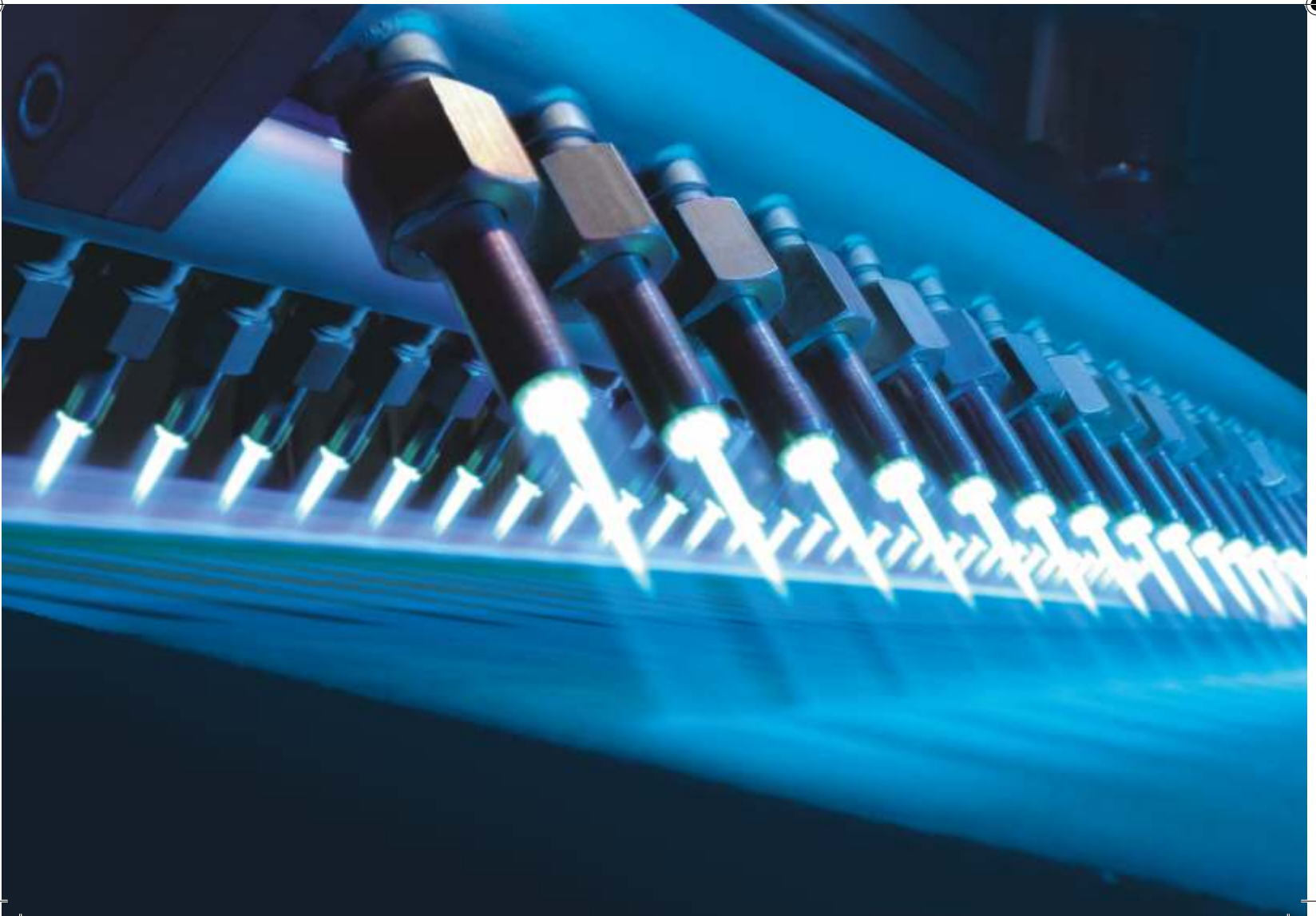


# LINDOFLAMM®

Flame solutions.





