%	1.1	10.6	0.0%	2.5%
Lathe	68.9%	1.6	17.1	4.1%	1.6%
Line Boring (Blocks)	47.5%	1.1	14.5	4.1%	1.6%
Line Boring (OHC Heads)	25.4%	1.1	7.6	4.9%	1.6%
Pin-Fitting & Rod	89.3%	1.3	16.3	3.3%	2.5%
Pressure Testing	82.8%	1.2	9.4	1.0%	4.9%
Spray Washers	80.3%	1.3	10.2	1.6%	3.3%
Valve Guide and Seat	92.6%	1.3	12.2	6.6%	6.6%
Valve Refacer	93.4%	1.4	11.9	3.3%	5.7%
Valve Seat	86.1%	1.5	12.6	3.3%	3.3%

AVERAGE AGE OF ALL EQUIPMENT IS 11.9 YEARS IN 2002

PRESENT VALUE (DEPRECIATION INCLUDED) OF YOUR MACHINE SHOP EQUIPMENT

YEAR	AVERAGE	PERCENT CHANGE
2002	\$206,433	1.0%
2001	\$204,428	0.1%
2000	\$204,156	16.2%
1999	\$175,682	-11.3%
1998	\$198,108	7.6%

A much higher percentage of shop owners indicated their intentions to purchase shop equipment this year in a variety of categories. Last year the highest percentage of shop owners – 3.9% – indicated they would likely purchase head/block resurfacing and or aqueous cleaning equipment.

This year, 8.2% of shop owners stated they were likely to purchase a head/block resurfacers. Additionally, 6.6% indicated they would likely purchase a valve guide and seat machine; 5% said they would likely purchase aqueous cleaning equipment; 4.9% reported they would likely purchase OHC line boring equipment and/or aluminum head welding equipment; and 4.1% said they would likely purchase a cylinder boring bar and/or a cylinder honing machine.

The apparent demand for better head/block resurfacers and valve guide and seat machines is due to engine builders experiencing increasingly greater demand for achieving smoother surface finishes on engine component parts ranging from crankshaft journals to connecting rod bushings to heads and blocks. Tighter tolerances are also being demanded for rebuilding multi-valve cylinder heads with smaller diameter

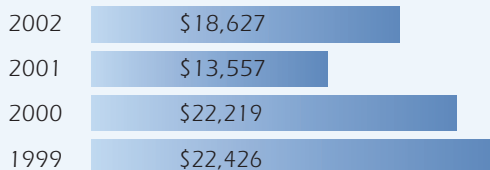


Shop Equipment Data

PERCENT OF TOTAL PRODUCTION TIME SPENT IN THE FOLLOWING AREAS

CATEGORY	2002	2001	2000	1999	1998
DISASSEMBLY/CLEANING	13.8%	15.8%	13.4%	12.8%	13.7%
BLOCK RESURFACING	4.4%	4.5%	4.4%	4.3%	5.0%
CYLINDER BORING	11.7%	11.7%	11.7%	11.8%	11.3%
CYLINDER HEAD RESURFACING	14.5%	14.4%	12.4%	13.2%	13.0%
VALVE GUIDE AND SEAT WORK	13.5%	13.2%	14.1%	13.4%	15.3%
CYLINDER HEAD CRACK REPAIR	3.0%	3.5%	4.4%	4.1%	5.4%
CONNECTING ROD RECONDITIONING	6.3%	6.4%	5.8%	6.7%	5.5%
VALVE RECONDITIONING	11.2%	11.3%	9.5%	13.8%	13.1%
FLYWHEEL GRINDING	7.3%	5.4%	6.5%	6.1%	4.6%
CLUTCH RESURFACING	0.3%	1.2%	0.3%	0.3%	0.3%
CRANKSHAFT GRINDING/POLISHING	6.8%	5.5%	5.9%	5.7%	5.5%
CRANKSHAFT WELDING	0.6%	0.8%	0.8%	1.1%	0.7%
CRANKSHAFT GRINDING	2.6%	1.9%	3.0%	2.0%	2.3%
OTHER	4.0%	4.4%	7.8%	4.7%	4.4%

AVERAGE AMOUNT SPENT ON MACHINE SHOP EQUIPMENT

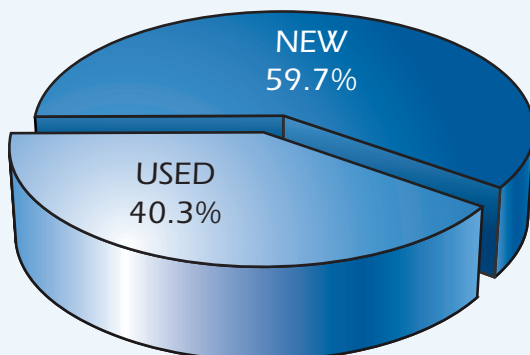


PERCENT CHANGE*

2002	+37.5%
2001	-39.0%
2000	-0.9%
1999	-10.4%

*From previous year

PERCENT OF EQUIPMENT THAT IS NEW AND USED



seats and guides.

The overall average value of total shop equipment increased from \$204,428 in 2001 to \$206,433 in 2002. This increase is in line with the reported 37.5% increase in the amount spent on shop equipment during 2002 compared to 2001.

Last year shop owners reported spending an average of \$18,627 on shop equipment compared to just \$13,557 spent on shop equipment in production year 2001. Valve guide and seat machines were purchased last year by more shop owners – 6.6% – than any other shop equipment.

In order of the highest number of shops making a purchase in 2001, valve guide and seat machines were followed by valve refacers and cylinder honing machines (5.7% of shops); aqueous cleaning equipment (5% of shops); pressure testing and cylinder boring bars (4.9% of shops); crack detection, engine balancing and head/block resurfacers (4.1% of shops); and spray washers and blasting equipment purchased by 3.3% of all shops.

The amount of dollars spent on new versus used equipment also rose in 2002 compared to 2001. In 2002 59.7% of all equipment purchases were new versus 57.8% in 2001. This increase likely reflects the need for better equipment required to meet today's engine building specifications. **EB**