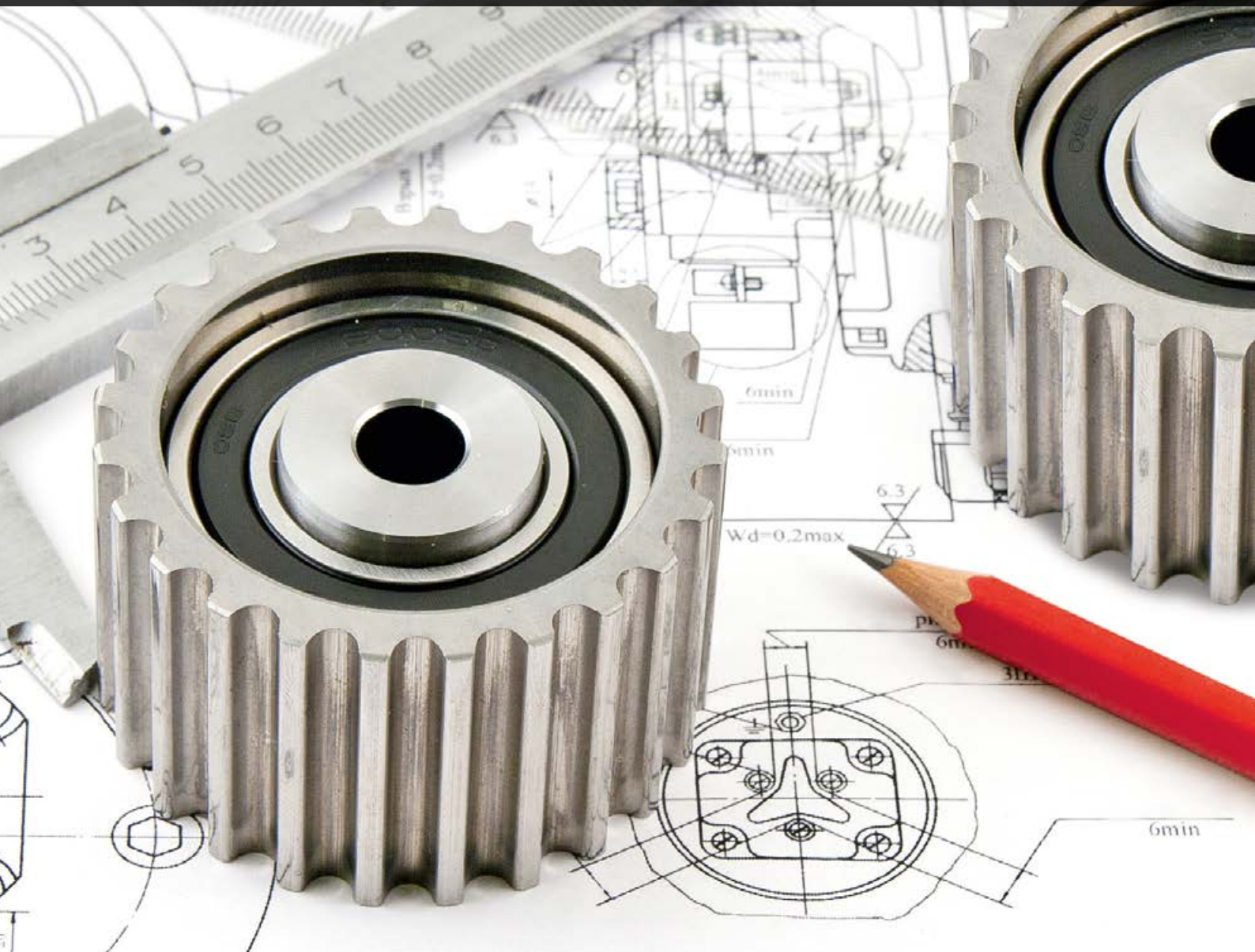


**ALD Vacuum Technologies**  
High Tech is our Business



# LPC-Engineering-Service

Your R&D partner for the case hardening  
of gear components





## High Tech is our Business

ALD is the global brand for innovative vacuum technology at the highest level. As one of the leading suppliers for vacuum systems and process technology we are serving the entire field of vacuum metallurgy and vacuum heat treatment with our high tech products and services.

### Technology, which makes an impact

Thanks to its advanced concepts, ALD Vacuum Technologies offers its customers individual solutions to achieve the best economic performance. New process technologies are improved constantly in ALD's own heat treat service centers. ALD has achieved the leadership position in global competition by applying an effective product and quality management approach. Maintaining our high standard in equipment and process technology, enables us to offer a broad field of engineering services.

### A complete service, which is unique

Given our longstanding experience in the design of heat treatment systems, we are familiar with a wide range of applications. The equipment and process technology is being optimized constantly. Over the decades, a wide range of know how and experience has been gained. If competent consultancy for case hardening of gear components is wanted, if heat treat processes need to be laid out in detail, if fixturing needs to be developed – our team of process specialists can support you. In our competence center in Germany and in our heat treat service center in Port Huron (USA) we offer the latest furnace equipment technology. We are processing prototypes, run-off quantities and original production loads. The LPC-Engineering-Service from ALD is unique in its field.

