DENTA PUK - Frequently asked questions (FAQ)

- ## DENTA PUK – A precision TIG welder

DENTA PUK uses the **T**ungsten-**I**nert-**G**as, or TIG welding technique.
Here a Tungsten electrode is clamped into a hand-piece, and the electrode is then surrounded with a protective Inert Gas, in this case Argon. An electrical impulse or "Arc" is then triggered between the electrode tip and the work piece, thus creating the weld. The electrode itself is not melted during this process, only the work piece or, if used, a welding wire; this is melted in a diameter varying from 0,3mm to 3mm depending on the settings chosen.
The energy distribution during the course of the welding impulse can, thanks to the software of the DENTA PUK, be precisely defined; the ability to adjust the welding parameters, allows an individual and exact controlling of the weld.

- ## Which metals or alloys can be welded?

All precious metals, and precious metal alloys can be successfully welded. These include gold, silver, platinum and palladium.

Cobalt-Chrome alloys and (Pure) Titanium.

- ## Can material be added?

Yes – Metal can also be fed in to a seam or applied to a surface, as the case may be. We recommend using welding wires with diameter of 0.2 – 0.4mm that are of the same material as the base metal / work piece. For further information here it is advisable to consult your alloy manufacturer.

- ## Can "solder" be added?

No – Because of the additives contained in „solder" and its comparatively low melting point, it has a tendency to burn during welding.

For this reason, it is not advisable to weld on areas that have already been soldered; rather, the old solder should be removed prior to welding. Observing this guideline will allow stable and corrosion resistant welds to be produced.

- ## Do all metals react the same when welded?

No – The welding result is largely dependant on the alloy composition, its melting point, and, most notably, the thermal conductivity of the metal or alloy.

The higher the melting point, and the lower the thermal conductivity are, the better the result will be.

- ## Can you weld directly adjacent to acrylics or ceramics?

Yes – The heat generated during the welding process is very low. However, if a large amount of impulses are fired in quick succession in the same place, the work piece will warm up considerably.

For this reason, work here must be carried out with caution so that the warming of the work piece can be kept under constant control. This is especially important when working next to acrylic or ceramic veneers so that cracks, or the loss of adhesion to the base material, can be avoided. In these cases, it is best to allow the work-piece to cool down at regular intervals.

- Can you weld without protective gas (inert gas)?

  No – Welding without protective gas would result high levels of oxidation, and the formation of soot around the welding area. In these cases, welds would also become porous and loose their stability. Because then of the improvement in welding results that working with protective gas brings, our welders are designed not to work without it.

- Can gases other than „Argon 4.6“ be used?

  We recommend argon protective gas in the quality „Argon 4.6“ or higher as we have found this to be most suitable for work with the PUK.
  If the quality 4.6 is not available, the purity of the gas can be used as an indication of suitability (quality). In this case, always choose a gas with a purity of minimum 99.8%. The reason for this, is that impurities (as found in lower quality gases), will interfere with the welding result.

  For the vast majority of applications, “Argon 4.6” is completely sufficient. As an exception, when welding titanium, using the purer “Argon 5.0” can improve the welding results.

- How much gas is used during the welding process?

  Per weld, the PUK uses 0.1 litre of gas; a 10 litre bottle contains (because of the high pressure), 2000 litres of gas. This amounts to 20 000 welds per bottle or refill.

- Does it make sense to increase the flow rate of gas?

  No – Quite on the contrary, if the flow rate is increased, the argon gas can start to swirl when it leaves the hand piece. This swirling causes the argon to become mixed with oxygen in the air around it, which in turn can produce an unwanted oxidation of the welding point.
  The results are an adverse effect on the welding quality, and the stability of the weld. The best results are achieved with a flow rate of 2 L/min.

- Is it possible to close pores and cavities?

  Yes – Here we recommend that the affected area first be welded over without using welding wire. This will compact and expose the pore / cavity so that it can then be closed using the appropriate welding wire.

- How far does the weld penetrate into the metal?

  The exact penetration depth will depend on the welding energy (Power and time), the mode used and heat conductivity of the metal which is to be welded.

  Thus, the higher the Power, and the lower the heat conductivity, the deeper the penetration will be.

  Additionally, the penetration depth will depend on the angle of the electrode (hand piece) in relation to the work piece.

  If the electrode is held at an angle of 90° to the work piece, the penetration depth will be at its maximum.

