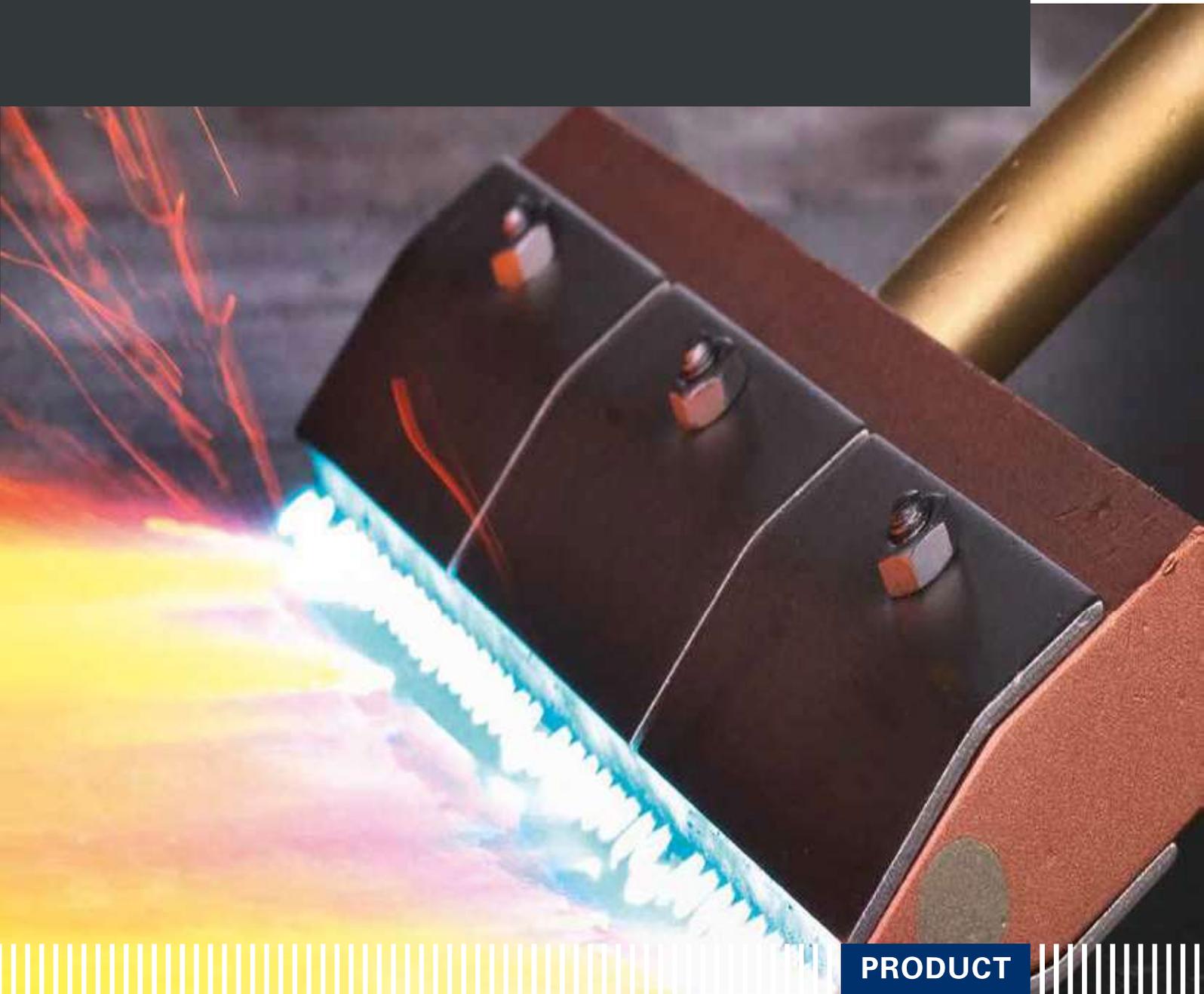


# FLAME WASHING MESSER CUTTING SYSTEMS





## FLAME WASHING:

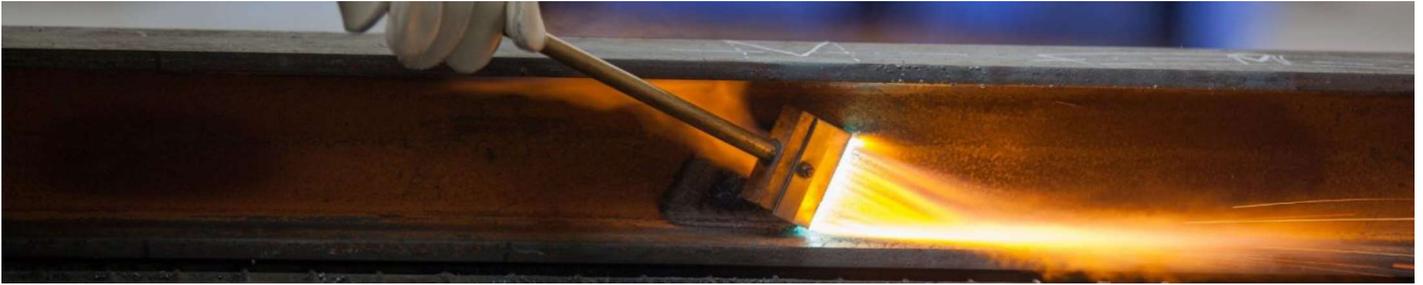
### Definition:

Flame washing involves two different operations:

- The thermal treatment of the steel or concrete surface with the help of flame washing torches to loosen, transform and remove corroded surfaces.
- The mechanical removal of the reaction products caused by the flame and the loosened or strength reduced parts.

Both operations together result in flame washing.





## FLAME WASHING:

### Applications:

#### 1. Flame washing of steel

An essential prerequisite for durable corrosion protection by coatings is proper preparation of the substrate, i.e. the steel surface.

Impurities, such as dirt or oil, which impair the adhesion or effectiveness of the intended coating or overlay must be removed.

Native layers (scale, rust) and foreign layers (existing coatings) must be removed to the required degree of cleanliness. Inherent and foreign contaminants and coatings may be removed in one operation as far as the type, degree and thickness of the coating permit.

#### 1.1 Descaling

Scale is impurities of iron oxide ( $\text{FeO}$ ;  $\text{Fe}_2\text{O}_4$ ;  $\text{Fe}_2\text{O}_3$ ) on the surface of metals.

Scale forms after hot rolling of the steel sheets or profiles and does not have a uniform composition.

In order to prevent the damaging influence of the electrochemically "nobler" rolling scale compared to the base steel, it must be removed (descaling). The removal effect in flame washing is caused by the following two factors:

- The different expansion coefficients of the mill scale and the steel.
- The release of strong intercrystalline forces that occur during chemical transformation as a result of the reducing effect of the oxy-acetylene flame. In this process, the firmly adhering scale layer is transformed into a loose powder which can be easily removed with brushes.

