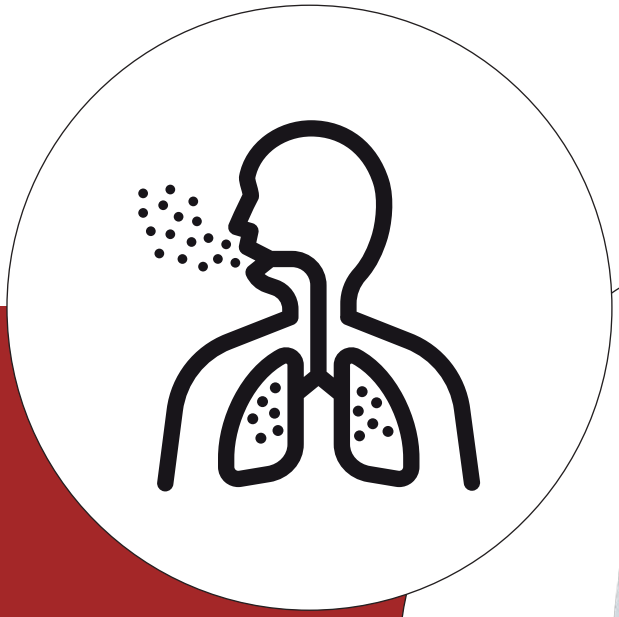
inelco grinders

TUNGSTEN ELECTRODES' IMPACT ON HEALTH & SAFETY



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Are you disregarding Tungsten dust? How do you avoid inhalation of Tungsten dust when TIG welding?

SUMMARY

The necessity of collecting Tungsten dust!

It is no secret that the metal working industry, throughout the years, has exposed workers to a fair share of risks. Fortunately, today, a new awareness has spread and the technology introduced on the market is most often taking health & safety into account.

Despite these important advancements, there is still a lot of space for improvement, especially when it comes to the welding department.

When grinding Tungsten electrodes, welders are exposed to poisonous dust inhalation, metal particle projections and a higher risk of accidents due to direct contact with the grinding wheel.
Unfortunately, there is a lack of legislation and guidelines for reducing dust in connection with grinding of Tungsten electrodes.

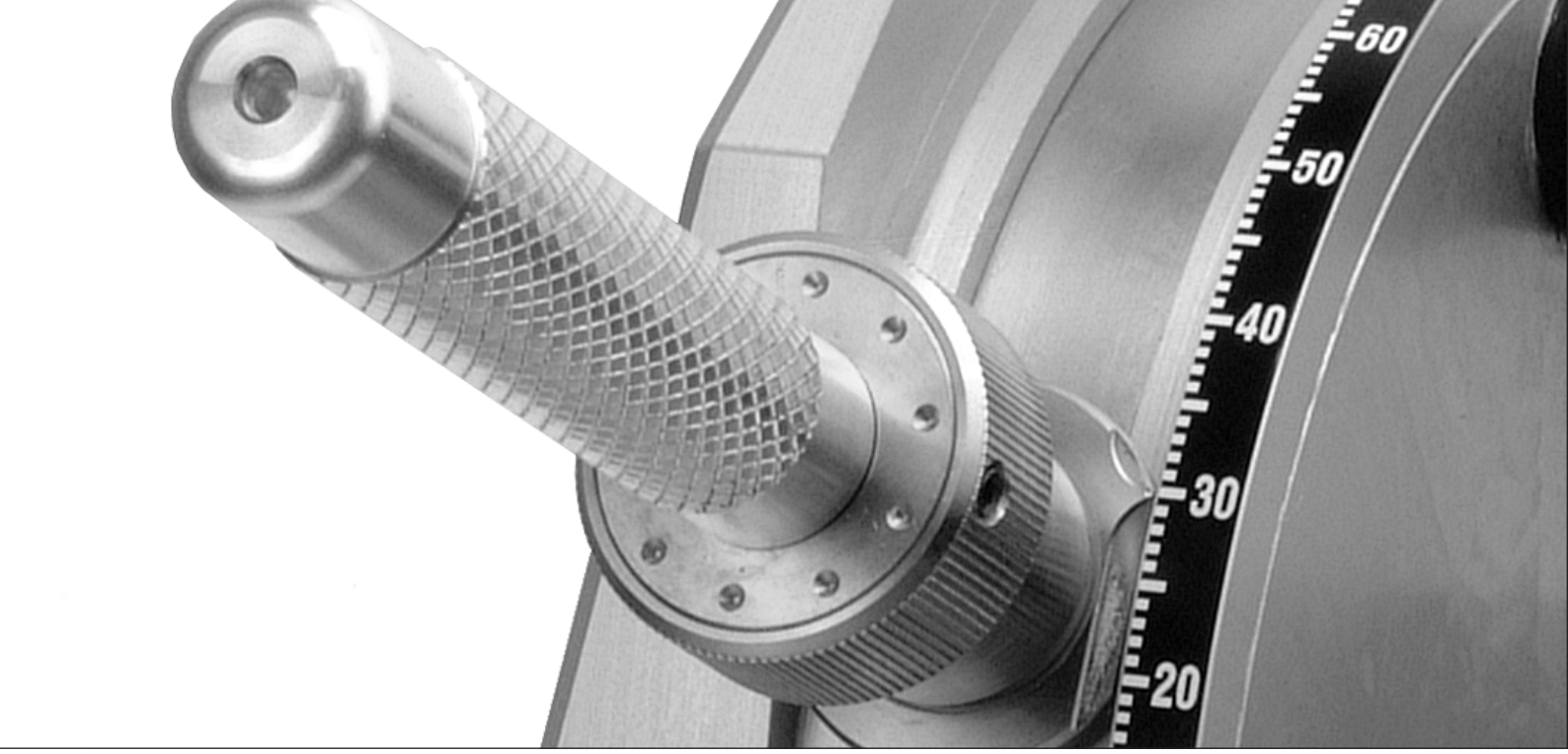
The technology, knowledge and experience already exist on the market - our Ultima-TIG wet grinder - but if you do not have laws or guidelines in the field, then I do not think that health is taken seriously enough.

