

The Guide To Deep Hole Drilling, Boring & Honing Costs:

Understanding The Factors
That Affect Your Quotation &
Overall Quality



HoneAll



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Introduction

Hone-All Precision are a family run business who specialise in a variety of advanced engineering methods such as Deep Hole Boring, Deep Hole Drilling, Gundrilling, CNC Turning and CNC Honing as well as dynamic balancing and manufacturing precision rollers. We take a customer-focused, dialogue based approach to our work to ensure everything we produce is of the highest possible quality and machined perfectly to suit your application.

We're immensely proud of our achievements over the past couple of years. In fact, the success of our approach is shown by the results we deliver to our customers. As a business, we refuse to do anything by half measures – instead we give each individual project (regardless of the size) the same degree of care and critical thinking to ensure the final product is delivered on time and within budget.

We serve a variety of sectors including:

- Aerospace
- Oil and gas
- Pharmaceutical and medical
- Packaging
- Printing
- Hydraulics
- Automotive manufacturing
- Motor-sport
- Defence

We provide all our services in-house at our facility in Leighton Buzzard, giving us complete control over our quality, our supply chain, procurement and lead times. This enables us to offer highly competitive rates that meet and exceed the demands of our customers.



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Over Engineering: Saint Or Sinner?

Specialist services such as deep hole boring, deep hole drilling and honing are a black art to some and still slightly grey for others.

Modern apprenticeships do not cover such skill sets and even the traditional apprenticeships from decades ago only ever covered honing or grinding in a minimal format.

This can often make it difficult for buyers looking to procure these services as there can be a whole host of complications and confusion over cost versus quality, which can arise simply through specifying the level of machining, the technical specification and the overall impact on the finished component.

What Do We Mean By This?

Firstly, let's take the issue of tolerances achievable by these services. When quoting deep hole drilling or gundrilling, which is most commonly used to drill bores from 2mm – 20mm diameter, the standard industry tolerance up to 10mm diameter would be $\pm 0,05\text{mm}$. However, anything in excess of 10mm diameter, a safe tolerance to quote would be $\pm 0,1\text{mm}$.

For deep hole boring which would be utilised on bores from 20mm – 200mm+ diameter, a standard, industry tolerance quoted would be $\pm 0,25\text{mm}$. Therefore, any tolerances below these parameters result in a requirement for honing.

However, adding honing to the cost of the sub-contract machining can often result in our quotation not being as cost-effective as the prices offered by our competitors.

The choice here is, do we simply quote our standard tolerance and guarantee to win the work with the lowest price? Or, do we quote on a basis which will ensure the quality our customer requires, as well as preventing them from having a surprise additional cost or delay to the promised lead time when half way through the order the tolerance isn't achieved? The same applies to surface finishes.

At Hone-All Precision, we always take a cautious approach to our work as quality must be paramount; furthermore, the costs and lead time must be known in full at the start of the project to ensure accurate and competitive project costs for our customers to submit to their clients.

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The Wonder Of Wander

The first thing to clarify here is that honing does not and cannot affect drill wander. The honing process will only follow the machined bore currently in place. It will improve surface finish and will achieve tighter tolerances than boring or drilling, but the position of the bore in relation to the outside diameter will never be affected when honing to a consistent size.

However, drill wander is a major feature of all deep hole drilling and deep hole boring machinery and service provision. This is where the drilled hole will start perfectly on centre and although the bore will be completely straight, the exit will be off-centre by an amount relative to the length of the hole drilled.

We try to minimise this in a number of ways, for example, ensuring contra-rotation of the billet. This is where the billet is rotated in the opposite direction to the chuck. In some cases, customers allow for us to drill the billet from each end as mismatch in the middle of the bore is permissible if the bore is for lightening, air or fluid flow.



Another way is by ensuring that the faces of the components are clean, even and chamfered. Again, even this simple act of chamfering the billet can add additional cost to the quotation and reduce our competitiveness as the handling, loading, set-up then facing and machining of a 45° chamfer on a billet 200mm diameter x 2 metres long can take up to an hour depending on the sawn face supplied potentially adding a cost the customer was not expecting.

