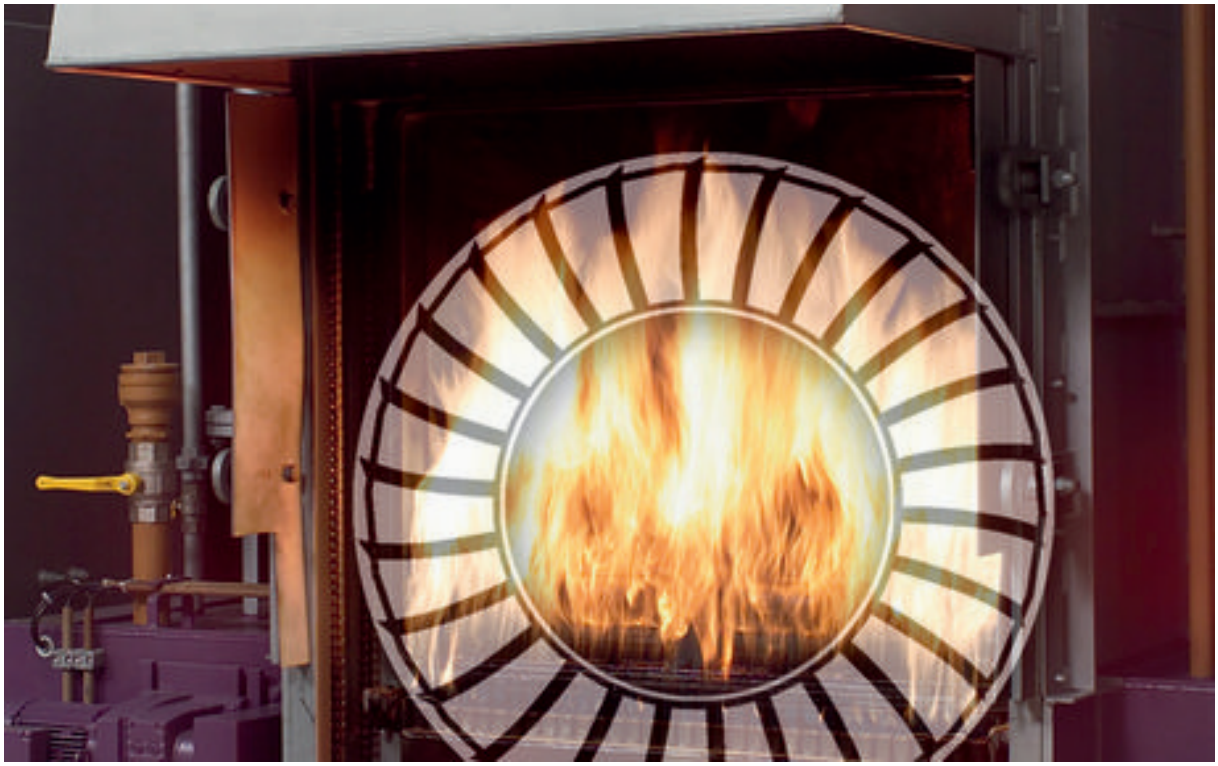


More efficient carburisation

Hydrocarb – reducing the surface oxidation depth during tempering and case hardening of steels

When tempering and case hardening steels, it is essential to reduce surface oxidation during heat treatment and thereby increase wear resistance. Modern plasma and low-pressure carburisation systems allow the oxidation depth to be reduced to a minimum. However, for those who are not prepared to invest in a new system but would rather use existing resources, this variable gas technology is the ideal option. The alternative is to use the existing furnace installations (multi-purpose chamber furnace and/or retort furnace) in combination with endogas. The disadvantage with this process is that its high carbon monoxide content of approximately 20% vol. CO causes surface oxidation of the alloying elements chromium, manganese and silicon.