ARE YOU DISREGARDING TUNGSTEN DUST?

I hope you find this white paper enlightening and educational!

Kind regards,

Anders Thy
Owner & Managing Director
Inelco Grinders A/S



Health & Safety awareness

grinding of Tungsten electrodes

All welders wear a helmet and protective clothing when welding and fume extraction systems are installed to improve the working environment for the welders. But several times a day, when Tungsten electrodes have to be ground, the welder often use an open belt or bench grinder putting himself at risk. When grinding Tungsten electrodes, welders are exposed to hazardous dust inhalation, metal particle projections and a higher risk of accidents due to direct contact with the grinding wheel. Additionally, exposure to prolonged high noise levels can also result in health implications, however our Ultima-TIG grinder significantly reduces the noise levels when grinding in comparison to a bench or angle grinder.

The working environment has a crucial impact on the workers' long-term health. That is why any business dealing with a welding process has invested in fume extractions and ventilation for their workers. It has become a standard in the industry to have such equipment. No welder today would work without one, because the impact of welding fumes on human health has been proven harmful a long time ago. But the grinding process of Tungsten electrodes, a necessary step in any TIG welding application, is most often disregarded.

This is why Inelco Grinders A/S chose 'Health & Safety' to be one of the main focus areas with the following text to explain the icon:

Sealed machine and collection of the dust particles for optimal safety.

CURRENT PRACTICE
in TIG-welding environments

Much research has been done into the working environment of welders, and experience shows that the environment around welding is still one of the main causes of working environment problems in the iron and metal industry. Smoke, nitrous gases and particles from welding are harmful to the health as inhalation of welding fumes have been discovered to be carcinogenic.[3] Legislations are in place in most countries to prevent exposure to such harmful substances and to ensure that equipment installed in the workplace is performing correctly.

Welders are required to wear and use the correct protective equipment and have proper exhaust installed for the welding gases. In the conversation about safety, there is typically a lack of focus on the grinding of Tungsten electrodes and we see no specific legislation in this regard. It is still considered common practice to grind the Tungsten electrodes with open belt or bench grinders, where unhealthy grinding particles fly around in the air.

