The "ennemies" of Checking Fixtures

Specialists in Dimensional Checking Fixtures

Author: Xavier Conesa
xavier.conesa@tecnomatrix.com

Within their ecosystem, checking fixtures also have their predators. We can even be their main ennemies without being aware of it. To manage to produce a part, it is necessary to make a series of investments in the part design, production means, and checking fixtures. The various aspects detailed bellow can have the effect of a time bomb: if it cannot be avoided or controlled, it will end up having all the attempts to check quality through checking fixtures brought down. Checking fixtures ennemies are, by order of importance:

- **A low budget**
- **An incorrect design**
- **A production timing too short**
- **Faulty or non-existent information for final users**
- **A bad execution**
- **Poor quality materials or normalised elements**
- **A bad maintenance**

Throughout the next articles, we will detail each and every one of these aspects, and we will be able to analyse their importance.

A Low Budget: Ennemy #1

In the article The Ennemies of Checking Fixtures, we indicated first this factor for its importance and influence on the other factors. It is by far the main pitfall we are hit by, because all the chain in the automotive sector is very sensitive to the final cost and its reduced margin. This is how things must be, but in a lot of occasions, when this factor is too restrictive, it is impossible to compensate it with imagination. In our article, we wrote that to have a part made, the companies must carry out a series of investments and expenses in *design, means of production, inspection and quality checks, production management and follow-up, logistics…* and much more aspects that make it very difficult in a lot of cases to have a total cost lower than the determined budget when arriving at the end of the chain. When this budget is overspent, there is always somebody in charge of taking the cissors to begin to cut expenses by order of priority, until reaching the objective: maintaining a positive margin.

Checking fixtures, just like the other factors for inspection and quality check – staff, methods, reports, and so on – are likely to be the last links of the chain and are the most difficult to justify at first glance; consequently, the fact that they are hit by the main budget cuts is not surprising.

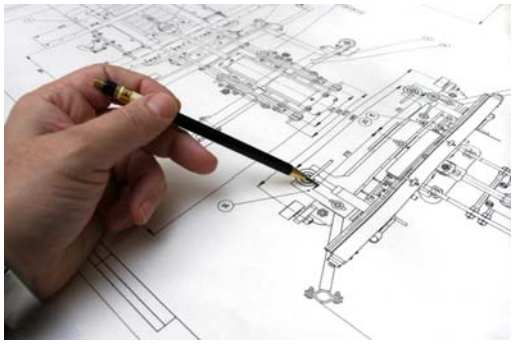
To make a checking fixture for a part, an infinity of solutions exist, with prices ranging from options enabling to make a full check to options for a minimal check, that should not be made simpler. Logically, it is better to choose a medium solution, as close as possible of the minimum cost but always ensuring the possibility to make the

minimum checks. One of the most difficult aspects to determine are these minimum checks, that are always handed over to the most qualified staff to foresee the potential manufacturing problems through the basis of former results (FMEA – Failure Mode and Effects Analysis).

To get optimal results, you should have a range of regular providers having a good knowledge of the product you make and can determine quickly and simply which solution is the best one for each and every case. Finding global solutions for groups of parts with a similar problematic is usually a good working method.

The persons having to deal with cuts of expenses are the ones that should most clearly understand that a good check can avoid a lot of other useless and "no quality" expenses. It goes without saying that some customers try to get a very cheap price for the most complex checking fixtures, but on the long term, such a policy does not give good results, since it can imply the loss of a good provider of that type of services. Do not forget that quality has a price!!!

An Incorrect Design: Ennemy #2



Following with the subject treated in the latest articles about The Ennemies of Checking Fixtures, we will now deepen the second most important aspect to be taken into account.

Our experience throughout many years has shown us that there are three types of part manufacturers that could be classified according to their idea of "checking fixtures": (i) the first type of manufacturer is *absolutely convinced* of the fact that checking fixtures, gauges and measuring tools are an *essential factor* in all the production chain to get the quality level demanded by his customers ; (ii) the second type of manufacturer purchases checking fixtures, but more because it is one of the *final customer* requirements than for its own convictions, as if it were a mere step in the production process ; (iii) finally, the third type of manufacturer *does not use checking fixtures at all* as a prevention checking tool. He only purchases checking fixtures once a problem has appeared and he has to deal with a problematic solution he does not know how to fix.

Such different visions of "checking fixtures" are obviously related to the "quality check" policy that each company can have. A mere overview of the equipments, metrology and measuring tools used is enough to conclude that sometimes, there are abysmal differences.

Of course, it is not always possible to be in the situation of the Group (i) manufacturers, and that each company, considering its resources, economic situation, and specific circumstances will have to set its "quality check" accordingly. The aim of

this article, however, is to make you think about the fact that the "checking fixture" is, in a lot of occasions, underestimated. For a lot of people, it is not more than an expense increasing the price of the product; yet, if things are done well and it is given the importance it should really have, it will, on the contrary, not only enable to save a lot of money and time to fix problems that could have been avoided ("prevention is better than cure"), but also have a direct influence on the quality of the product.