However, without this, drill wander can be worsened from the industry standard of 1mm per 1 metre drilled or how it is usually referred to in the industry: “one thou per one inch drilled”. Therefore, we quote a method that we believe will offer the best possible result for the customer but again, at initial review, the customer may only see the price we quote, not the reason we are quoting it.

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Drilling Into Wander

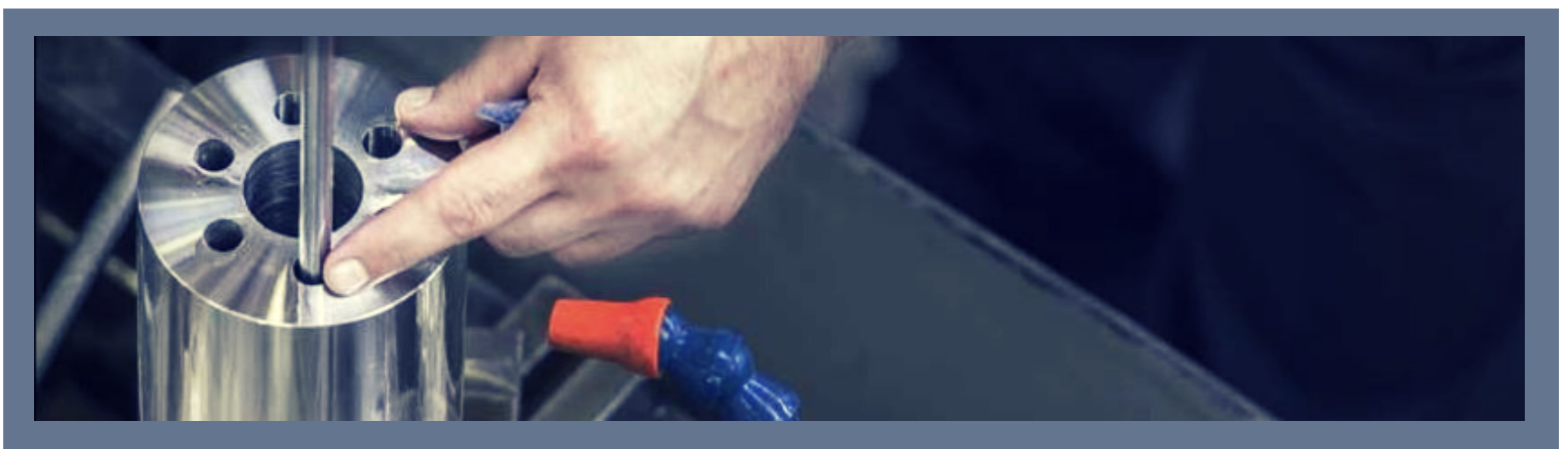
The impact of this intensifies when we are asked to machine a blind bore or multiple bores. Certain applications require a bore to be drilled only part way through the shaft. The easiest way to quote this is to simply quote for that operation which is specifically what the customer wants, but this quote would ignore what the customer requires!

However, here at Hone-All Precision, we carry out a full contract review on every quotation we raise. Therefore, at this stage, we shall not only look at what the customer is asking us to do but what they need to achieve overall through machining.

Firstly, we would check the outside diameter of the bar being supplied. Whether through or blind bore, we have on numerous occasions saved our customers unnecessary expense by pointing out that the size of bar they wish to supply will simply not clean up once the component has been drilled and drill wander has occurred. This means that when the bar has been turned true from the bore, the outside diameter would end up being undersize to the finished drawing.

To ensure that drill wander is minimised and concentricity limits are achieved, we always advise that the customer starts with an oversized bar, allowing us to machine at the rough billet stage and then either they, or we, can turn the outside diameter true to the bore.

Secondly, we must thoroughly review the drawing for concentricity limits, and determine whether any apply to bores either in relation to each other in the case of multiple drilled holes, or simply to the outside diameter.