## Complete solutions for complex tasks. LINDOFLAMM®.

Whether you are preheating, postheating, flame straightening, flame hardening, flame brazing, fusing or hot forming, you want to be sure you are using the appropriate gas and the best equipment. Linde can help you make the right decision. Our complete LINDOFLAMM flame solutions ensure that you always deliver the optimum performance with the highest possible cost-efficiency.

Special manufacturing processes call for special solutions. The use of standard, off-the-shelf burners is often an unsatisfactory compromise. The LINDOFLAMM® flame solutions are designed to fulfil your unique requirements, utilising special burners whose shapes and capacities are tailored to your application and are matched with the right fuel gas mixture.

### Benefits at a glance

- Lowest processing costs: economical gas use
- Highest productivity: optimum heat transfer to the workpiece
- since the technology and the gas are fitted to the task
- Possibility of mechanisation

### Our full service offer

The LINDOFLAMM® programme is the result of over 100 years of experience with our customers. We are therefore able to meet any demand and can provide you with complete solutions, including the right gas and equipment, comprehensive services, continuous gas supply and extensive process know-how.

#### Process solutions

High-quality fuel gases, burner technology, automation systems and dedicated support for:

- Flame heating
- Flame straightening
- Preheating (welding and cutting)
- Postheating (welding)
- Hot forming
- Flame brazing
- Flame hardening
- Fusing of flame-sprayed coatings

#### Supply solutions

- Reliable and cost-efficient supply
- High-quality equipment and installations
- Express and emergency deliveries
- Automatic gas supply

#### Process know-how

- Application training
- Customer R&D
- WELDONOVA® process consulting
- Development of future technologies

#### Quality and safety services

- Integration management
- Installation and inspection services
- Burner maintenance
- Safety audits
- Safety training

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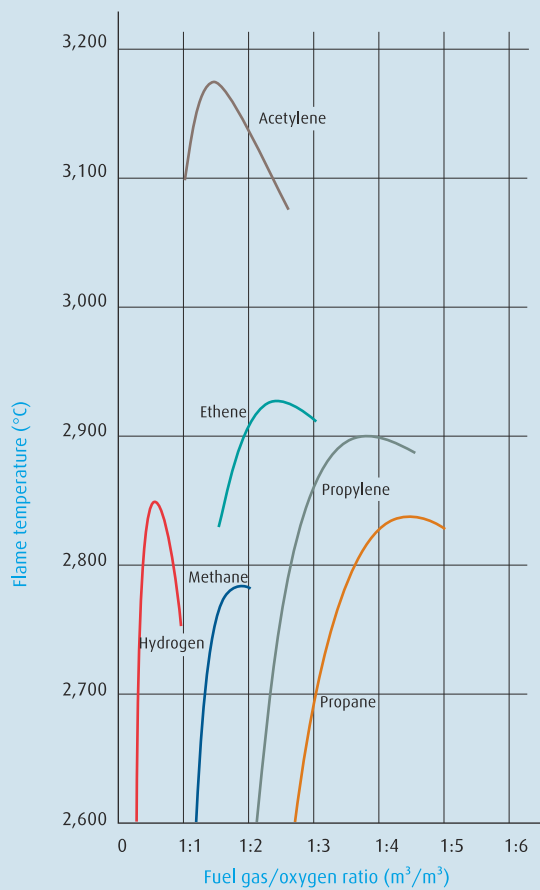
# The classic combination: oxygen and acetylene. Your flame of choice.

## Acetylene: The perfect fuel gas

When efficiency, precision and accuracy are required, there is no better choice than acetylene:

- Acetylene produces the highest flame temperatures, providing rapid and concentrated heating.
- The unique temperature distribution in an acetylene flame means that most of the energy is contained within the primary flame, allowing for precise heating.
- Acetylene also has the highest flame propagation rate, increasing thermal efficiency.
- Acetylene produces the lowest moisture content in exhausted gases, reducing corrosion and quality issues.

