

# HYCUT

Hydrogen makes oxyfuel technology more cost-effective and better for the environment and human health



# OXYFUEL TECHNOLOGY

## NEW STRENGTHS WITH HYDROGEN

The history of oxyfuel technology goes back more than a century. To this day, it remains an indispensable part of established application areas such as oxyfuel flame cutting, and heating and straightening, as well as brazing and soldering and flame spraying or glass processing. The field of oxyfuel technology is currently dominated by hydrocarbon fuel gases such as acetylene, propane and natural gas. But in view of increasingly limited natural resources and the need to manage industrial production as sustainably as possible, hydrogen offers an effective fuel gas alternative. Take advantage of the benefits of hydrogen in oxyfuel technology – with HyCut.



## Special properties

Hydrogen is odorless, non-toxic and the lightest gas on the Earth. Hydrogen differs significantly from established fuel gases such as acetylene and propane: its chemical formula alone indicates that no carbon atoms are present, which means no additional CO<sub>2</sub> can be formed. With water as the combustion product, the oxygen requirement for complete combustion is comparatively lower for hydrogen.

## Top quality

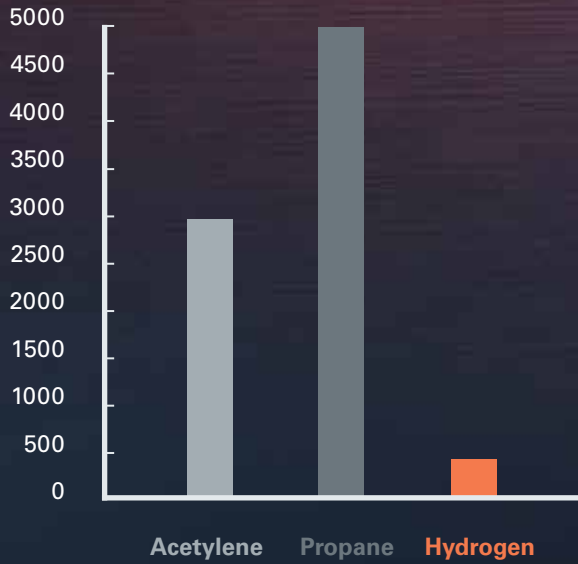
In the flame processing of high-purity glass, hydrogen is indispensable because it contains no carbon. Initial tests with the materials under study showed no increase in hardening or hydrogen inclusions. The surface roughness corresponds to the values of other fuel gases or is somewhat lower.

## Physical properties of hydrogen as compared with established fuel gases

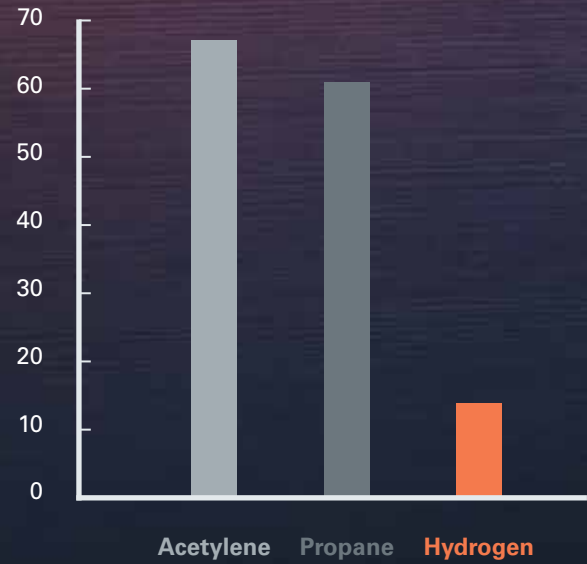
	Density (standard condition) in kg/m <sup>3</sup>	Ignition limit (in air) in vol.-%	Autoignition temperature in °C	max. flame temperature (with O <sub>2</sub> ) in °C	Heating value in MJ/kg / MJ/m <sup>3</sup>	Calorific value in MJ/kg / MJ/m <sup>3</sup>
<b>Hydrogen H<sub>2</sub></b>	0.09	4.0–77.0	560	3080	120.0 / 10.8	141.8 / 12.7
<b>Acetylene C<sub>2</sub>H<sub>2</sub></b>	1.17	1.5–80.0	305	3030	48.2 / 56.5	49.9 / 58.6
<b>Propane C<sub>3</sub>H<sub>8</sub></b>	2.01	1.9–9.5	470	2850	46.3 / 93.6	50.4 / 101.8