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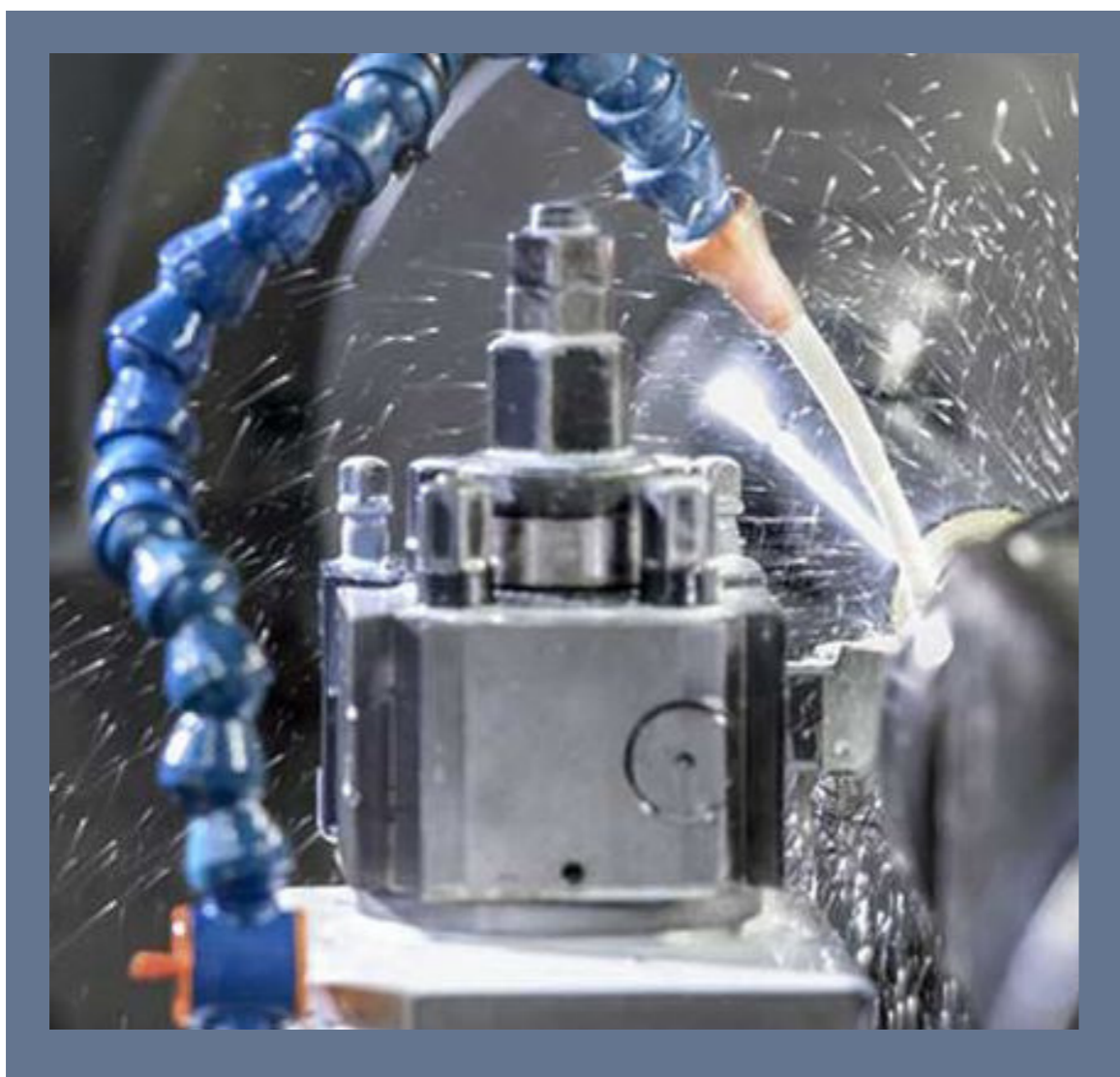
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The “Hole” Picture

We have often seen quotes being returned quicker and at a cheaper rate than ours by others within our field. However, if we manage to speak to the customer and explain why our costings may be a little higher than our competitors, in most cases, it is because we are considering the overall finished quality of the component, and how the results of our machining will impact our customers machining further down the production sequence.

We do not believe in using a standardised spreadsheet without fully reviewing the drawing, the specification and mapping out all the processes of the job. It could be said that this is a waste of time and effort, as depending on the conversion rate applicable at the time, you could be mapping our processes for 50% of jobs which we, or our customers, do not win and this can also adversely impact our quotation response time.

However, it is often by reviewing the specifications fully and mapping the processes at the quotation stage that issues and potential risks are identified, as it results in us looking deeper than simply the question of “how big multiplied by how long” that a standardised price per inch spreadsheet gives.



