

# Plasmaschneider

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Ein **Plasmaschneider** schneidet Metalle mittels eines Plasmas, das durch einen elektrischen Lichtbogen erzeugt wird.

## Funktionsweise

Der Plasmaschneider besteht aus Inverter, Handstück, Massekabel, Stromzuleitung und Druckluftzuleitung. Ein Plasmaschneider erzeugt einen Lichtbogen zwischen einer Wolframelektrode und dem Werkstück. Ein Plasma ist ein elektrisch leitfähiges Gas mit einer Temperatur von etwa 30.000 °C. Der Lichtbogen wird in der Regel mit einer Hochfrequenzzündung gezündet und am Austritt durch eine isolierte, in der Regel wassergekühlte, Kupferdüse eingeschnürt. Einige Systeme verwenden auch die Lift-Arc-Zündung, die auch beim WIG-Schweißgeräten eingesetzt wird. Bei diesen Geräten, wird der Brenner an der Schnittstelle auf das Werkstück aufgesetzt und es fließt ein geringer Strom der nicht ausreicht den Brenner zu beschädigen. Der Gasstrom drückt den Brenner von der Werkstückoberfläche, der Lichtbogen zündet und die Elektronik der Schweißstromquelle erhöht den Strom auf die für den Schnitt erforderliche Stärke. Durch die hohe Energiedichte des Lichtbogens schmilzt das Metall und wird durch einen Gasstrahl weggeblasen, wodurch die Schnittfuge entsteht. Als Gas zum Ausblasen wird häufig Druckluft verwendet. Für eine bessere Schnittfuge werden auch Schutzgasgemische eingesetzt, welche eine Oxidation verhindern oder abschwächen. Charakteristisch für Plasmaschneidfugen ist eine Abrundung der Kante an der Eintrittsstelle.

## Anwendung in der Industrie

In der Metallverarbeitung werden hand- oder maschinell geführte Plasmaschneider eingesetzt. Abhängig von der Stromstärke können elektrisch leitende Werkstoffe mit bis zu 200 mm Werkstückdicke getrennt werden. Gängige Handplasmaanlagen haben bis 120 Ampere Stromstärke, bei den stärkeren maschinell geführte Plasmaschneidsystemen kann die Stromstärke beim bis zu zehnfachen dieses Wertes liegen. Übliche Anlagen arbeiten mit etwa 300 Ampere und können damit 70 mm Schwarzblech durchstechen. Bei der heutigen Plasmatechnik wird zwischen konventionellem Plasmaschneiden und dem Präzisionsplasmaschneiden unterschieden. Beim Präzisionsplasmaschneiden werden Gratfreiheit der Schnittlinien, Winkeligkeit des Schnittes oder eine metallisch blanke Oberfläche als Kriterium angesetzt. Hierbei wird statt Druckluft technisches Gas eingesetzt, um eine bessere Schnittqualität zu erreichen, welche der Qualität des Laserschneidens nahe kommt. Die Vorteile gegenüber dem autogenen Brennschneiden bei CNC Plasmaschneidanlagen liegen hauptsächlich in der etwa viermal so hohen Schnittgeschwindigkeit und in dem wegen der hohen Energiedichte geringeren Wärmeverzug. Außerdem können Plasmaschneider praktisch **alle Metalle** schneiden, während autogenes Brennschneiden weitgehend auf Baustähle beschränkt ist.<sup>[1]</sup>

## Anwendung im Rettungswesen

Der ursprünglich für industriellen Einsatz entwickelte Plasmaschneider wird in einer mobilen Variante auch bei Bergungsarbeiten, zum Beispiel von der Feuerwehr und dem THW, eingesetzt. Können ein hydraulischer Spreizer und eine Rettungsschere aus Platzmangel nicht eingesetzt werden oder verbietet sich der Gebrauch eines Schneidbrenners aufgrund seiner schwierigen Handhabung und erheblichen thermische Ausbreitung, stellt der Plasmaschneider eine ideale Alternative dar. Die geringere thermische Ausbreitung ermöglicht es, näher an Personen zu arbeiten. Es ist nicht möglich, eine Rettungsschere an gehärteten Stahl einzusetzen, wie er in der Lenksäule und im Querlenker verwendet wird. Dort kommt deshalb häufig der Plasmaschneider zum Einsatz. Die verwendeten Geräte erreichen im Allgemeinen eine Stromstärke von 20 bis 60 A. Mit diesen ist es dem Rettungsdienst möglich, bis zu 30 mm dicken Baustahl zu durchtrennen.



Plasmaschneider der Feuerwehr

## Siehe auch

- Wasserstrahlschneidemaschine

## Referenzen

- [1] Erläuterung des Prinzips und Vergleich verschiedener Trennverfahren ([http://www.kjellberg.de/german/plasma/index.php?get=plasma\\_ueb&detail=plasma\\_prinzip](http://www.kjellberg.de/german/plasma/index.php?get=plasma_ueb&detail=plasma_prinzip))

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