Often, group (ii) manufacturers wrongly regard checking fixtures as a mere formality. An initial lack of concreteness of the checking fixture (be it when sending the quotation to the final customer or when setting practical aspects with the checking fixture manufacturer) triggers in many cases an accumulation of mistakes which are difficult to fix. This lack of concreteness, as well as last minute emergencies and modifications can be avoided if, as soon as the beginning, the checking fixture is given the importance and fondamental role it should have in the whole manufacturing process. We are convinced of the fact that if these companies change their vision of checking fixtures and begin to regard them differently, by giving them the importance they should have, then "checking fixtures" will make them save time and money, and they will stop to see them as an "expense" to see them as an "added value". Believe me, the effort is worthwhile.

As for Group (iii) manufacturers – in which are still too many companies – there is still a long way to go. These companies are not aware yet of the fact that quality problems have negative consequences, be it, obviously, on the very product, or on the organisation, working atmosphere, and stress that will end up weakening all the levels of the organisation, from production to quality or business… Problems get piled up, preventing them from having a clear vision of the situation, solutions are choosen hastily, nearly without thinking, and all this spiral lead them to failure. Although it does not seem to be true, I have lived through situations of real chaos that could have been fixed very easily if, initially, the suitable measures had been taken. These companies must be convinced to give an opportunity to the "checking fixture" so that they will gradually get closer to the Group (i) companies, whose characteristics regarding their quality policy are described bellow.

This Group (i) companies are characterised by the following points:

- They have staff and premises exclusively dedicated to quality checking.
- They have technicians with experience in that type of tools and metrology, that dedicate themselves from the very beginning to the awarding of the project for the production of gauges and checking fixtures. They carry out the follow up of the project.
- They consider that an economic part be must defended to be able to be provided with the necessary gauges.
- They always try to get the minimum checking means to deal with potential risks (SWOT) during each part manufacturing.
- They make sure to have the suitable checking means before having at disposal the production means, in order to be able to check the first parts manufactured.

- They prepare specific technical specifications for every checking fixture, which are analysed in detail to get as much profit from the investment realised and are previously approved by the final customer to avoid further modifications.
- Finally, they do not forget either to make a correct maintenance and regular calibrations, while making sure that the production staff always have at their disposal user manuals to use correctly their checking fixtures.
- They are sure of the cost each checking fixture will have, and if they do not have any budget available, they have time to make a careful search among their ranges of providers to get it as cheap as possible.

This is an important effort, but on the long term it is worthwhile and the results are visible. A badly designed checking fixture will end up in a disaster. The lack of definition and concreteness for the details is usually the main reason for this failure. Nobody knows better than their manufacturer the parts problematic, aspects to check and things that must be avoided; so, the project will be a failure if he does not get involved in it. An investment of time "on time" can save a lot of money.

We sometimes hear the following sentences: "Just decide it, you are the checking fixtures expert", "… but have not you made other similar checking fixtures for other customers?", or "You have already made checking fixtures for similar parts for us" – when the part has had significant changes compared to the past versions -. And in some cases they do not even have the information necessary to design correctly the checking fixture.

To take decisions, we will need to have a drawing indicating us the isostatisms, critical dimensions as well as their tolerances, etc… and the latest update of the 3D file. Consequently, if we do not have this information at the beginning, then it is impossible to make a correct work.

We would like to hear less often these sentences. The manufacturer must be treated with the respect he deserves, but he has to value our work as well. We all have to be involved in the project, this is the only way to get a satisfying result.

We will always repeat it, the checking fixture must not be underestimated any longer and must be given the importance it deserves. We are convinced of all this, and this is why we will continue our work and give the best service and quality to our customers, while being sure that throughout time the group (ii) companies will get closer to the group (i) ones, and hoping that the group (iii) companies will sooner or later give to checking fixtures the opportunity they deserve.

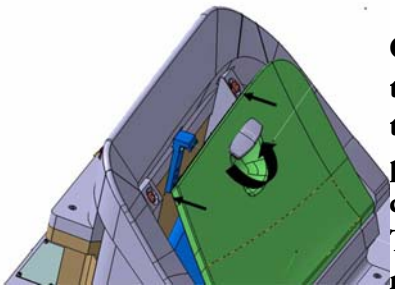
A very Short Production Timing: Ennemy #3

It is important to foresee the launching of checking fixtures early enough. Just like production means like moulds or matrixes are planned, why not planning the launching of checking fixtures at the same time?

