STAHL HEADERS/CAMS
1513/1515 Mt. Rose Ave.
York, PA 17403

September 1987

STAHL HEADERS/CAMS NEWSLETTER
ISSUE #2

The STAHL CAMS Story

From 1968 until 1974 we plotted and graphed over 285 SB Chev cams. This gave us some insight into application and design variations. It also made us aware of what would be required to properly get into the cam business. We bought our first cam grinder on Nov 1, 1983. By May of 1984 we thought the rebuild was complete and it was ready to go. We spent from then until Sept 1985 before the surface finish suited us and no cam left our door until that time. Our cam design program came from Frank Speckhart, former consultant to Cam Dynamics. By early summer of 84 we also had the basic cam check software from Speckhart. The cam check machine became operational in Aug 84 and we were now experienced enough with the design program to turn out some usable designs. A total of 6 man months of computer programming that went into the package of 7 programs that we use for one thing or another relative to cams. By early 1985 we had accumulated enough data from our cam check machine to give us some good guidelines. We then embarked on a stressful journey to find a way to make our masters in a precision fashion. Most of the company's who design their own cams make model cams either on a milling machine or on a precision tool grinder. They then mount the model cam on a shaft which they in turn mount in the cam grinder to copy to make a master. Needless to say there are many opportunities to make mistakes. I really admire the skill that some of those model makers have achieved. However, we elected to by pass the model stage and go directly to masters. Today, although the process is very costly, our models are made on a CNC grinder. As a result we have significantly more accurate masters and more accurate cams.

In 1985 very few people had heard of Stahl Cams. In 1986 a few people that hold high creditability for Stahl Headers took a gamble and tried a Stahl Cam. In 1987 a few more took the gamble. By 1990, MOST hard core race engine builders will acknowledge Stahl Cams are the #l quality cams. Many will agree we have the best valve train reliability, most power under a graphed horsepower curve and, most of all, drivers will acknowledge how smooth they are to drive.

STAHL HEADERS/CAMS NEWSLETTER QUESTIONNAIRE

Your Name: _____

Company _____

Address : _____

_____

Phone: _____

Flow Bench: _____
Brand Model

Dyno: _____
Brand Model

Computer: _____

Specialty:
Drag Race: _____
Oval Track: _____
Road Race: _____
Other: _____

Cams Used Most:
Flat Tappet: _____
Roller: _____

Please complete & return to:
STAHL HEADERS/CAMS
1515 Mt. Rose Ave.
York, PA 17403
(717) 846-1632 or 846-3123

ATTENTION!
DO YOU WANT TO CONTINUE TO RECEIVE THIS NEWSLETTER?
Return above questionnaire to remain on our mailing list for future issues.

INTEGRITY

Companies grinding racing cams can essentially be put into two classes: Those who design the cams they grind and sell and those who copy cams. (It is not possible to accurately copy a cam.) How would you feel if someone copied your work and then sold it for a lower price. If you choose not to buy a Stahl Cam then at least buy from a company that does their own designs.

BUICK V-6 HEADERS

Stahl Headers now has Buick V-6 headers for NASCAR type Grand National cars. Testing by Dick Moroso indicates a measurable power increase over the commonly used brand.

LOBE SHAPES

Yes, our lobe shapes are different. Yes, we have analyzed SB Chev cams ground by most other cam manufacturers on our computerized camcheck machine. By combining camcheck data with reports from racers and engine builders we were able to separate the cams that run good, those that broke parts and so on. Yes, we used that information as guidelines for designing our cams. Yes, we did gain about 50 years of camshaft knowledge in 3 years. Yes, we would like to explain all we learned to engine builders and racers, but we can't because of competitors in the cam business. Incidentally we check our cams the same way we check those manufactured by other companies.

CARB FUEL LAG

The difference between the optimum jetting with a carburetor engine on the dyno and the race track varies with the size of the track. The shorter the track, the quicker the engine accelerates and the more fuel lag there is, thus requiring larger jets. Many 1/2 mile tracks require jets 4 or 5 numbers larger than the dyno wants. A very large track may only want 1 or 2 numbers larger. These thoughts apply only to gasoline. Methanol creates a different situation.

ENGINE BUILDERS

When you order a Stahl Cam, you can specify Serial Number only marking and that is all we will mark on the cam.

IGNITION TIMING

A short track will normally want two degrees more timing than the optimum timing derived on the dyno. The engine is always a little "quicker". Some drag race engines want four or five degrees more.

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HELP

Space does not permit a complete discussion of the "Daytona Phenomena" or an engine's ability for THROTTLE RECOVERY POWER. We have finally acknowledged that the dyno appears to be letting us down in evaluating the causes/cures for the above. We really need help on this one. Bill Jenkins recently came up with a very unique way to use his Superflow dyno for Pro Stock engines that required some special computer software which we were able to supply him. As a result, we now have the ability to read IBM compatible Super-flow Dyno data files and import that data directly into Lotus spreadsheets and do further statistical analysis and data smoothening . We are looking for ideas, thoughts, questions etc. on how you want to look at data. Call on a Saturday PM only for this one.

