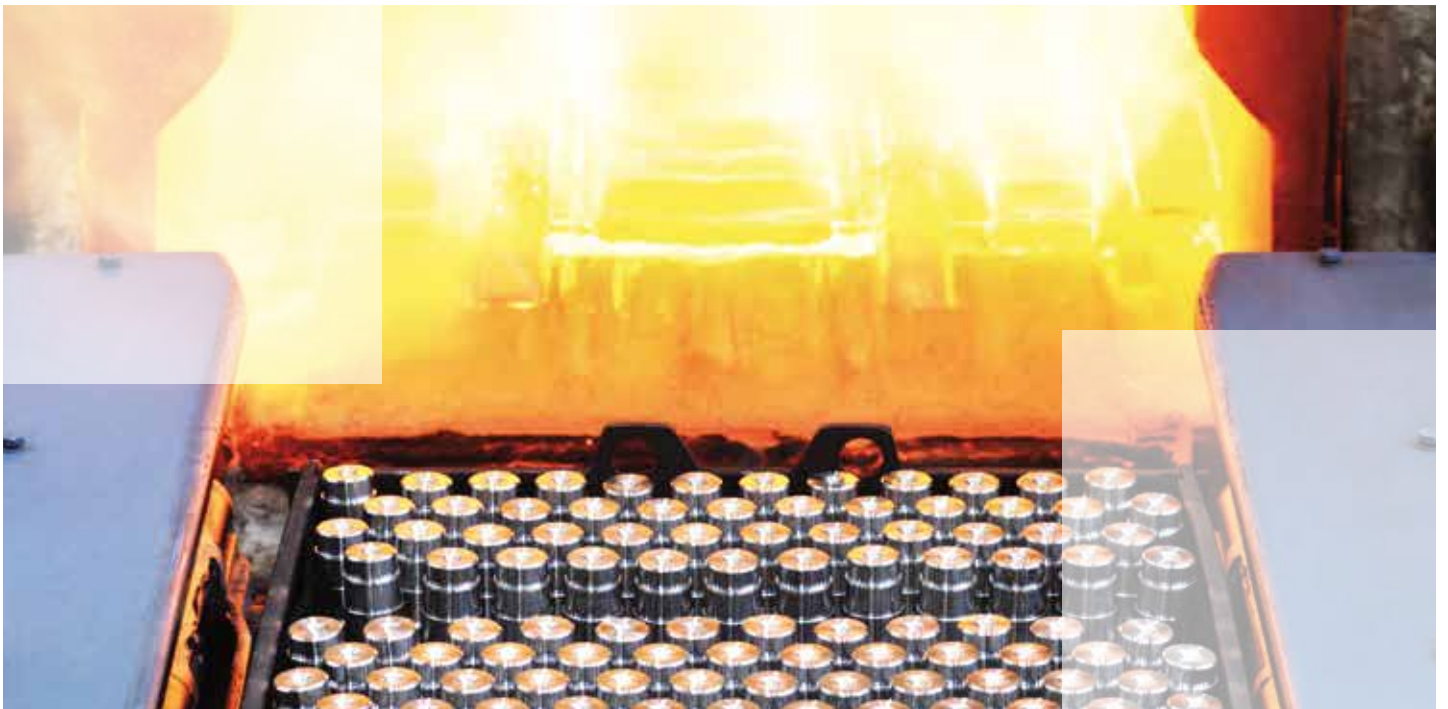




What you should know about  
Ipsen's atmosphere technology.



# So the atmosphere is correct – technically and economically.

Ipsen atmosphere furnaces are used in conventional heat treatment processes, that is to say for hardening, quench hardening and tempering, carburisation, carbon nitriding, nitro-carburisation, bright tempering and annealing. The technology involved is distinguished by its simple design and comparatively low costs.