# HyCut as compared with propane and acetylene: Significantly lower CO<sub>2</sub> and NO<sub>x</sub> emissions

CO<sub>2</sub> emissions in ppm



NO<sub>x</sub> emissions in ppm

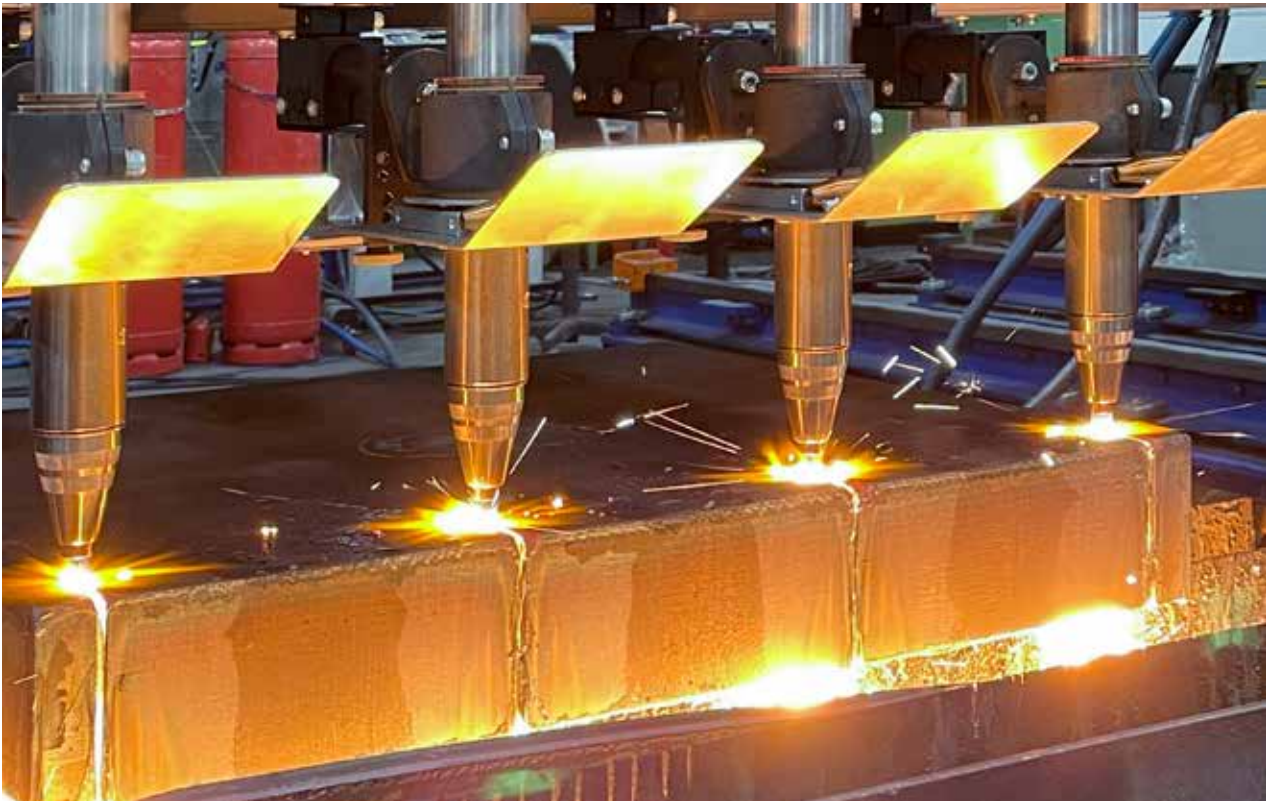


Source: Leibnitz University Hanover



Hydrogen





## Measurable cost-effectiveness

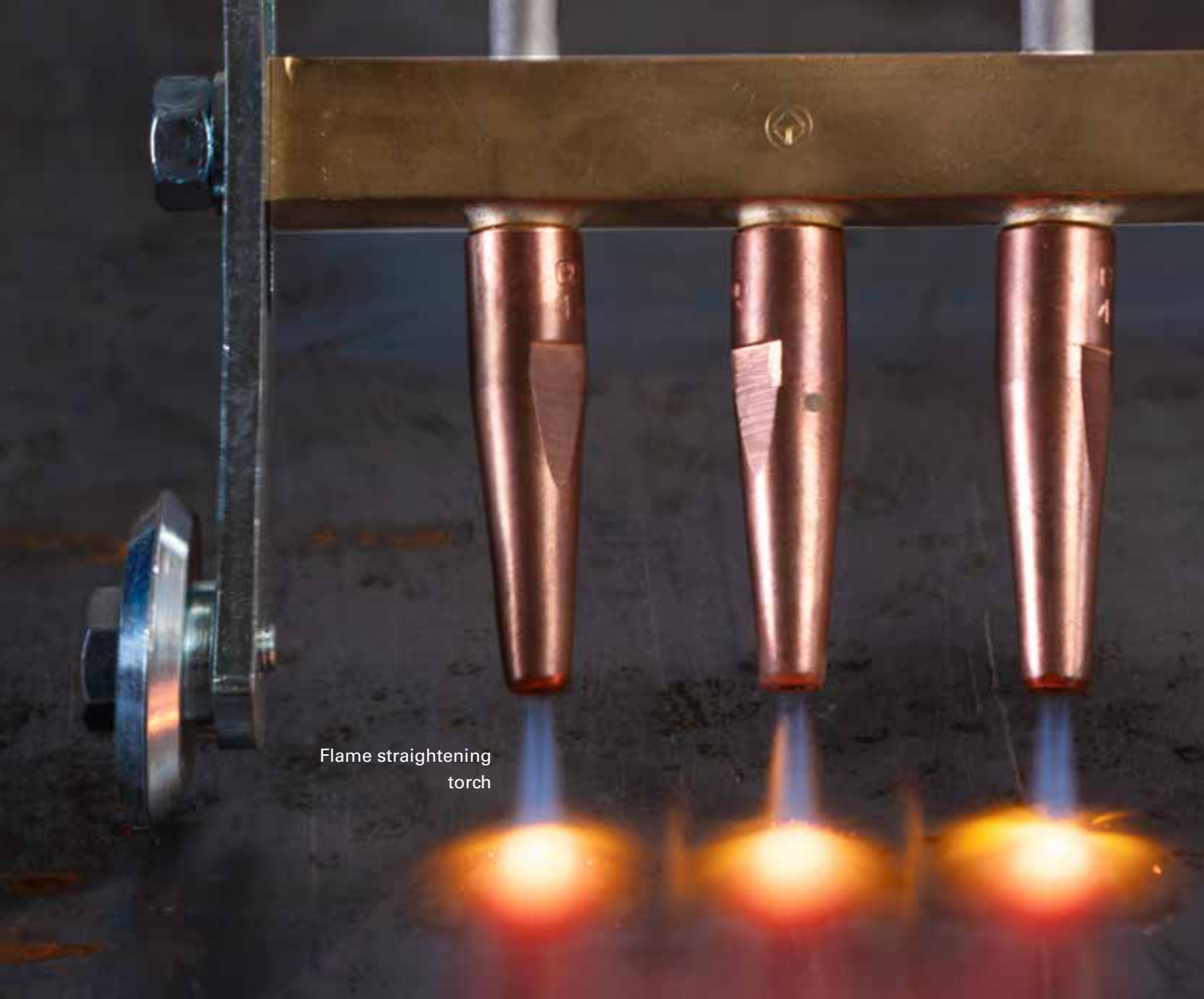
It goes without saying that costs are an important factor in oxyfuel technology – particularly as compared with conventional alternatives such as propane or natural gas. Our extensive tests found that HyCut gases, in conjunction with our advanced oxyfuel equipment, provide measurable cost benefits.