We do see an increase in regulations for micro dust particles, and even nanopartices in some EU countries, as these are the particles considered most dangerous since they can get deep into the lungs and some may even travel into the bloodstream. Most of these nano dust particles are the ones that are not even visible to the human eye. When manually grinding Tungsten electrodes it is possible to see the dust particles, however it is important to keep in mind that these particles also include the very hazardous nanoparticles.

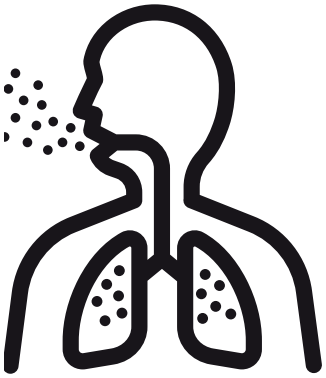
Our Tungsten electrode grinders for TIG welding are equipped with a unique dust container, which automatically collects the toxic dust particles and enables safe disposal or even collection for recycling of the particles.

3. The Danish Cancer Society ("Kræftens Bekæmpelse"), " Forskere slår fast: Svejsning er kræftfremkaldende", *Ritzau*, (217).

Various physical risks

when grinding Tungsten electrodes

INHALATION INJURIES



Inhalation of Tungsten dust particles between 0.01 µm and 1 µm causes contamination via the respiratory route: irritation, allergies, pneumoconiosis, and can lead to lung cancer. The presence of various metals in the electrodes are at the origin of other pneumoconiosis, resulting in a life with chronic lung disease with symptoms such as cough, shortness of breath, chest pain, joint aches, fever, heart problems and can possibly end in death. There is no treatment for pneumoconiosis, the damage is irreversible. Prevention is the only possible solution.*1*

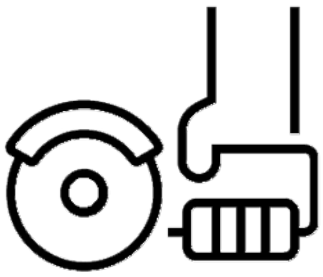
HAND INJURIES

Hand injuries can occur when the Tungsten electrode is projected out of the user's hand during the grinding process. The projected Tungsten electrode can also hurt someone standing close to the user at that time. Furthermore, there is also a risk of hitting the grinding belt with your fingers when grinding a short electrode, which also can lead to contact dermatitis.

EYE INJURIES

The projection of metal particles, such as iron filings, can cause skin burns and eye damages. It has to be removed quickly from the eye. The irritating dust can cause an eye oedema, which can lead to permant sight loss if left untreated. Another possible side effect is siderosis bulbi, which comes from iron diffusion in the eye, and can lead to sight-threatening complications.*2*

DISC DISINTEGRATION



Disc disintegration can occur if working with a grinder inappropiate for Tungsten grinding. If this situation occurs, the grinding disc or pieces of it can be projected towards the user and/or someone standing close to the grinder at that time, causing serious injuries.

1. Keith, L. S., et. al., "ATSDR evaluation of potential for human exposure to tungsten", *Toxicology and Industrial Health 23* (2007).
2. Acharya, I. " Siderosis Bulbi", *National Library of Medicine,* (2022).

