From: Terry Burtz model.a.engine@hotmail.com
Subject: September 2020 New Model A Engine Update
Date: September 30, 2020 at 10:20 PM
To:

Hello to All,

27 September 2020

Updates

In case someone gets this email without seeing the full article on the "new" Model A engine, it is available at http://www.modelaengine.com. This website also has all of the previous updates, pictures, and videos.

If anyone has a question, concern, comment, suggestion, or wants to get on the email list for updates, please email model.a.engine@hotmail.com. We will add your email address to our mailing list and do our best to address any questions you may have.

New Engine

The term "new engine" is loosely used. The only new parts are the cylinder block, crankshaft, and connecting rods. All interfaces for mating parts are identical to the original Model A engine, and they have been documented from the original Ford drawings.

Since our last update on 15 July 2020, we have been working with the factory to complete and ship the prototype components for evaluation and testing.

Design Verification

The new engine parts and the optional flywheel arrived in the US and were received by the 3rd-party evaluator during the first week of September. John, Terry, and I met there the following week to begin the verification process. Leonard had intended to join us but had an important family obligation.

Over the next ten days, we conducted a detailed inspection of the new parts, evaluated their fitment, and completed a working engine assembly with the new parts combined with stock Model A components. Following assembly, the new motor was run for approximately 15 hours under varying conditions to observe its performance.

As mentioned previously, due to the impacts of COVID, this was our first opportunity to inspect the parts physically. We worked with the evaluator who is experienced with building Model A engines to confirm the new parts' specification, compatibility with existing stock components, complete the engine build, and test run it for several days on both a stand and installed in a Model A. We finished the test run by performing a hill climb of over five miles that included over 1,700 feet of elevation gain.

The evaluator's participation and input were critical, both from the standpoint of ensuring the engine was assembled correctly, but as important, providing an independent assessment and feedback of the internal modifications required to support a 5-main block. They have asked to remain anonymous, but we want to acknowledge their invaluable input and generous support and accommodation during the testing process.

Following is more detail on the testing process and the results. Also included at the end of this update is a link to some of the pictures and video clips that we recorded to provide additional context to the testing process we went through.

Parts and Fitment Inspection

Days 1 and 2 were dedicated to inspecting and measuring the new parts to ensure their design integrity. The focus of developing this engine has always been to integrate the understood advantages of a 5-main design without compromising the exterior appearance of the original design.

Accordingly, our evaluation included carefully assessing the fitment of the modified crankshaft and connecting rods in the modified block, as well as their complete compatibility with the inventory of stock components that includes heads, camshaft, pumps, pans, and supporting housing covers.

In particular, the modified oil galleys were checked to confirm all passages were clear, fully plumbed, and capable of supporting three- and five-bearing camshaft implementations and an external oil filter in the event an owner wants that as an option.

Plastigage was used to confirm proper clearances for all main and connecting rods caps when torqued to spec. Pictures are included of those results.

Valves were seated and connecting rods checked for balance along with other the many other details you would normally associate with a proper engine build.

The Build Process

After inspecting the engine and confirming the fitment of the individual components, we began the build process which required approximately two days. The crank, cam and oil pump were installed first, followed by valves, pistons, seals and the flywheel.

During the assembly, several minor clearance conflicts were identified. However, we were able to readily modify them without negatively impacting the test process or biasing the end results.

For example, there was a slight clearance issue with the cam and the rear of # 4 cam bearing housing. Through grinding, casting material was removed to provide the necessary clearance and documented for the factory. Prior to moving into full production, the tooling will be adjusted to eliminate that issue. A "before and after" picture is included that shows the area of conflict before and after the profile was reduced.

Similarly, several hex bolts that are used to attach the connecting rod caps were lightly contacting one of the sidewalls of the oil pan when rotating. For the purposes of testing, we switched bolts with lower profile heads and further refined them slightly through grinding the shoulders down. Moving into production, the permanent fix will spec these low-profile bolts and deepen the counterbore in the connecting rod cap to effectively countersink the bolt heads further into the cap and eliminate any potential of contact with the oil pan.

Finally, we had a minor issue with balancing the connecting rods. Due to the fact we were evaluating prototype parts at this stage, we logically authorized only a limited number of connecting rods, primarily to confirm fitment. However, this also impacted our ability to group rods of similar weights which is the normal practice when larger quantity of rods are batched produced.

We installed them with no noticeable effect, but with the goal of full disclosure, we wanted to mention it. John also brought it to the attention of the factory and they assured us that when we proceed to full production and manufacturing rods in greater quantities, this issue will self-correct as a result of the ability to more closely group rods of nearly equivalent weights.