#### 1.2 Derusting

Rust consists mainly of divalent and trivalent iron oxide hydrates, the composition of which can vary depending on the supply of moisture and water and the supply of oxygen.

With the aid of the reducing oxy-acetylene flame, it is possible to use flame washing to reverse the damaging effect of oxidation to give the steel a "healthy" surface again.

The effect of the oxy-acetylene flame on the grate is as follows:

- Drying, that is, freeing the grate from the moisture present in the pores. It is expelled in the form of steam with the addition of heat. During the initial increase in volume, the grate coating becomes brittle and loosened at the same time.
- Chemical reaction of the oxy-acetylene flame with the grate by reduction.



## FLAME WASHING:

### Applications:

#### 2. Flame washing of concrete and natural stone

During the thermal process step in the rehabilitation of concrete surfaces, the highest possible heat flux density is applied to the concrete for a short time.

The flame cone temperature is approx. 360° C. The flame energy is consumed in the uppermost or outermost approximately 1 to 2 mm of concrete mainly by two processes:

- Blasting (spattering) of the quartz due to transformation of the crystals and a
- melting of the rock particles, which subsequently solidify like glass and adhere relatively loosely to the surface.

Both effects, blasting and melting, consume most of the thermal energy of the impinging flame, so that only a small amount of heat penetrates into the underlying concrete and its reinforcement. Most of the energy remains in the spattered and melted material, which has no bond with the rest of the concrete.

In practice, flame washing of concrete is used in the treatment / renovation of road surfaces, garages, workshops, hall floors, airfield pavements and bridges.

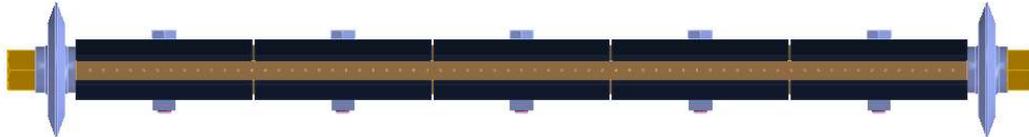
In the case of weathered natural stone surfaces, flame washing can be used to peel the surface so that it regains its original purity.