Once we are over a barrel, we usually say things like: *"I need something quick and simple because I will soon have my first samples"; "we need something to get out of trouble"* ???? Unfortunately, we listen to them too many times… and this forces us to look for a solution that will probably be far from being the best one. Good technical solutions and in some occasions the cheapest ones are those taken after a mature reflexion and a correct analysis, but emergencies never give good advice. And it is when one decides to produce something not adapted to his needs, and that finally is not valid, that it ends up being more expensive for the time and money wasted away…

Moreover, the pressure due to delays gets transmitted all along the chain to the following processes, obliging the projects that were planned to work in chaotic conditions.

Faulty or Missing Information for Final Users: Ennemy #4



One cannot pretend that someone without the specific training for the use of a checking fixture, and without the instructions for it, could use it without any problems. Some guidelines or user manuals must be created to specify the process to follow for a correct use. This is the only way to get good results for measurements, that can be both reliable and avoid possible imperfections due to an incorrect use. The staff motivation increases considerably if they feel confident when using the tools that are at their disposal.

Although in a lot of occasions these tools seem to be user-friendly, this appearance can be deceptive, since by the simple fact to carry out an action before another one when fastening the part, the results can be rather different or even spoil the checking fixture repeatability.

A Bad Execution: Ennemy #5

To carry out the production of a checking fixture in an optimal way, its manufacturing has to be taken into account when designing it. If we design something that is not manufacturable, then it will be impossible to get what had been initially designed, and the concept will be useless. Understanding the functioning of the checking fixture is crucial to manufacture it well, but this aspect can be neglected on some occasions.

Anyway, even when the latter conditions are fulfilled, some manufacturing mistakes can sometimes occur in the milling process, the adjustments, and so on, and if they are only detected during the last step of the dimensional report, then we run the risk to deliver a non-functional product to the customer.

It is very important to have some sample parts available to help eliminating any error we may not have detected.

The finishings and polishings are also important, since they affect the visual aspect of the checking fixture. A correctly made checking fixture must have a nice and well cared aspect as well, it has to give the impression that all the details have been carefully made. Somebody who sees for the first time a product he has just bought will think this way: if the finishings are good, then it must mean that the basic and functional aspects are correct.

Poor Quality Material: Ennemy #6

The unawareness of the functionality and use of checking fixtures, low prices or the wish to get a high margin can be reasons to use materials of poor quality or uncertain origin that will probably not give good results on the long term. Getting a good reputation is something difficult and slow to get, but it can be quickly lost in the most stupid way. As far as high precision and added value tools manufacturers are concerned, it is important to always avoid such a tempting practice.

In some occasions, the customer´s haste can be the very reason why we do not have enough time to do the superficial treatments necessary to ensure the good functioning of a checking fixture throughout its lifespan; that is why they have to be explained that it is crucial to give us enough time. Some time is necessary for anodising, tempering, nitriding or antioxide treatments.

Moreover, they have to be reminded that a product with a bad functioning and displaying our brand will not have a positive impact whatsoever on our reputation, since other professionals will identify it.

Materials such as aluminiums or steels will have to be of premium quality to avoid further deformations and other problems; what is more, normalised equipment, such as clamps, pins, towers, as well as metrology items like dial indicators also have to be of premium quality to have no negative impact on the various aspects previously described.

Faulty maintenance: Ennemy #7

The accumulation of rust, dust, materials or parts residues can be the cause of wrong measurement results on your checking fixtures, and can even make them fall into disuse. **A preventive maintenance plan and a periodic calibration are necessary to ensure their good functioning. Apart from this periodic calibration, a general inspection of the checking fixture should be done, in order to detect possible blows or broken parts triggered by the use of the fixture. This inspection can even enable to see if the checking fixture has been used unproperly. In some occasions, I have seen how checking fixtures were used as if they were assembly tools, and this is absolutely not correct. Checking fixtures cannot receive blows or stand high torques like the ones done during the mounting of parts, and this is why they are not designed to do so.**

To carry out a preventive maintenance on a checking fixture, we will need to know exactly how the fixture works and which areas are the most important ones. We will mainly check:

- **Centring elements to detect possible faults, blows, accumulation of residues preventing the good positioning of the part, etc.**
- **Mobile elements, to check that they can be moved smoothly, and grease them if necessary.**
- **Identification of the checking elements to avoid any risk of mistakes.**
- **Checking elements to make sure that the calibration is still valid and that they do not have any kind of problem.**
- **The repeatability of the measurements on several parts.**
- **The fixation of all the independent elements, to make sure they cannot be lost.**
- **The user manual, to check if it is clear enough**
- **The checking fixture identification, so that it cannot be mistaken for another fixture.**
- **The handling and transport elements, to be sure that they are safe for the operator.**

Doing the maintenance of checking fixtures for many of our customers has enabled us to learn how to improve some manufacturing aspects of our checking fixtures. Thanks to this, we can now solve problems more quickly, or prevent them. The state of checking fixtures says a lot about the working methods of a company, and with small details like the maintenance, we can understand if a company is more or less productive.