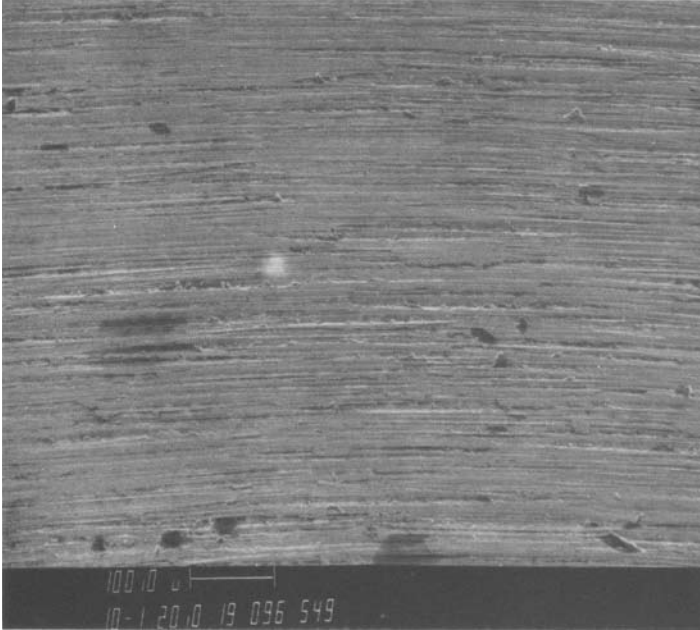
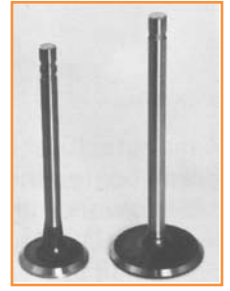


INTAKE AND EXHAUST VALVE STEMS

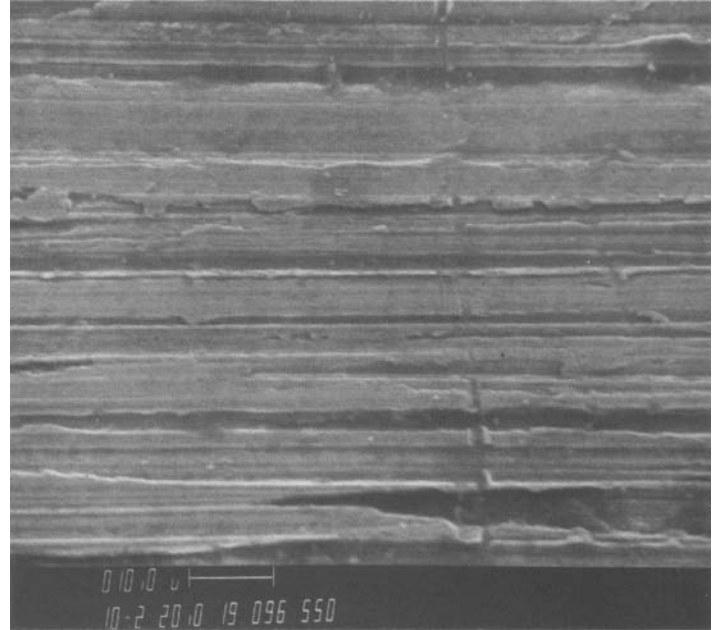
Because valve stem and valve guide wear has always been a major problem in the efficient performance of combustion engines, excessive oil consumption past the stems into the combustion chamber, poor valve seating due to excessive wear of the guide and the stem, blow-by due to excessive wear of the guide and the stem, burnt stems due to excessive friction and lack of lubrication etc, - we decided to have a closer look:

We bought two new valves from an auto parts store. One intake and one exhaust. One used in Ford and the other in GM. A large and small. Numbers S2090 and the other 2348X.. The stems had been ground. On our Rank surface Analyzer the arithmetic average on the small valve (Chev) S2090 measured from a 29.61 AA with 1% Plateau at 100. The stem on the 2348X large valve measured 17.60 AA with 74% Plateau at 100 (Ford).SEM on the Small in magnifications of 100X, and 1000X below:



As Received

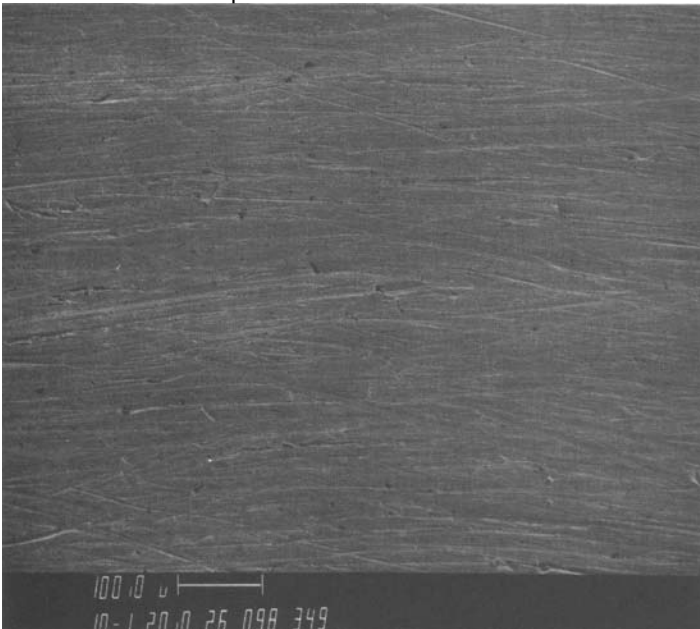
100 X



1000 X

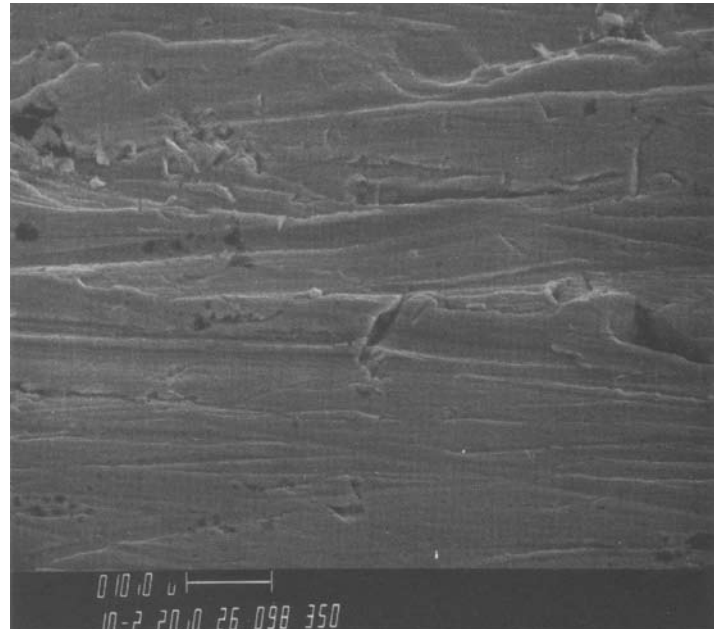
The boring and possibly reaming of the valve guide would then have a similar pattern on the surface with machining or grinding marks in parallel. These patterns would then abrade each other until they "mated" or had worn one another down until smooth. With no particular surface pattern to hold or retain or spread oil the heat and friction can only be imagined at this point. Or the amount of wear as these rubbed against each other at perhaps 50 or more times a second.

Flex-Honing the OD of these valve stems on our newly designed (and patent applied for) external honing device with a 240 grit boron carbide for 60 seconds the AA on the small valve stem (Chev) was 17.1 AA Plateau 95% at 100. The stem on the large valve read 22.3 AA and 56% Plateau at 100. The grinding horizontal pattern has now been changed to a plateaued finish, free of cut, torn and folded metal and a surface that will retain lubrication. It goes without saying that a compatible surface finish should also exist on the valve guide by Flex-Honing. SEM photos follow for comparisons first on the Small to match the above for comparison:



After Flex-Honing

100 X



1000 X