Flame washing insert STAR T-PM 150



Flame washing insert T-A 50



Torch head (250 mm) mounted with additional running wheels

### Version:

- **Type T-PM:** Three row drilled Copper strip torch head with screwed on stainless steel plate wear protection. Staggered jets, outermost row of jets inclined inwards by 12.5° for centred flame outlet.  
From T-PM 150 upwards with double gas mix pre-distribution at the torch head.
- **Type T-A:** Single row drilled Copper strip torch head with screwed on stainless steel plate wear protection.
- **Type T-PM and T-A:** All torch heads with threaded holes on the side for retrofitting of running wheels to be ordered separately.

Flame washing insert							
Type	Pressure [bar]			Consumption [m³/h]			Art.-No.
	Oxygen	Propane	Methane	Oxygen	Propane	Methane	
<b>Suitable for handle type STAR: propane (P), methane (M) / oxygen</b>							
T-PM 50	4,0 – 5,0	0,2 – 0,3	0,2 – 0,3	2,9 – 3,7	0,8 – 1,0	2,1 – 2,7	71600523
T-PM 100	4,0 – 5,0	0,2 – 0,3	0,2 – 0,3	5,3 – 7,3	1,4 – 2,0	3,9 – 5,4	71600524
T-PM 150	4,0 – 5,0	0,2 – 0,3	0,2 – 0,3	9,4 – 11,0	2,5 – 3,0	7,0 – 8,2	71600525
<b>Suitable for handle type SUPERTHERM: propane (P), methane (M) / oxygen</b>							
T-PM 200	4,0 – 5,0	0,5	0,5	14,5 – 16,0	4,4	9,3	71602107
T-PM 250	4,0 – 5,0	0,5	0,5	20,0	5,5	11,5	71602108
Type	Oxygen	Acetylene		Oxygen	Acetylene		Art.-No.
<b>Suitable for handle type STAR: Acetylene (A) / Oxygen</b>							
T-A 50	3,0	0,5		1,25	1,0		71600520
T-A 100	4,0	0,6		2,50	2,0		71600521
T-A 150	5,0	0,7		3,75	3,0		71600522
<b>Suitable for handle type SUPERTHERM: Acetylene (A) / Oxygen</b>							
T-A 200	3,5 – 4,5	0,7		5,0	4,0		71602105
T-A 250	3,5 – 4,5	0,7		6,25	5,0		71602106
<b>Spare parts:</b>		<b>Art.-No.</b>		<b>Accessories:</b>		<b>Art.-No.</b>	
Wearprot. 50 mm - Type T-PM		05335050		Running wheel for torch head*		67701202	
Wearprot. 50 mm - Type T-A		71600700		Axis M6 for running wheel*		67701216	
Hex.-Screw for Wearprot.		17552020		* only available separately as additional parts, Order: two pieces per torch head			
Hex.-Nut for Wearprot.		281005					

Handle STAR 2020



Handle STAR 1010



Handle SUPERTHERM



**Version:**

- STAR 2020 with side valve arrangement.
- STAR 1010; STAR 1300 and SUPERTHERM with V-shaped valve arrangement.
- STAR 2020; STAR 1300 and SUPERTHERM plastic handles.
- Suitable for all fuel gases.
- Handles are supplied without hose nozzles.

**Application:**

- Type STAR for Flame washing insert 50, 100 and 150 mm.
- Type SUPERTHERM for Flame washing insert 200 and 250 mm.

**Article-Number:**

Connections	STAR 2020	STAR 1010	STAR 1300	SUPERTHERM
G1/4RH-G3/8LH	71606820	71607725	71607304	-
G3/8RH-G3/8LH	71607230	-	-	-
G3/8RH-G1/2LH	-	-	-	71601818

**Replacement connecting nut STAR for all handle STAR**

24252020

**Replacement connecting nut SUPERTHERM for handles SUPERTHERM:**

71601756



Safety device DG 91 N - Oxygen



### Version flashback arrestor:

- **Type DG 91 N**
  - **Necessary:** Mounting at tapping point
  - With Filter, gas non-reverse flow valve, flame arrestor, post flow stop valve.