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ARE YOU CURIOUS

About rod angle, piston displacement, crank pin angle, piston speed, piston acceleration, crank pin forces. Write us with bore, stroke, rod length, rod small and large end weights, piston weight with pins, pinlocks and rings and we'll send you back a computer printout at no charge. For those with IBM PC's or compatibles the program is available for $25.00.

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AVAILABLE STAHL ROLLER CAM LOBE COMBINATIONS

Intake	Lift	Exhaust	Lift
255	.4145	261	.4015
259	.4207	264	.4099
263	.413	270	.4230
264	.4305	270	.4230
267	.4345	274	.4235
268	.4182	274	.4235

COMPUTER SOFTWARE

We have several computer programs available.

(1) An engine dyno program to be used to key in pertinent data with edit ability combined with a unique way to compare the data is available for IBM PC's/compatibles. In use since 1980 and presently priced at $195 (samples are available by asking).

(2) A special program that reads Superflow data files and converts them to the Stahl format to allow comparing up to 8 Superflow tests on the same piece of paper is available for $25.

(3) A flow bench program is available that is used to key in the range and flow %. The correction chart for each flow bench is keyed in and the program corrects and stores the data permitting comparing up to 8 sets of flow data on the same piece of paper. Priced at $195, it includes plotting capability.

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DYNO TESTS

What constitutes a valid dyno test? When you run a test 3 times back to back and there is no more than l/2% difference in corrected HP at each RPM test point. Are current dyno's capable of such repeatability? YES

What makes the difference?

(1) Proper cell ventilation.
(2) Proper engine air supply.
(3) Proper dyno exhaust system.
(4) Proper oil cooler setup.
(5) Proper test procedures.

Dick Moroso (Superflow 901) has modified his dyno facility, is careful with procedures, and always runs each test twice in 100 RPM per second acceleration mode. If the numbers looks almost the same he goes on to other things. If there is any question, he runs a third test. By running each test three times, you can always come up with good data IF the tests repeat within l/2 % . The man who built the engines that won both 1986 Daytona races normally gets repeatability within .2 to .3 % on a modified Stuska.

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FREE! !--UPON REQUEST

4 pages of thoughts on headers.

HOW TO INSPECT A CAM

1. Inspect all steel roller cams for grinding quality. Look for very small hairline cracks or pits on the opening side of the lobe. Do not use a cam that has cracks or pits. Optical flats or a "Venetian blind effect" indicate grinder problems.

2. Measure every lobe with a micrometer from the base circle to top of nose (toe to heel). The intake lobes of a dual profile cam should not vary more than .005 to each other nor should the exhaust lobes vary more than .005 to each other. All 16 lobes of a single profile V8 cam should measure within .005 of each other. All lobes are designed for a specific lobe size. Once you deviate more than .020 from design size you start to mathematically disturb the lobe. The dynamic characteristics of a full size base circle cam will be different than those of a small base circle cam as well as the duration at specific lift points and engine performance. There can be differences from one cam grinding machine to another if they are not set up correctly. In addition the size of the grinding wheel will have some influence on the shape of the lobe.

3. We recommend checking both lobe centers which is more properly called checking lobe separation. This is the difference between the intake lobe centerline and the exhaust lobe centerline. Degree the cam using #l intake lobe and then check #l exhaust lobe centerline. If #l cylinder lobe separation is correct, then all the cylinders will be within the lobe separation specs except for lifter bore location variations. (This applies to racing cams ground on Van Norman or Berco cam grinders.) The after market bolt on lifter boring tools need help getting the bores perpendicular to the front to rear shaft centerline.

4. The "WEAR" factors in a cam grinding machine are one of the things that will affect performance and valve train life. One of the ways to check for machine wear is to check for "DIP". Position the engine on an engine stand with the #l intake push rod vertical between the lifter and dial indicator. Rotate the crankshaft and observe the indicator. There should be no more then .0003 indicator "dip" (if you were using a digital dial indicator the reading would go negative when you go into the dip) as the lifter goes from the base circle to the opening ramp. The indicator should not vary more than .0008 over the entire base circle.

CAM PACKAGING

We have received numerous compliments on the thick round cardboard tubes we package our cams in. Apparently only GM and Stahl figure that's what you need to properly protect a cam.

HEADER TUBE SIZE SELECTION

Header primary tube size is a function of the horsepower the cylinder is producing, fuel efficiency and manifold vacuum/throttle area. Primary tube length requirement is generally a function of RPM range.

CALCULATE BASE CIRCLE

To calculate the base circle size of a cam we suggest using a micrometer to measure the max lobe height from the base circle to the nose. (toe to heel). A typical value could be 1.433". Subtract the cam lift which could be .413 and you have a 1.020 base circle.

To those who responded to Issue #l , we say "Thank You! ". Your participation in this effort is vital to its future existence. We appreciate the helpful criticism and gratifying comments. We mailed over 800 copies of Issue #l and there will be over 900 copies of Issue #2. Keep those letters and phone calls coming in!