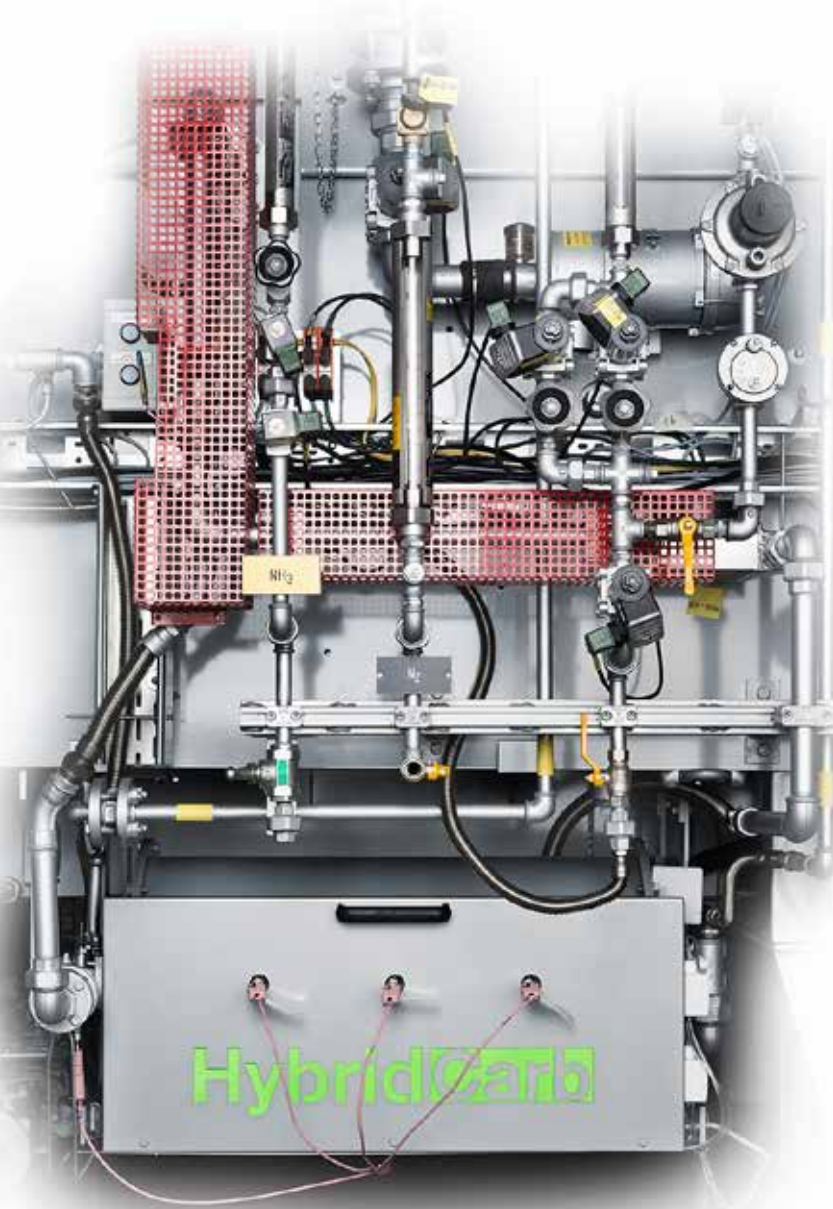
How is such an atmosphere furnace constructed and why in this way and not another? The following requirements were all important in the development of the design: First – uniform heat transfer to the charge and protection against direct heat radiation. Second – a uniform flow of the furnace atmosphere through the charge. Third – problem free operation and long furnace service life.

For the latter the most important factor is the characteristics of the furnace interior. The bricklining comprises insulating firebricks, which are suitable for temperatures well above the working temperature and are extremely durable. The arched roof is self-supporting and contains a built-in duct for the atmosphere circulator. The hearth is formed from a silicon-carbide plate – with especially large outlet openings for the gas recirculation, which ensures uniform penetration of the charge by the furnace atmosphere. The muffle which surrounds the hearth, and is likewise made from silicon-carbide, serves both to protect the charge from direct heat radiation and to promote a uniform temperature distribution in the material being hardened.

The Ipsen atmosphere furnaces are assembled from standard modules. Therefore they can easily be ideally matched to individual customer requirements.

How is an Ipsen atmosphere furnace heated? There are two alternatives available: gas or electric heating.

Integrated HybridCarb







Mixing battery and control electronics of a Recon®-heating system

a very long service life, not least because the heating elements do not come into contact with the process gases. In addition they do not cause any environmental pollution and do not cause any noise emissions.

For gas heating, the proven Ipsen Recon® burners with interior tubes made from special ceramic are used. They attain a particularly high thermal efficiency of up to 85% – not least thanks to a new type of recuperator burner, which uses the exhaust gas flow to recover waste heat. It is suitable for use with natural gas, a propane/butane mixture and LPG. It is distinguished by a low noise level and high temperature uniformity as well as a long service life, low maintenance and easy installation. Moreover the NO<sub>x</sub>-values are considerably below the permitted values for TA air.