## Enhanced work safety

Measurements confirmed that using our HyCut gases also significantly reduces the emission of CO<sub>2</sub>, nitrous oxides and dust particles. As compared with the fuel gases used in oxyfuel technology up till now, this improves occupational health and safety in the workplace.

## More environmental protection

As industries implement changes to decarbonize the economy, the use of hydrogen as a fuel gas for oxyfuel technology can play an important role. To enable hydrogen to address today's demands for quality, productivity and profitability, Messer collaborated with Messer Cutting Systems on an extensive development program. The result is HyCut, the eco-friendly fuel gas alternative for oxyfuel technology.



Flame straightening  
torch

## High-performance hardware

In view of hydrogen's unique properties, special burners and nozzles were developed. They make it possible to adjust the HyCut flame for any application – in automated or manual operation.

## Secure supply

As an industrial gases specialist, Messer has mastered the safe and reliable manufacture of hydrogen, along with the associated quality assurance, filling technology, and logistics, as well as its onsite distribution. Depending on the needs, we offer appropriate supply concepts ranging from individual cylinders to bundles and trailers to stationary tanks.

## Finding the best solution together

Take advantage of the experience of our application specialists. We'll be glad to show you how HyCut can help your oxyfuel cutting operations achieve greater sustainability and profitability.

## Constant withdrawal volume

Hydrogen is a highly compressed gas which, unlike conventional fuel gases, is not limited in the amount that can be extracted.

The associated additional equipment and therefore costs for complex installations via bundles or cylinder couplings are eliminated.



Heating torch with  
laminar flame outlet

## HyCut's benefits at a glance:

- + Sustainable, climate-friendly alternative to established fuel gases
- + Greater occupational health and safety
- + Enables extremely high cutting performance
- + Cost benefits over established fuel gases
- + Eligible for subsidies in the context of climate-friendly initiatives
- + No CO<sub>2</sub>-related emissions
- + Constant withdrawal volume



# CREATING SOLUTIONS

## What we stand for

PRODUCT

AUTOMATION

DIGITAL

SERVICES

KNOW-HOW

Messer Cutting Systems is a global supplier of cutting-edge technology for the metalworking industry. With almost 1.000 employees worldwide in over 50 countries, we maintain a constant dialogue with our customers to achieve sustainable user-oriented innovation.

Our portfolio embraces the themes PRODUCT, DIGITAL, SERVICES, AUTOMATION and KNOW-HOW. We will live up to our claim "Creating Solutions Beyond Machines" not just with the most modern cutting systems and solutions for oxyfuel technology.

Appropriate services and training, our own software applications as well as the integration of solutions from our technology partners, e. g. in the field of automation, complete the machine to give forward looking total solutions.

Our Know-how combined with our customer-oriented attitude and actions make us the world-wide partner of choice for innovative total solutions on all aspects of cutting systems for over 125 years.

## Messer Cutting Systems GmbH

Otto-Hahn-Straße 2-4 | 64823 Groß-Umstadt  
Germany

Tel. +49 6078 787-0

Mail [info@messer-cutting.com](mailto:info@messer-cutting.com)

[messer-cutting.com](http://messer-cutting.com)