The New Normal in

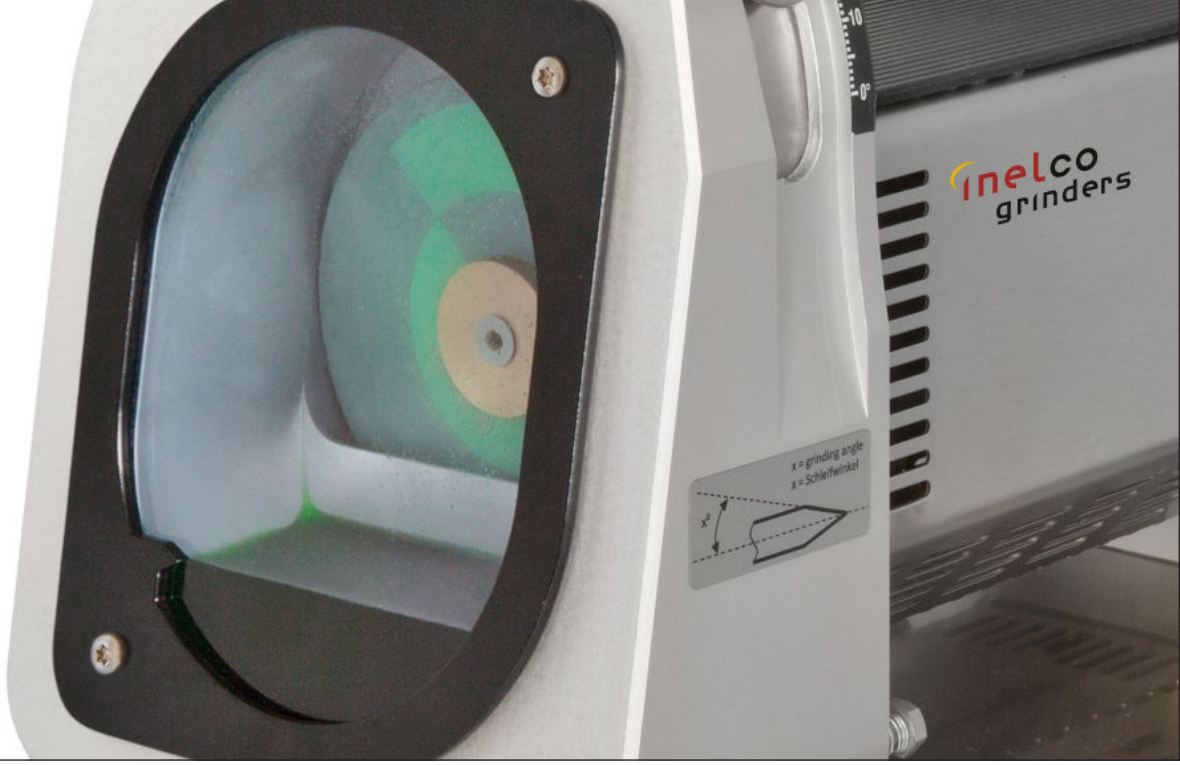
TUNGSTEN GRINDING

Our intention with the New Normal in the welding industry is to encourage welders to consider safety as well as sustainability and steer away from the traditional viewpoint, in which it is generally believed that scars from grinding and welding are a matter of course.

Thus, we want to contribute to the shift in the welding community where the following matters are given a higher importance; health, safety, quality as well as taking the environmental footprint into account. Therefore, in all of our development projects we strive to advance our grinders ensuring the beforementioned are always at the focus.

In our development projects, one of our main focal points have been the health of the welder. It can be harmful for the welder when grinding the Tungsten electrodes on traditional open belt or bench grinders as the harmful Tungsten particles are dispersed in the room and can end up in the welder's lungs. Our dust collector ensures safe containment of the particles and thus secure disposal thereof. We take pride in this project, as it reduces our customers environmental footprint and ensures safe working conditions.

At Inelco Grinders A/S, we never stop challenging ourselves to create better grinders. We take pride in delivering premium quality in everything we do. We innovate the future making it the New Normal.



ENCLOSED GRINDING CHAMBER

prevents injuries

At Inelco Grinders, we care about the health and safety of the welder and have therefore developed the Ultima-TIG with an enclosed grinding chamber to guarantee prevention of accidents as well as health implications due to inhalation of Tungsten dust.

Dust particles of all sizes between 10 µm - 0.01 µm are present in the air during grinding of electrodes. The really dangerous particles are those smaller than 0.1 µm as they cannot be excreted by the body due to their size or shape and therefore remain in the body, also referred to as nanoparticles.[4]

When measuring nanoparticles in the air at a distance of 40 cm from the grinder, we see a tremendous increase of nanoparticles during the grinding process of the open belt grinder compared to the Ultima-TIG grinder*. This means that the well-recognized risk of occupational exposure to dangerous dust particles is close to eliminated when grinding Tungsten electrodes on the Ultima-TIG due to the enclosed grinding chamber.

Furthermore, due to the enclosed grinding chamber the grinding can take place with a specifically designed cooling liquid in order to avoid overheating of the electrode. Injuries due to disc disintegration are prevented 100% as the grinding disc is completely secure in place and because the grinding chamber is completely shielding the grinding disc, thus protecting the user.