Flame temperatures fuel gas/oxygen



Oxidising flame

Neutral

Reducing flame



Flame setting

## Oxygen: The right selection

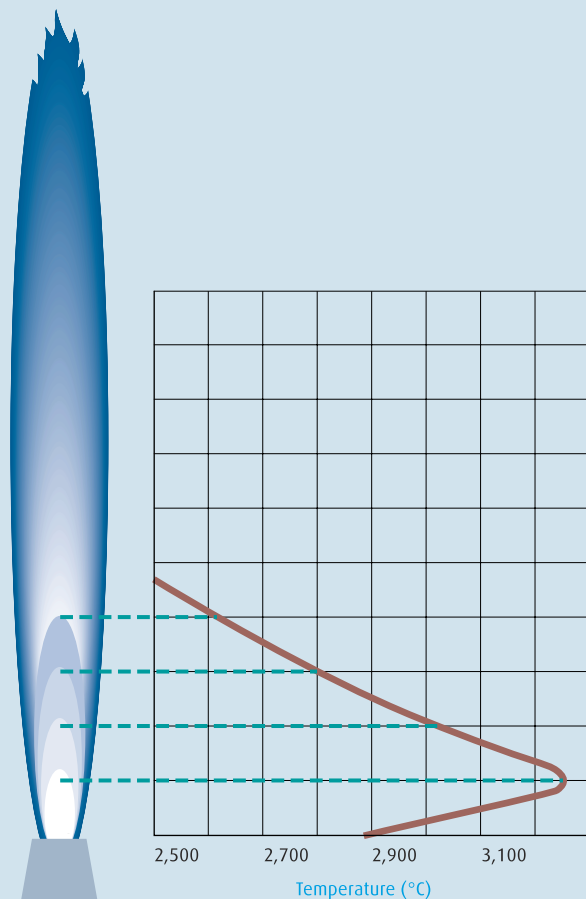
In order to achieve optimal heating of the workpiece, the flame properties have to be tailored to the specific application. Therefore, the oxygen source (oxygen gas, compressed air, aspirated air) has to be selected carefully:

- Oxygen is used for hot forming, flame hardening, flame cleaning and fusing of sprayed coatings. It gives a rapid rise in temperature at the workpiece surface and causes a build-up of heat with a high temperature gradient inside the workpiece.
- Compressed air is used for preheating, postheating, flame brazing and flame drying. It lowers the temperature and combustion velocity, producing a mild and gentle, yet intense and economical

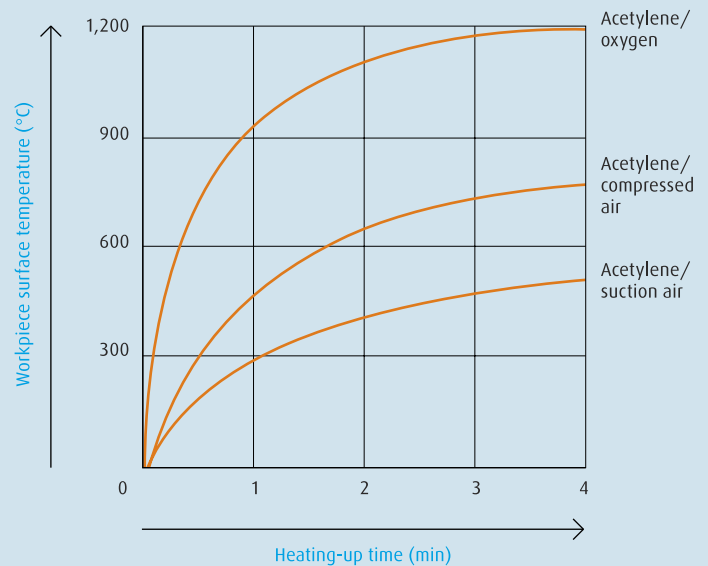
flame, which can be well controlled. The heating of the workpiece and the temperature gradient inside the part are less than when oxygen is employed. The workpiece is thoroughly heated at a lower surface temperature.

- Aspirated-air burners are sometimes used for brazing. They provide lower surface temperatures, a very slight temperature gradient and thorough heating.