An example of this would be when the customer requires us to drill one bore diameter from one end to a depth, and then another smaller or larger diameter from the opposite end, either to a depth or to meet and break into the other bore.

There are two ways of quoting – simply quoting for the drilled holes and the drill wander and the relation of the bores to each other is the customers problem. We see this happen regularly. This is not the Hone-All way.

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The “Hole” Picture

To ensure the customer receives a quality machined component, we will use one of two different methods:

1

We will drill the first bore, ultrasonic thickness test (T.I.R – typical limit being within 0,1mm), skim the billet true and then drill the other bore from the other end which ensures the concentricity between the two bores is excellent. This method must also be used when the customer requires a blind hole drilled from each end but which do not meet in the middle.

2

Alternatively, depending on the bore size and drill depth we will drill the first bore, manufacture a bush and then re-drill the second bore using the bush to ensure the second bore follows in line with the first one drilled. This again minimises drill wander without the need for turning.



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Cost Vs. Quality

We will naturally assume there is a requirement of concentricity or equal wall thickness unless we are told otherwise, for example, if the application is simply for fluid flow.

Again, you could argue that we are over-engineering the machining and this is at the expense of our competitiveness within the industry. However, we believe in giving the customer the very best that can be achieved and ensuring that they do not encounter any unexpected issues further down the production process.

We explain the processes we are quoting within the descriptive text on our quotes. However, all too often, the price is the first and only thing which is reviewed.

Our plea to our customers and anyone reading this guide, is to consider some or all of the aspects we have included above, and when mapping out the process and selecting a supplier for your deep hole drilling or deep hole boring process, double check exactly what you are being quoted for. Ask yourself what is being included and if / how this will benefit your next process. Please also consider the overall quality of the components being machined.

Hone-All Precision has gained extensive knowledge and an excellent reputation over the years. Our skilled engineers use the latest technology to ensure outstanding attention to detail.

In some commercial activities, cost is everything due to restraints placed upon us by the OEM. However, in other cases, a little more time spent at the beginning of the process can save endless hours of re-work, corrective machining or even replacement material further down the line. This type of work not only increases costs dramatically but all too often results in a late delivery, as well as a service failure which lingers in the mind of the end-customer long after the memory of saving a few pounds at the start of the project.

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Why Choose Us?

The goal of our business is to enable our customers to source high quality parts, in the right time frame, to the right specifications, and at a competitive price. This makes good business sense and has served our customers well for many years, but no doubt there are other suppliers out there who can make the same claim.

So what factors do we feel give Hone-All the competitive edge over other suppliers? The following four characteristics are what makes Hone-All a unique place to work and do business with. They represent a uniquely personal way of working, which, when taken together, have the potential to deliver unbeatable value for our customers.

- 1 Accuracy and quality:** We work closely in collaboration with our customers to ensure their drawings and requirements are accurate, and therefore they can choose where they source from in the future. We supply accurate, high quality products at fair prices, in a good time frame, that not only meet but exceed our customers' requirements. By ensuring this open-handed approach we have secured a loyal customer base, many of whom have given us repeat business for decades.
- 2 Flexible and honest service:** We pride ourselves on customers choosing our service because of the product and experience they receive. We do not want customers to be bound to us due to our historical job knowledge which in previous times or companies, "cannot and must not be shared". Relationships are key for us. Many of our customers are still with us after 25 years and we hope they will be with us for another 25.
- 3 Aerospace standards:** Our processes meet aerospace standards irrespective of the sector, size or cost of the order placed. Our customer service and attention to detail is second to none, including automated delivery and quality documentation alongside feedback requests both at the quoting stage and after manufacture. We also send automated order acknowledgements and completion of manufacture emails as soon as the order has passed inspection and is ready for despatch.
- 4 Passion and commitment:** We may be a small company but our knowledge and capacity rivals many of our larger competitors. We combine the passion and commitment of a family run business with the processes and standards of a large corporate supplier. This satisfies the quality requirements of even the largest and most stringent customers, such as Rolls Royce Nuclear.

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At Hone-All Precision we believe we have the winning formula of customer service, professionalism, advanced technology and industry expertise. To see what we can deliver for you, or for a free quote, please get in touch by any of the means below.

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