  By holding it at a different angle (e.g. 45°), the metal tends to flow in the direction of the electrode; thus the metal (e.g. when adding metal with a welding wire) “flows” in the direction of the retracting electrode.

- Can different metals be welded to each other?

  Yes - This is even possible with metals whose physical characteristics are very different from one another e.g. cobalt-chrome alloys and gold alloys.

  If however the differences are too extreme, a joining of the two will not be possible e.g. titanium and steel.

- Can seams be welded?

  Yes – Whereby the results will depend on the metal or alloy used.

  Good results can be produced with cobalt-chrome alloys, gold, platinum and palladium alloys, as well as pure titanium and stainless steel.

- Can the heat that is generated during welding with the DENTA PUK be compared to the heat that a laser generates?

  Yes – The work piece builds up only a minimum of heat during welding with the DENTA PUK, similar to when laser welding.

- Can tungsten from the electrode tip find its way into the weld?

  It cannot be completely ruled out that tungsten particles get trapped in / or find their way into the weld. Having said this, if the DENTA PUK is used correctly, this is very unlikely.

- What is the minimum thickness of material which can be welded?

  Depending on the alloy used, metals right down to a thickness of 0.2mm can be welded.

- Is there any maintenance needed, or are there any running costs?

  Under normal working conditions, the DENTA PUK and the welding microscope “SMD” need only a minimum of care. Every now and then, the devices should be cleaned and dusted off and the cables and plugs checked to make sure that they are not damaged. Apart from this, no further steps are necessary.
  For further information on the care of the DENTA PUK or the SMD, please consult the appropriate operating instructions.

  During normal / correct usage, the only running costs are the small amount for protective gas, and the low consumption caused by the wear of the tungsten electrodes.

- How many welds are possible with one electrode?

  In time, the electrodes decrease in length, as it is necessary that they are re-sharpened regularly; this ensures best results.
  Despite the wear of the electrodes, a single electrode will do at least 2000 welds.

- If the weld which is produced is not of the required quality, what are the possible causes?

  First test that the machine is working correctly: Touch the electrode to a work piece so that the welding process is started. Gas should flow from the nozzle, and after a short pause a weld will be triggered.

  To ensure that the device operates correctly, it is important that there is always a good electrical contact to the work piece. The point of contact should always be as near to the welding area as possible.

  It is important always to work with a sharp electrode. If the electrode is blunt, then the welds will not be properly welded through.

  To achieve the maximum welding penetration, the hand piece must be held at a 90° angle to the welding area.

  For best results, during welding, the operator's hands should be placed on the hand rests of the SMD; they should also be kept steady, as a "trembling" of hands or the work piece should avoided as far as possible.

  If the material thickness in the welding area is thicker than 1.0mm, then the penetration depth is not sufficient that the material can be welded all the way through; in these cases the welding area must be specially prepared.

  The sides of the welding area are milled or filed into the form of a "V-groove", and only the material that still touches at the base of the groove is then welded. This welded seam is then filled back layer for layer, using an appropriate welding wire.

- When an electrode breaks or splits, what is the reason for this?

  The electrodes which we use are made of a special alloy consisting of tungsten and metal oxides.

  These electrodes are specially designed for use with Lampert Precision Welders; they possess excellent welding characteristics, and are at the same time hard and brittle.

  If an electrode is bent out of shape, (e.g. after it has become „stuck" to a work piece and has been removed, and broken off), this „removing and breaking" of the electrode tip can result in a splitting of the electrode.

  Additionally, during welding, there is an enormous difference between the heat generated at the electrode tip, and the heat of the shaft of the electrode. The extreme temperature difference causes large amounts of mechanical stress in the electrode.
  It cannot therefore be completely ruled out that in occasional cases this results in a breaking or splitting of the electrode.

  If this happens, the electrode must be shortened and the damaged part removed, or a new electrode used entirely.

- Can other microscopes, apart from the SMD be used in conjunction with the DENTA PUK?

  No – The DENTA PUK and the welding microscope "SMD" together form a synchronized system whose components' technology has been especially matched to compliment each other; as such, they cannot be replaced with other products (i.e. a different microscope).
  This fact also has a very important safety aspect, as our welding microscopes come complete with an electronic eye protection filter which is not only an absolute necessity, but also demanded by law.
  The electronic eye protection system of the SMD is directly controlled by the electronic circuitry inside the DENTA PUK.