### Temperature distribution within an oxy-acetylene flame



### Effect of oxygen source on workpiece surface temperature



# Designed for greatness. Manually guided and mechanised burners.

The LINDOFLAMM portfolio includes manually guided as well as mechanised burners. Manually guided special burners differ from off-the-shelf models as both their shape and capacity are modified for the purpose at hand. The burners are usually gas-cooled. For severe loading applications, however, water cooling can be employed.

Mechanised special burners find use wherever heating processes are carried out under partial or full automation. The use of burners in mechanised systems requires a customised burner design with the heat delivery precisely matched to the workpiece to be heated.

We work closely with you to ensure that our technology is seamlessly integrated into your production line and that our burner designs fully meet your requirements and work at their best.

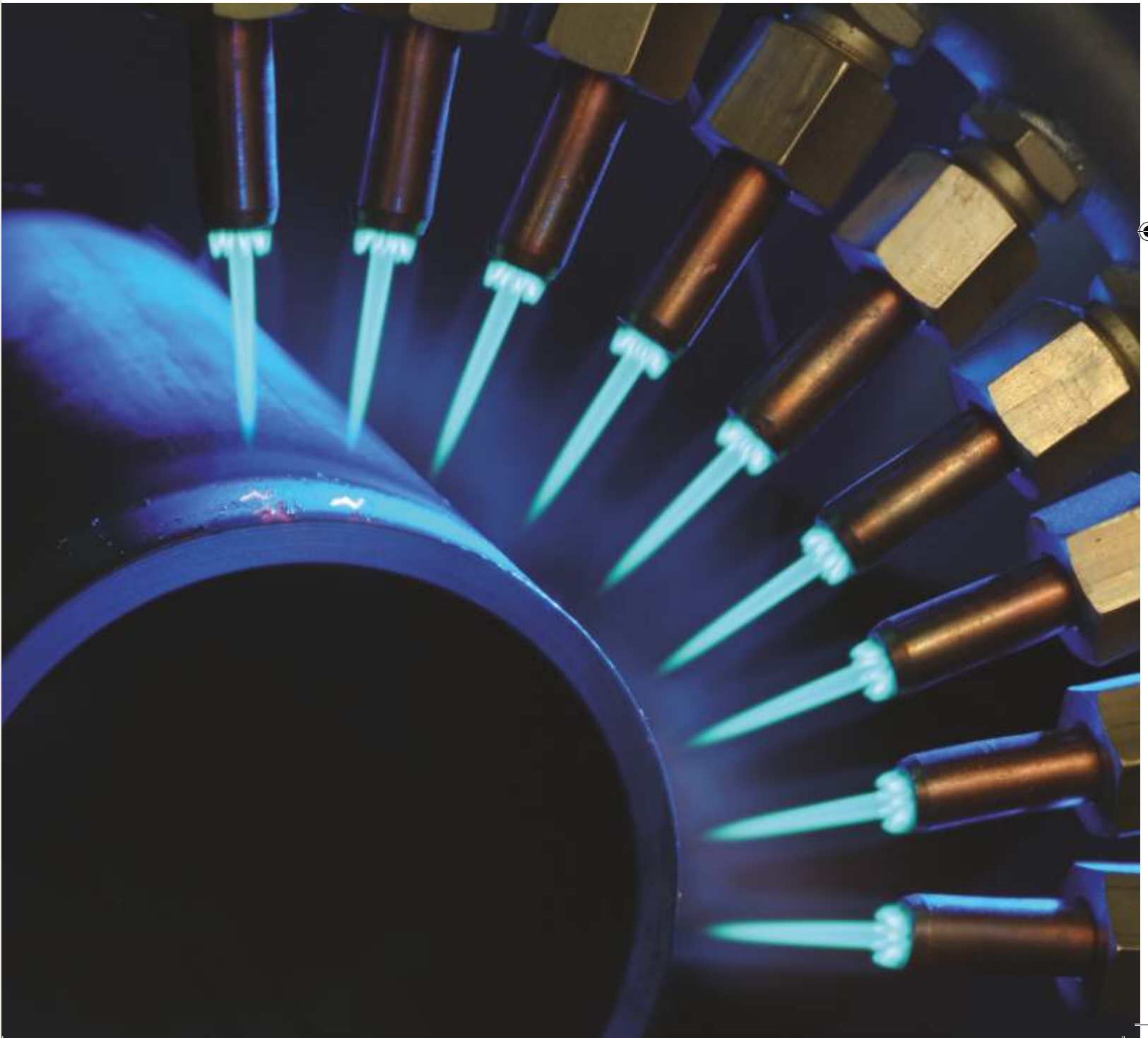
## Control panels: Reliable automatic operation