### Flashback Arrestor:

Type	Type of gas	Connections	Label German	Label English
<b>Handle STAR G1/4RH-G3/8LH – Assembly at tapping point</b>				
DG 91 N	Oxygen	G1/4" RH – DN 6	Art.-No. 0463291	Art.-No. 0463831
DG 91 N	Fuel gas	G3/8" LH – DN 9	0463290	0463829
<b>Handle STAR G3/8RH-G3/8LH – Assembly at tapping point</b>				
DG 91 N	Oxygen	G3/8" RH – DN 9	0463330	0463832
DG 91 N	Fuel gas	G3/8" LH – DN 9	0463290	0463829
<b>Handle SUPERTHERM G3/8RH-G1/2LH – Assembly at tapping point</b>				
DG 91 N	Oxygen	G3/8" RH – DN 9	0463330	0463832
DG 91 N	Fuel gas	G1/2" LH – DN 11	0463329	0463830

Hose with metallic cover



Rubber hose



**Version:**

- Rubber hose with fibre inserts, following ISO 3821.
- Additionally with metal braiding and / or pressed connections on request according to length.

**Rubber hoses, Metre ware**

Type of gas	Nominal bore DN [mm]	Max. pressure [bar]	Art.-No.
<b>Handle STAR G1/4RH-G3/8LH</b>			
Oxygen	6,3 x 5	20	05101010
All fuel gas	9 x 3,5	20	0462859
<b>Handle STAR G3/8RH-G3/8LH</b>			
Oxygen	9 x 5,5	20	05101060
All fuel gas	9 x 3,5	20	0462859
<b>Handle SUPERTHERM G3/8RH-G1/2LH</b>			
Oxygen	9 x 5,5	20	05101060
All fuel gas	11 x 3,8	20	0462860

**Steel braided hoses, cut to length and fully assembled**

Type of gas	Nominal bore DN [mm]	Max. pressure [bar]	Art.-No. -X = Length [m]
<b>Handle STAR G1/4RH-G3/8LH</b>			
Oxygen	6,3 x 5	20	71651615-X
All fuel gas	9 x 3,5	20	71651611-X
<b>Handle STAR G3/8RH-G3/8LH</b>			
Oxygen	9 x 3,5	20	71655741-X
Oxygen	9 x 5,5	20	71651617-X
All fuel gas	9 x 3,5	20	71651611-X
<b>Handle SUPERTHERM G3/8RH-G1/2LH</b>			
Oxygen	9 x 5,5	20	71651617-X
All fuel gas	11 x 3,8	20	71651613-X

**Rubber hoses, twin hose fully assembled**

Type of gas	Nominal bore DN [mm]	Length [m]	Art.-No.
<b>Handle STAR G1/4RH-G3/8LH</b>			
Oxygen / Acetylene	DN 6 x 5 / DN 8 x 3,5	5 m	0469013
Oxygen / Acetylene	DN 6 x 5 / DN 8 x 3,5	10 m	0469014
Oxygen / Acetylene	DN 6 x 5 / DN 8 x 3,5	20 m	0469015
Oxygen / Acetylene	DN 6 x 5 / DN 8 x 3,5	40 m	0469016
<b>Handle STAR G1/4RH-G3/8LH</b>			
Oxygen / Propane	DN 6 x 5 / DN 8 x 3,5	10 m	0469021
Oxygen / Propane	DN 6 x 5 / DN 8 x 3,5	20 m	0469022
Oxygen / Propane	DN 6 x 5 / DN 8 x 3,5	40 m	0469023

Cylinder pressure regulator CONSTANT Acetylene



Cylinder pressure regulator CONSTANT Oxygen



## Flaschendruckregler:

Type of gas	max. backpressure [bar]	Cylinder-connection	Hose connection	Connection Torch handle	Art.-No.
<b>Type CONSTANT – Oxygen primary pressure: 200 bar</b>					
Oxygen	10	G3/4" RH	G1/4" RH – DN 6	STAR	71620100
Oxygen	10	G3/4" RH	G3/8" RH – DN 9	SUPERHERM	71620256
<b>Type CONSTANT – Oxygen primary pressure: 300 bar</b>					
Oxygen	10	W30x2 – Ø17.3/18.3	G1/4" RH – DN 6	STAR	71630100
Oxygen		W30x2 – Ø17.3/18.3	G3/8" RH – DN 9	SUPERHERM	71630156
<b>Type CONSTANT – Fuel gas</b>					
Propane	2,5	W 21,80 x 1/14" LH	G3/8" LH – DN 9	STAR	71620108
Acetylene	1,5	Bügel	G3/8" LH – DN 9	STAR	71620107
Acetylene	1,5	Bügel	G1/2" LH – DN 11	SUPERHERM	71620388
<b>Type U11 – Propane</b>					
Propane	6,0	W 21,80 x 1/14" LH	G1/2" LH – DN 11	SUPERHERM	71655598
<b>*STAR: Flame widths 50, 100, 150 mm</b>					
<b>*SUPERHERM: Flame widths 200, 250 mm</b>					

For a sufficient supply of the flame washing inserts SUPERHERM T-A 200 and T-A 250, normally an acetylene cylinder bundle is usually required.