For electric heating, Ipsen standard cage elements made from metal radiant tubes are used. They provide the highest possible heat efficiency, a high power density and uniform heat radiation. They require very little maintenance and thus have

Excellent uniformity and reproducible results ensure high productivity



# How the furnace charges are processed.

Various gassing processes are available for use in heat treatment of charges in Ipsen atmosphere furnaces. They are controlled using the Ipsen Carbon Sensor® and computer-based Carb-o-Prof® measurement and control system.

Carburisation, carbon nitriding, bright hardening and carbon-free bright annealing in multi-purpose chamber furnaces take place in carbon content-regulated atmospheres – for bright tempering in tempering furnaces, no controlled atmospheres are required.

The following gassing processes are particularly important in the above: Supercarb® air direct gassing, Endogas gassing and nitrogen-methanol gassing.

The proven Ipsen Supercarb® process is remarkable for its high efficiency and quick, uniform and reproducible carbon transfer. It works at heat treatment temperatures above 850 °C. In the process, the chamber furnace system is directly gassed using air and natural gas or another fuel, e.g. propane or alcohol (but not methanol). In comparison with other processes the Supercarb® process reduces gas consumption by up to 90 %, considerably shortens the processing time and results in an exceedingly uniform carburisation layer.

Endogas is a gas mixture of 40 % hydrogen, 20 % carbon monoxide and 40 % nitrogen as well as small fractions of carbon dioxide, water and methane. It can be used in very varied manners, e.g. with additional carbon dioxide for C-level controlled carburization, as a protective gas during bright annealing and tempering or with the addition of ammonia in nitro-carburization. In addition, endogas similar atmospheres with nitrogen-methanol gassing can also be used, but only at process temperatures above 800 °C.

Independent of which gassing type is used, hardening processes, carburisation and carbon nitriding cycles are controlled in a targeted manner by the process software Carb-o-Prof®.

The most common quenching method in a multichamber furnace takes place in an oil bath quenching-chamber. The quenching tank comprises a double-walled, insulated, steel plate housing.

Chain transport  
system of a multi-purpose  
chamber furnace





SuperQuench  
offers optimum  
quenching especially  
for low alloy steels.

Often, the quenching performance of a conventional oil bath is not sufficient, even with only slightly alloyed steels, to obtain the required properties. With the SuperQuench quenching chamber, Ipsen provides an oil bath for the heat treatment of widely varying steel grades, even slightly alloyed steels. To achieve this, the flow speed of the oil is much higher than that obtainable in conventional oil baths, due to the use of more powerful drive motors and larger circulators. Up to six motors per frequency converter can be continuously regulated – at up to four times the speed of conventional motors. In addition each individual circulator has been allocated a separate flow control system, so that the entire charge is reliably, uniformly and quickly cooled. Here also, the process software, Carb-o-Prof®, guarantees optimally adjusted control of the quenching process for all steel grades.

Here a chain conveyor system is used to lower an automatically fed in charge per hoist into the oil bath.

Symmetrically arranged circulators ensure that the hardening oil is strongly, turbulently mixed and fed via guidance channels through the charge. The process results in uniform hardening and minimal distortion. At the same time the speed of the oil circulation defines the type of quenching and with it the result of the heat treatment. It can be very flexibly controlled using the process software, Carb-o-Prof®.



Drive motors  
of the two oil circulators



# About Ipsen.

**At Ipsen, we believe that innovation drives excellence. With more than 65 years of thermal processing experience, choosing Ipsen means choosing a partner in success.**

Since 1948, Ipsen has been inventing and evolving new technologies and heat treatment processes, as well as designing and manufacturing industrial vacuum furnaces, atmosphere furnaces and supervisory control systems. The outcome of our work: energy-efficient furnaces and plant systems, as well as unrivaled products that are in demand all over the world and used by leading companies. Overall, Ipsen's international product range combines the highest performance with outstanding reliability and is used in the fields of atmosphere, vacuum, braze and sinter technology.

Additionally, Ipsen's newest 360-degree service, Ipsen Customer Service (ICS), considers every aspect of your processes and the entire life cycle of your system, thus delivering top performance and high reliability. With vast technical expertise, ICS is by your side every step of the way to success – including getting your system up and running, providing speedy service that helps prevent downtime and helping ensure your equipment is optimized to take the lead.

Ipsen's sophisticated industrial furnaces and equipment are developed for a wide variety of thermal processing markets, including: Aerospace, Automotive, Commercial Heat Treating, Industrial Machinery, Medical, Tools and Wind Power. With production locations in Europe, America and Asia, along with representation in 34 countries, Ipsen is committed to providing support for customers worldwide.



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