Acetylene flames lend themselves to mechanisation. The use of electrical components makes it possible to control both the flame adjustments and flow rates of acetylene and oxygen or air. But how do you achieve consistent results?

For this purpose, Linde has developed control panels that allow for automated flame ignition and provide consistent flame properties at all times. They can be integrated into your machine controller or operated independently. For some applications, it is necessary to heat a workpiece up to a certain temperature and maintain this temperature until the process is complete. By the addition of a remote sensor, this function can also be automated with our control panels.

Reliable safety systems are crucial for any mechanised process. Our control panels can monitor the gas and coolant flows, the burner and coolant temperatures as well as the pilot light status. Moreover, they ensure that flames always ignite correctly and, if any problems occur, they safely shut down the system.

Pipe preheating using air-acetylene LINDOFLAMM burners





## Always there when you need it. Continuous gas supply.

For acetylene, oxygen or air, Linde can provide you with the solution that is most effective for your needs: from mobile cylinder packs to trailer packs for acetylene and bulk tanks for oxygen. Thanks to our wide and well-organised supply network, we can guarantee the highest level of supply reliability and can react rapidly to unexpected changes in demand with express and emergency delivery services.

In addition, Linde offers the optimum supply equipment for every container size. From single cylinder regulators to the fully automated LINDOMATIK® supply station, we always ensure the maximum possible withdrawal rates – and that without any disruption to your process. Add SECCURA® automatic gas supply and you will never need to worry about your gas again.



# Global knowledge from local experts. Detailed process know-how.

Tailor-made solutions require extensive process know-how and experience to achieve the desired results in the most efficient way. Our local technical experts meet this demand down to the last detail. They are supported by our state-of-the-art Application Development Centre in Unterschleissheim, Germany, where we concentrate the resources for our LINDOFLAMM® solutions. Our expertise includes:

- Burner design
- Customer R&D
- Application training
- WELDONOVA process consulting

Our highly-skilled engineering team continuously develops and evaluates new technologies. This ensures that our customers are always equipped with the latest and most innovative solutions.