For sufficient supply of the flame washing inserts SUPERHERM T-PM 200 and T-PM 250, a supply of six cylinders of propane is usually required for an operating time < 30 min.

Cylinder couplings



## Cylinder couplings:

### Maximum take-off quantity from single cylinders:

Type of gas	Operating time < 15 min.	Operating time 15 up to 30 min.	Operating time: > 30 min.
Acetylene (10 kg cylinder)	Ca. 1,0 m3/h	Ca. 0,7 m3/h	Ca. 0,5 m3/h
Propane (33 kg cylinder)	Ca. 0,99 – 1,49 m3/h	Ca. 0,79 – 1,12 m3/h	Ca. 0,59 – 0,75 m3/h

### Consumption off flame washing inserts

Type of insert	Consumption Acetylene	Type of insert	Consumption Propane
STAR T-A 50	1,0 m3/h (0,5 bar)	STAR T-PM 50	0,8-1,0 m3/h (0,2-0,3 bar)
STAR T-A 100	2,0 m3/h (0,6 bar)	STAR T-PM 100	1,4-2,0 m3/h (0,2-0,3 bar)
STAR T-A 150	3,0 m3/h (0,7 bar)	STAR T-PM 150	2,5-3,0 m3/h (0,2-0,3 bar)
SUPERTHERM T-A 200	4,0 m3/h (0,7 bar)	SUPERTHERM T-PM 200	4,4 m3/h (0,5 bar)
SUPERTHERM T-A 250	5,0 m3/h (0,7 bar)	SUPERTHERM T-PM 250	5,5 m3/h (0,5 bar)

Acetylene – Coupling Type	Number of gas cylinders	Consisting of:	Art.-No.
FK-A 2 RSV	2	Cylinder coupling complete	71654846
FK-A 3 RSV	3	Cylinder coupling complete	71654847
Propane – Coupling Type	Number of gas cylinders	Consisting of:	Art.-No.
FK-P2 up to FK-P6	X = 2 up to 6	(X-1 St.) HD-Propane hose	71654764
		(X-1 St.) T-piece Propane-cylinders	71654765

For a sufficient supply of the flame washing inserts SUPERTHERM T-A 200 and T-A 250, normally an acetylene cylinder bundle is usually required.

For sufficient supply of the flame washing inserts SUPERTHERM T-PM 200 and T-PM 250, a supply of six cylinders of propane is usually required for an operating time < 30 min.

**MESSER CUTTING SYSTEMS GMBH**

**OXYFUEL BUSINESS UNIT (OBU)**

**Am Brüchelsteg 8  
64823 Groß-Umstadt  
Germany**

**Tel.: +49 (0) 6078 787 0**

**Email: [griflam@messer-cutting.com](mailto:griflam@messer-cutting.com)**

**YOUR MESSER DEALER:**



# CREATING SOLUTIONS BEYOND MACHINES

## What we stand for

### PRODUCT

Messer Cutting Systems is a global supplier of cutting edge technology for the metalworking industry.

### AUTOMATION

With over 900 employees worldwide in over 50 countries, we maintain a constant dialogue with our customers to achieve sustainable user-oriented innovation.

### DIGITAL

### SERVICES

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.

### KNOW-HOW

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 have made us the worldwide partner of choice for innovative total solutions on all aspects of cutting systems for over 120 years.

## Messer Cutting Systems GmbH

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

Tel. +49 6078 787-0

Fax +49 6078 787-150

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

[www.world-of-oxyfuel-technology.com](http://www.world-of-oxyfuel-technology.com)

© Messer Cutting Systems GmbH 2022

The descriptions, technical data and illustrations contained in this document are provided for guidance purposes only and are non-binding. The manufacturer reserves the right to make alterations to products without notice.

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

THE MESSER  
**EXPERIENCE**