



CHEVROLET MOTOR DIVISION
General Motors Corporation

Inter-Organization Letter

To Mr. A. R. Carpenter *AR* Location Superintendent Inspection
 From Mr. W. C. Bartlett *WB* Location Ass't. Sup't., Inspection
 Subject Investigation of Vega Case *W.C.B.* Date June 19, 1972.
 problems experienced by *W.C.B.*
 Cosworth Engineering. *W.C.B.*

The purpose of this trip was to investigate Cosworth Engineering complaint of defective Vega Cases which have caused engine failures or build problems.

The following Chevrolet personnel visited Cosworth Engineering in Northampton, England.

- H. H. Majer - Plant Manager, Massena.
- C. E. Wade - Sr. Project Engineer, C. E. C.
- W. C. Bartlett - Ass't. Sup't. Inspection, Tonawanda.

A display of defective cases had been set up showing the various foundry and machining problems:

Machine Problems.

Damaged Cylinder bores - (3) cases were rejected for a horizontal depression in the cylinder bores. The mark ranged from 1/16" wide to 1/2" to 1" long, and from 1/2" to 4" down in the bore. This mark is caused by the automatic Bendix Bore Sizing machine and is associated with low size cylinder bores.

Scored Main Bearing bores - One case had an axial score on all five main bearings caused by a machining chip on the sizing bar being drawn in during the inspection operation. Corrective action has been taken on these defects so there will be no recurrence with additional orders of T. C. cases for Cosworth.

Badly tapped holes (torn thread, not full form, not square, not deep enough) - These conditions do occur with 390 aluminum and machine tapping of holes. The squareness and depth will be corrected on these cases but the torn and forming is considered acceptable for production and Cosworth will continue to individually hand tap all threaded holes for their specific purposes.





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Foundry Problems.

- 1) Visual porosity and cold shuts, particularly left hand side crankcase.
- 2) Visual porosity front of main oil gallery.
- 3) Visual cold shuts in rear face holes and around starter motor flange.
- 4) Hidden porosity around head - stud hole area (left hand side and right hand side).
- 5) Pits or holes in cylinder bores.
- 6) Vertical crack at top of cylinder bore - cold shut mark.
- 7) Miscellaneous cold shut (front face and top of cylinder seal areas).

These casting details are acceptable for production engines but because of the severe strain on the T. C. model, this type of imperfection can not be accepted on the Cosworth engines.

Defects during Service.

Vertical crack at top of cylinder bores - produced by head bolt deck pressures, design application necessary.

Horizontal crack between main bearing housing and base of cylinder bores, left hand side - this type of defect was produced on Tonawanda Dynamometer Durability engines but is not a production field problem.

Horizontal crack at base of water jacket on left hand side - This defect occurred on an 8A die which does not have the casting support in the head bolt area as the present T. C. die #9.



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The outside water jackets are under a heavy strain after cylinder head installation. Cosworth assembly procedures show a .004 to .006 gap between the outside case wall mating face and the cylinder head. Their present operating procedure is to measure this distance and then add .001 to this dimension and place the correct shim between the outside case wall and head. A suggestion was made at this time for them to possibly try milling a slot between the siamese bore sections to help reduce the strain in this area. A casting change was also discussed which would add a support rib at the bottom of the water jacket adjacent to the head bolt bosses.

Cracked webs below head - stud holes, left hand side -
A possible casting change was discussed which would increase the rib radius and blend in the adjoining wall.

Cracked web above oil filter mounting - This rib is presently being notched out by Cosworth and has had no detrimental affects. This rib serves as a parting line in the die.

Water leak from porous #2 right hand side head stud hole -
When a stud or bolt is assembled into the head attaching hole, the pressure from the bolt can fracture the sodium silicate impregnating solution causing a water jacket leak. This condition was experienced by Chevrolet Tonawanda in the past and created a heavy reject problem. A possible solution to this would be to have the cases resin impregnated.

"Extra" pits or holes appearing in cylinder bores - The extra parts coming out of the cylinder bore surface are pieces of cold shut breaking away. The cold shuts are not visible after etching therefore all T. C. cases will be removed from the automation prior to etching and visually inspected for all bore defects.



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During the past year, records on specific Vega Case vendor defects have been categorized by die number to show Massena whether the die has a significant influence on types of defects. Our records show that Die #5 is far superior than the others and would recommend it be reworked and used for the T. C. cases.

This itemized review covers the list of defects given to the Chevrolet personnel by Keith Duckworth of Cosworth Engineering.

WCB/b

cc: Messrs. L. M. Seidl
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L. J. Bentley
R. J. Bammel
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W. C. Bartlett,
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