

TUNING HONDA

BIRTH OF A PRODUCT

In our series of six technical articles so far, we have discussed :

- Evaluating Performance
- Engine Management Systems
- Tuning and Optimisation
- Airflow and Cylinder Head Modification
- Suspension, Geometry and Handling

If you have missed any of these technical articles, these are available on the *Total Honda* website.

In this final article, we are going to give an overview of how a performance product goes from initial idea to becoming available for sale to the general public. Clearly there are some variations depending upon whether the product is mechanical, electrical or cosmetic; here we are going to focus more on mechanical products.

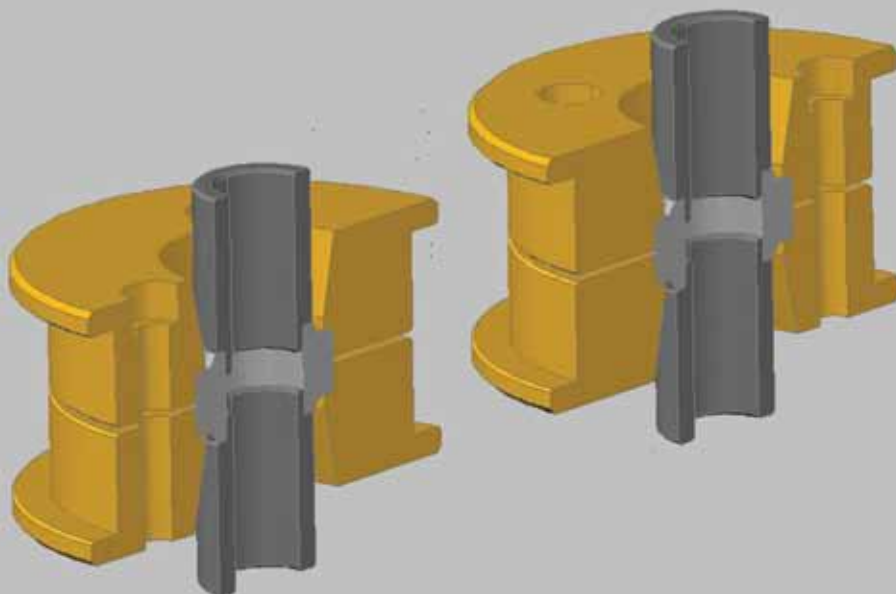
Obviously all products start with the initial idea. In the case of CPL Racing, this idea will have been generated as a result

of working on, owning, driving and racing Honda cars. We will either have found an area of weakness in the car or one of the car's components, have had an idea for improvement, or there will be something our customers have reported to us that they dislike about their car – or they have asked for an uprated performance part – and there is nothing available in the market at that time that meets their need.

From the idea, we will commence with measurement and drawing. In years gone by, this would mean sitting at the drawing board with a pencil and paper, and drawing the components of the new potential product to scale in many different views. Now, however, we have the benefit of computer aided design (CAD) to produce three- dimensional models. I am sure that readers will have seen reference to three- dimensional design, but let us explain some of the advantages that this can offer:

1. It allows sectioning of parts. This allows the designer to see material thicknesses and ensure that the part is strong enough and will not break. See figure A below for an example.

Figure A – CPL Racing EP3 Front Spherical Bearings dimensional model



HONDA ENGINES

2. It allows the mass (weight) of the part to be found, which then allows the designer to assess the benefits of different materials.
3. The designer can ensure fitment with other parts also drawn as three dimensional models.
4. Relevant loads can be applied to the parts to check the design and materials are adequate for the intended use.