Also, given this issue, it is worth mentioning the potentially beneficial impact of the new crankshaft design. As most are aware, the counterweights on the new crankshaft incorporate significantly more mass than the stock design. The shaft diameter and supporting main bearing sizes were also increased by 33%. The goal of these modifications was to both deliver torque and power more smoothly, but also reduce the stress impacts recognized with the original 3-main design and the maintenance requirements extending from them.

The build process was finished by installing the stock engine covers and pans. A 6:1 compression head was used for testing and a stock oil pump. Toward the end of day four, we transferred the engine to a test stand and started it for the first time. Over the next two hours we ran the engine at moderate speeds to confirm the absence of unexpected noises or anything else that would have sensibly caused us to stop the testing process for further investigation. Basic operating conditions like oil and water circulation and temperatures, and timing, were within normal standards of stock Model A engines.

Initially we had installed a stock oil pump and ran 10w-40 oil but following the warmup of the engine observed minimal oil pressure readings on the pump and return gauges. The next day we installed a modified stock pump (increased inlet port and galley), 20w-50 oil and inspected the used oil for any noticeable signs of wear, which we found none. The oil and pump change raised the oil pressure which was recorded regularly while the engine was being run on the test stand.

Run Testing

Following the pump and oil change, the engine was run on the test stand for six hours at 3,100 RPM, roughly the equivalent of 70 to 75 miles per hour in Model A. Temperatures and oil pressures were recorded regularly during this period. Oil pressure at the pump was approximately 8 psi and 5 psi on return. Oil temperature in the sump reached 275 degrees and averaged 263 degrees. Water temperature at the # 4 cylinder reached a high of just over 200 degrees, but on average was approximately 190 degrees while running the engine at this speed.

A link to a brief video of the engine running at 3,100 rpm is included. Please note that the sensitivity of the microphone was reduced in the early part of the recording which might leave the impression that the engine operation was very quiet. Later in the video the external mic was changed, and the actual volume recorded. As could be expected, running at 3,100 RPM’s is quite loud, evidenced by the fact we were all wearing hearing protection.

We would also note that other than running the engine for two hour prior to this phase of testing, there had been no other “break-in” period. Overall, we were pleased with the engine’s operation at this speed and feel confident of its capacity to sustain higher temperatures and stresses associated with running at this speed.

The following day we ran the engine for four hours, but more moderately at 2,100 RPM’s to approximate normal driving conditions. The engine ran smoothly during the entire period. Oil temperatures averaged 180 degrees, the water temperature at cylinder 4 averaged 168 degrees, and oil pressure at the pump and return averaged 4 psi.

Later that day the engine was transferred from the test stand and installed into a vehicle to further evaluate its operation in real-world conditions. Installation was completed late in the day, but we had the opportunity to take it for a brief drive. Impressions were promising. Power delivery was smooth and torque was noticeably available at the lower range of RPM’s.

Hill / Stress Testing

During the final day of testing, the engine was run up a five-mile course with an average grade of about 6.5 percent. Total elevation gain was approximately 1,700 feet. We recorded the climb using both drone and dashcams. A link to the video footage is included.

Other than stopping briefly during the ascent to allow for the drone operator to move to his next line of sight, the engine was run continually and as fast as safely possible given the narrower road and switchback conditions. We did not record average speeds, but regularly observed speeds in excess of 35 miles per hour while climbing with no notable strain on the engine.

Overall, we were satisfied with all aspects of the run testing and feel very confident of the engine’s design integrity and long-term performance.

Next Steps

During the evaluation process we were actively communicating the adjustments needed in the tooling process to the factory to address the fitment issues we identified during the build process. We are already receiving revised drawings and will confirm with them that all of the needed modifications are properly implemented. We expect to complete this work by the end of October, at which time we will authorize production.

The factory is estimating it will take them 90 days to deliver blocks to the US once production is authorized. As a result, we expect to be in a position to deliver blocks to customers around the end of January or early February 2021.

Depending on the distribution of demand, we will warehouse the blocks regionally to minimize the delivery time to end customers and any incremental delivery costs.

During the first 60 days, the block kit, including crankshaft and connecting rods, small parts (cam bearings, thrust washers, oil galley plugs etc.) and a “Builder’s Guide” will be offered to buyers directly at a discounted cost of $3,500. Following the initial offering period cost will be $3,900 and the availability through parts distributors and engine builders.

builders.

For those that are interested, we will be following up shortly with pre-order details and delivery details.

In the interim, please contact us with any questions you have.

Bill Percival

Link to picture, video & test data files:

https://www.dropbox.com/sh/at89mx8bt...j-WMblVVa?dl=0