Minimal oxidation potential

To limit the effects of such "internal oxidation", so to speak, it is necessary to reduce the oxygen content in the furnace atmosphere to a tolerable level. This is only possible when using a low-carbon-monoxide gas. It is this that forms the basis for the Hydrocarb process developed by Messer, which uses a gas mixture consisting of nitrogen (N_2), hydrogen (H_2) and a hydrocarbon (C_xH_y), usually propane. The maximum carbon monoxide content is three per cent by volume, which means that hardly any oxygen is injected into the furnace, thereby minimising the extent of surface oxidation. The degree of carburisation is comparable to that of endogas.

The heat treatment determines the application properties.

Optimal process control

The composition of the protective gas used in the Hydrocarb process is based on requirements. The process is monitored by sensors and controlled in line with individual preferences: if the carburisation requirement is greater, more propane is added to the furnace atmosphere.

What the experts think

The Hydrocarb process from Messer is the right choice for those who want to increase the tempering and carburisation performance of existing furnace installations while keeping investment costs comparatively low. Gas purge time and volume can be adjusted as required. The oxygen activity in the furnace is in the subcritical range at all times, thereby preventing surface decarburisation.

Your benefits at a glance

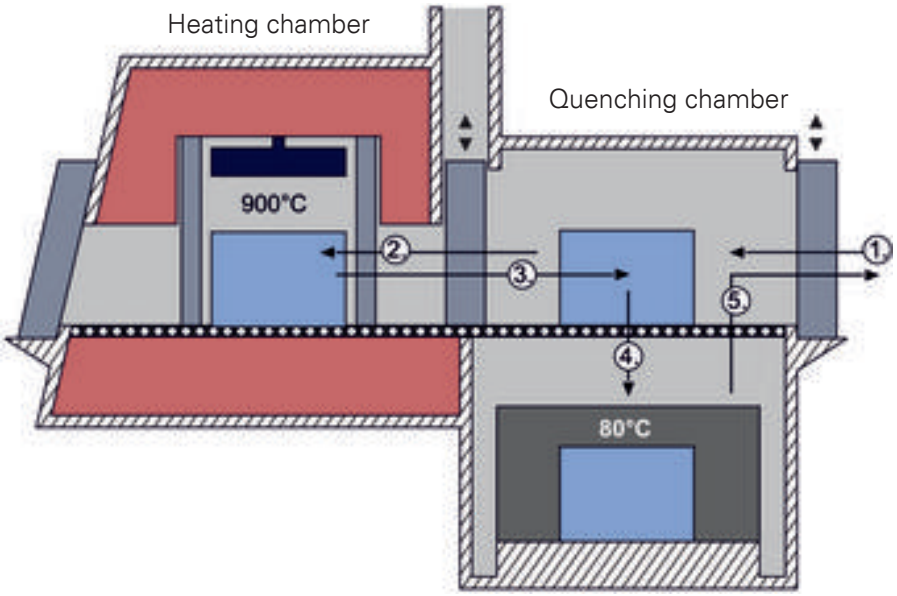
- Rapid heating due to a hydrogen-rich furnace atmosphere
- Uniform heating due to greater thermal conductivity and capacity of gas phase
- Low CO_2 emissions
- Degree of surface oxidation can be determined indirectly with oxygen probe
- Heating phase monitored by integrated oxygen probe
- High carburisation speed
- Easy adjustment of carbon level in hydrogen/propane atmosphere
- Case hardening, tempering and carbonitriding with low surface oxidation
- Carburisation of thin components in ferrite/austenite range possible
- Chromium-rich alloys can be carburised or sintered without the formation of a passivation layer (Cr_2O_3)

Please do not hesitate to contact us if you have any questions regarding the Hydrocarb process or would like to arrange a personal consultation with our application experts.

Contacts in your country can be found at:

www.messergroup.com/de/Standorte

This and many other brochures can also be downloaded from the Internet in PDF format: www.messergroup.com



Processes in the furnace installation:
1. Batch enters the quenching chamber (heating and quenching chambers are purged of air)
2. Batch enters the heating chamber (batch is heated and carbon level adjusted)
3. Batch enters the quenching chamber
4. Batch is quenched in the quenching/hardening oil bath
5. Batch is removed from the quenching chamber

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