4. Det Nationale Forskningscenter for Arbejdsmiljø et. al., "Nanopartikler i arbejdsmiljøet", *Industriens Branchearbejdsmiljøråd*, (2010).

*Taking into account that in any given workplace there can be other forms of nanoparticles in the air.

DUST COLLECTOR

minimizes risks

The Ultima-TIG is equipped with the dust collector to ensure optimal collection of grinding dust, further preventing inhalation of the harmful dust particles.

Once a dust collector is full, as can be seen on the second photo to the right, it is **important** to dispose of the Tungsten dust correctly. This is because potential inhalation and intake of Tungten particles can not only occur during the grinding process with a grinder without dust collection, but also because of handling and improper disposal of the grinding dust. Other Tungsten grinders without correct gathering of the grinding dust require sweeping it off the floor or even if using an extraction system there is a risk when handling the filter. With the Ultima-TIG dangerous handling of the dust can be avoided and with the dust collector this process is made easier.

The general population may be exposed to Tungsten through inhalation of air and consumption of food due to improper disposal of Tungsten particles. This may occur especially in the areas near industries that process or use Tungsten or its compounds, where the Tungsten particles can be found in the air, soil and water. Correct handling of the grinding dust is returning the full container to the local distributor or Inelco Grinders.[5]

All risks can be avoided using a secure Tungsten grinder which captures 100% of the dust!

5. De Palma et. al., "Biological monitoring of tungsten (and cobalt) in workers of a hard metal alloy industry", *Int Arch Occup Environ Health*, (2010).

Electrode holder

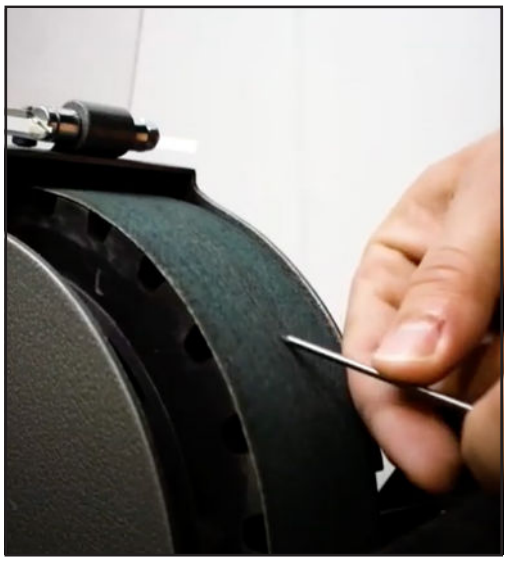
INCREASES SAFETY

When grinding Tungsten electrodes welders are exposed to projections of metal particles as well as the electrode flying out of the user's hand. If the user is grinding the electrode on an open belt grinder without protective gear, there is also a high risk of accidents due to direct contact with the grinding wheel, which can lead to bruises, burns, blisters, pain and contact dermatitis.

On the other hand, if the user does use protective gloves there is a risk that they can get caught in the grinding belt, resulting in accidents and hindering how short the electrode can be ground. Furthermore, when grinding manually a potential hazard is how the electrode tends to get hot after a while, which may burn the fingers of the user.

The electrode holder is designed to elimiate 100% all of the risks aforementioned. The user can insert the electrode in the electrode holder, which ensures a secure grip on the electrode, preventing the electrode from projecting out of the user's hands. The electrode holder can assure a grinding process in which the electrode can be ground down to 8 mm, which is a dangerous length to grind on an open belt grinder.

Eliminate accidents by using an electrode holder and grind short electrodes without any risks!