In the majority of instances, because we are producing a product which will fit into an existing space (the engine bay, chassis etc), prior to starting a drawing, a survey will need to be carried out. This involves measuring accurately the area that the new product will need to fit to or into. Depending on the type of product and accuracy required, this might be carried out in a number of ways:

1. Measuring using traditional hand measuring tools, such as rules and vernier calipers.
2. Measuring using modern probing devices. Devices such as these can feed back to the CAD system very accurate dimensions in three-dimensional space.
3. Three-dimensional scanning – items can be 3D scanned and three- dimensional images can be fed back to the CAD system.
4. Three-dimensional X-ray – items can be X-rayed to produce a 3D model, this is similar to scanning but allows the designer to see through the item, and then reproduce details such as water ways in cylinder heads.

At this point one or a number of prototype parts will need to be made. It does depend on the type of product which is being produced, but for example, in the case of a part that is designed to give more power, one or more prototypes will be needed for dyno-testing to ensure power production is as intended by the designer.

The prototype will go through different tests, mostly depending on the type of product, as follows:

1. Dyno testing.
2. Track testing.
3. Road testing.
4. Testing in usage.
5. Pressure testing.
6. Fitment.
7. Performance.

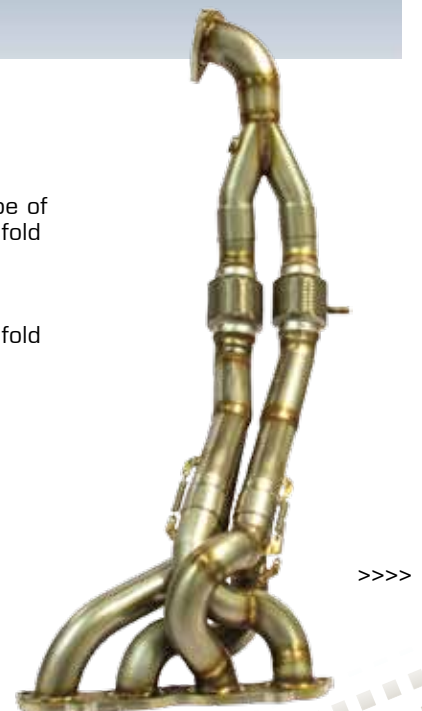
Depending upon the results of the tests, it may be necessary to go back over previous stages to make any required alterations to the product, and manufacture further prototypes.

Below are some images of the CPL Racing FN2 manifold prototype design drawing and the finished product, see figures B and C.



Figure B (Above) -
Image of first prototype of
CPL Racing FN2 manifold

Figure C (Right) -
CPL Racing FN2 manifold
finished product



> Once full testing of the final prototype is complete and the designer is happy that this is the optimal design, it is then time to go into production. Jigs and fixtures will have to be designed to allow mass production of the product, and a full manufacturing procedure will have to be written along with quality control procedures put into place. A bill of materials will also need to be documented of all the various components and a decision on the pricing of the product will need to be made.

As well as actually making the components, if the product is a multi-part item it may also have to be assembled.

Where relevant, packaging will need to be obtained and/or designed and once this is complete it is then down to the manufacturer to make potential customers aware of the new product so that they can benefit from it.

Any well-known, long-established and reputable high quality

manufacturer will produce products designed from the ground up as we have explained above.

To take an example, with a product designed by a well-established reputable manufacturer, it could be discovered on a first prototype that, say, manufacturing by a certain method resulted in the product's durability being insufficient, which in turn resulted in tubing cracking or parts failing (e.g. the part may have bent or snapped). This manufacturing method would then be immediately replaced with a different manufacturing process more suitable for the application. With the second prototype, special attention would be taken to ensure that the same issue did not recur with the new manufacturing procedure.

We would always recommend that our customers choose only quality, genuine parts, in the long run we feel this is better for your car and your pocket.

Below are two further examples of ground-up designed performance products.



LEFT:
CPL Racing FN2
Cold Air Intake



BELOW LEFT & RIGHT:
CPL Racing K20A
Dog Engagement Kit

This article concludes the initial series, if you missed any of the magazine issues so far, you can purchase back copies from the *Total Honda* website, or download just the technical articles, also from the *Total Honda* website. ■