## Supporting you all the way. Complete your LINDOFLAMM solution with our services.

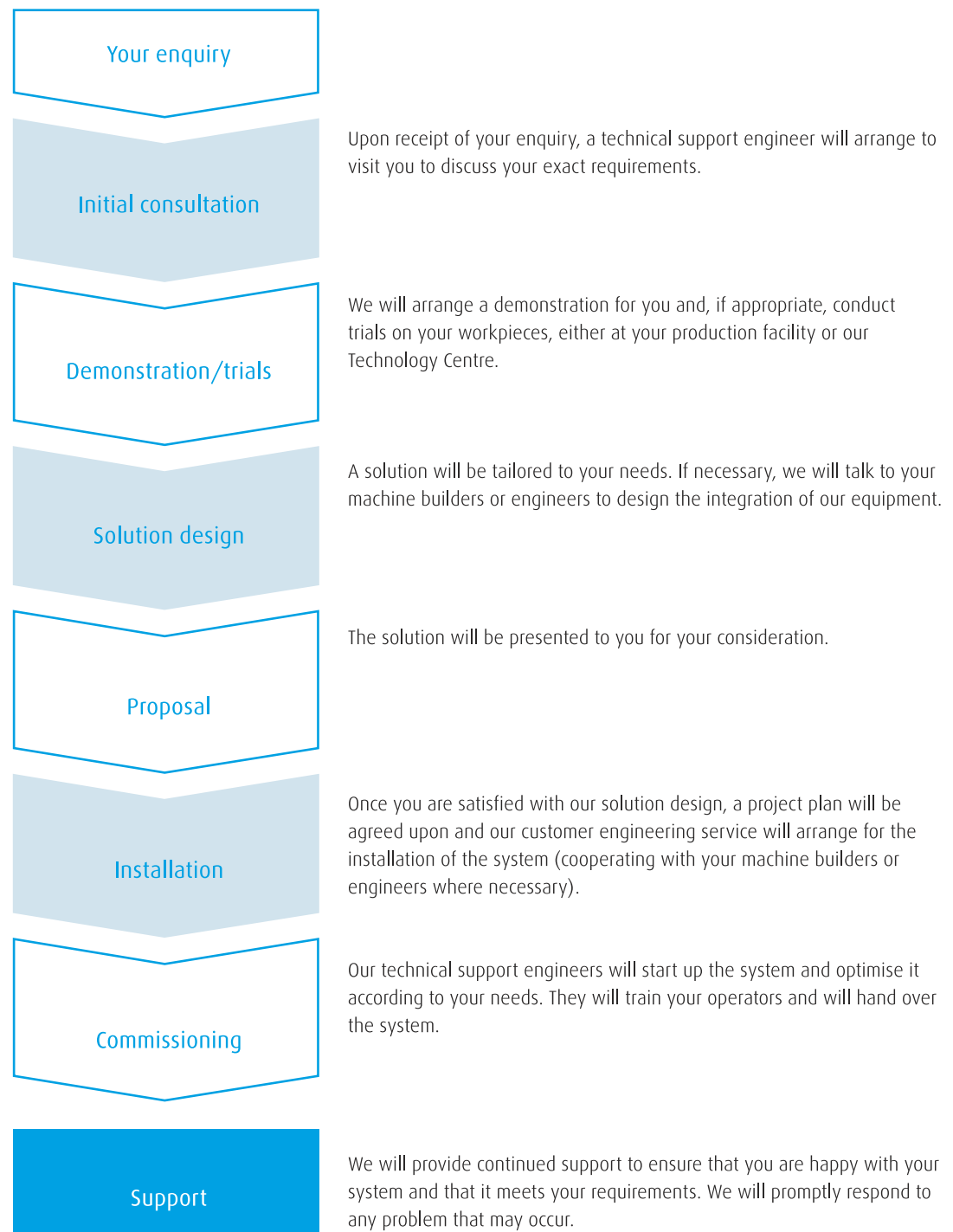
Is it difficult to integrate our LINDOFLAMM solutions into your production process? The answer is a clear no. Take advantage of our full service offer and you are just a few steps away from the perfect flame.

Our wide variety of services includes:

- Integration management
- Installation service
- Burner optimisation
- Burner maintenance and servicing
- Next-day deliveries
- Dedicated support
- Quality and safety audits
- Safety training

For further information on LINDOFLAMM, please call your local Customer Services Centre.

## Leading you from start to finish: Seven steps to a perfect flame



# Getting ahead through innovation.

With its innovative concepts, Linde is playing a pioneering role in the global market. As a technology leader, it is our task to constantly raise the bar. Traditionally driven by entrepreneurship, we are working steadily on new high-quality products and innovative processes.

Linde offers more. We create added value, clearly discernible competitive advantages, and greater profitability. Each concept is tailored specifically to meet our customers' requirements – offering standardised as well as customised solutions. This applies to all industries and all companies regardless of their size.

If you want to keep pace with tomorrow's competition, you need a partner by your side for whom top quality, process optimisation, and enhanced productivity are part of daily business. However, we define partnership not merely as being there for you but being with you. After all, joint activities form the core of commercial success.

Linde – ideas become solutions.

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