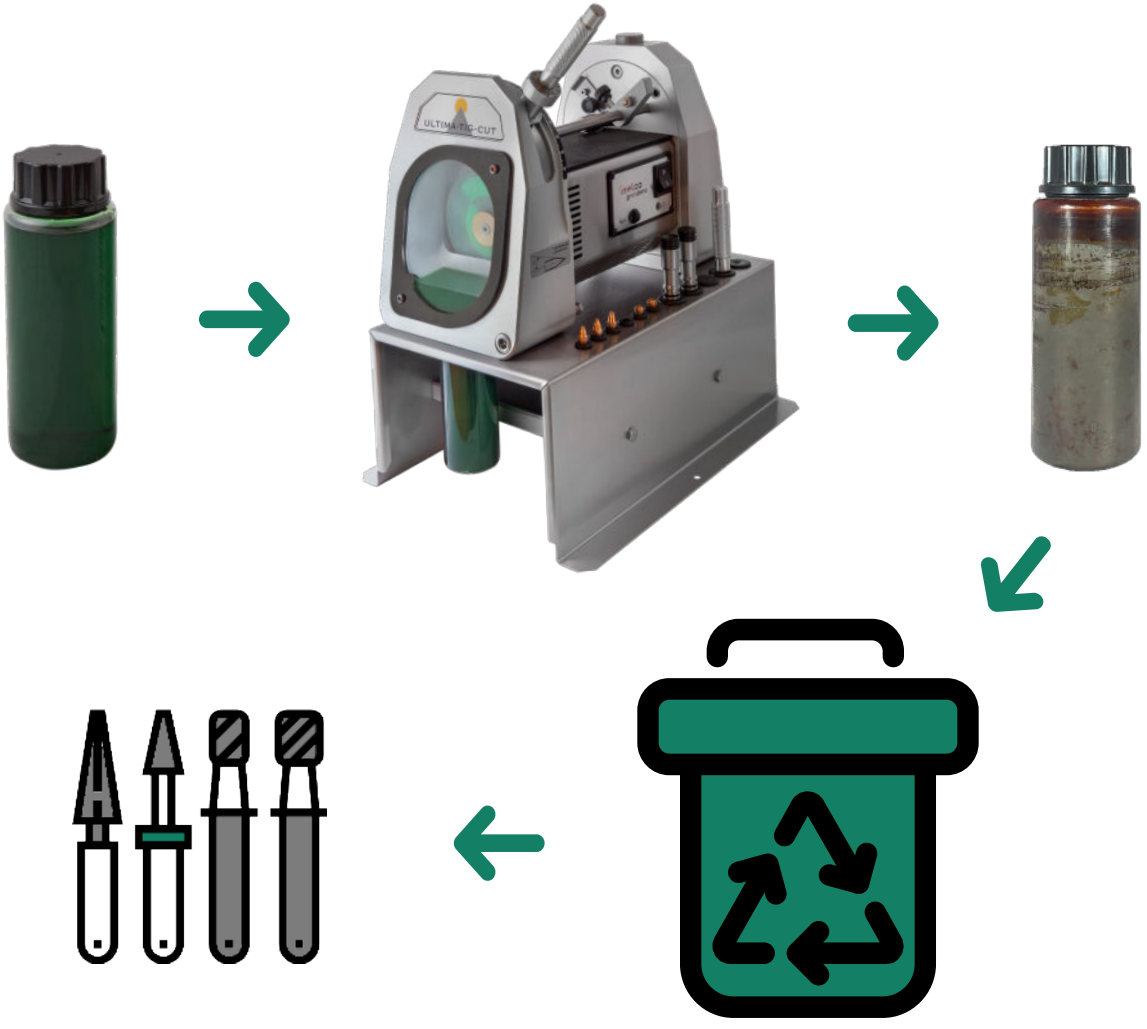
Safety also means

SUSTAINABILITY

At Inelco Grinders we are becoming more environmentally conscious in which we aim to help our customers save natural resources in terms of the extraction and production of Tungsten, as it is considered to have an extensive and negative impact on the environment. Thus, we intend to examine possibilities of reducing our customers' carbon footprint as well as our own.

In addition to minimising the waste of Tungsten electrodes, all our grinders are equipped with a dust collector, which prevents the toxic grinding particles from polluting the environment and ensures safe disposal. We continuously strive to become more and more sustainable. Our first steps in reducing our own CO2 emissions involve reducing, sorting, and recycling our own waste. Going forward, all our development projects will have a focus on sustainability.

It is possible to return the full dust collectors without cost to the distributor or to Inelco Grinders, so we can ensure recycling of the grinding dust and remaining electrode ends to use for tools, electronics components, aircraft parts etc.



Inelco Grinders A/S
Klokkestøbervej 4
DK-9490 Pandrup
Denmark

Tlf. (+45) 96 50 62 33
info@inelco-grinders.com