### Results, which create value

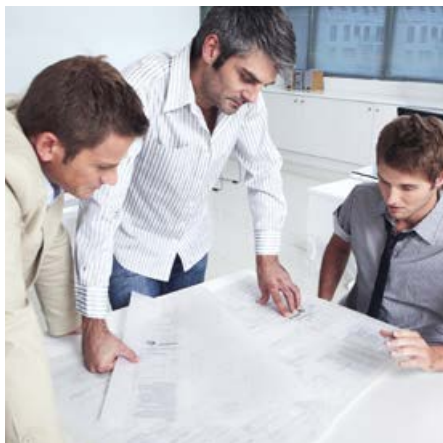
If you rely on our expertise to develop recipes, which are specifically targeted for your components your economic numbers will improve, if distortion is minimized, the costs of your total manufacturing chain are reduced substantially. Optimizing furnace recipes can improve your production capacities and the optimize use of media consumption (energy, gases etc.) which provides solid support for a planning of your future production. Additionally, ALD offers production support in your production facilities during the start of production. By using the LPC-Engineering-Service from ALD, you gain robust processes without the additional investment in human resources.

# ALD – leadership in technology

ALD Vacuum Technologies is the recognized leader in the application of vacuum case hardening. The process technology and the systems for Low Pressure Carburizing (LPC) and for High Pressure Gas Quenching (HPGQ) have been continually improved over the years. Today the process is globally established as one of the standard technologies for the automotive industry.

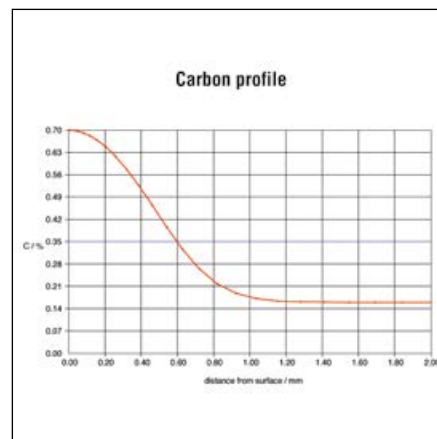


## Know how



You can exploit our engineering know how to optimize your processes in heat treatment.

## Process development



- Process development for case hardening by using the most advanced technology (Low Pressure Carburizing LPC combined with High Pressure Gas Quenching HPGQ)
- Optimization of microstructure and hardness profile
- Reduction of distortions
- Development of robust processes which are ready for industrial implementation

## Design of fixtures



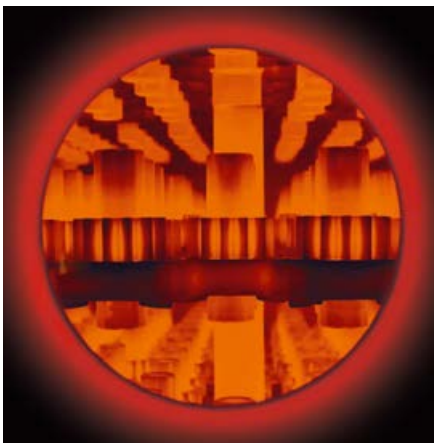
- Optimized for value creation (highest density of components in the load)
- Optimized for distortion control (adapted to part geometry to reduce heat treat distortion)

# LPC-Engineering-Service

More than 15 years of experience in the application of the process technology, extending the opportunities for vacuum case hardening of gear and motor components. With our extensive experience we can provide technical consulting and engineering services at the highest level.

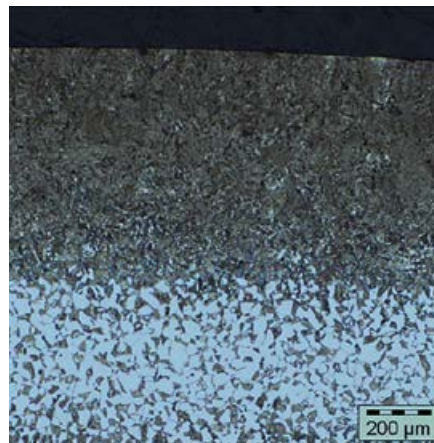


## Prototype treatment



- Treatment from small quantities up to full production quantities (by using full-scale industrial furnaces)
- Treatment of prototypes, run-off parts and original production loads to secure the start of production

## Documentation



- Complete documentation (process parameters, load maps, metallurgical analysis etc.)

## Transfer



- Training for design engineers, planning engineers, process engineers and furnace operators
- Transfer into industrial production
- Process and production support at the customer's premises

# Competence, you can rely on

Our engineers and process specialists support you as a competent partner to develop customized solutions which are targeted for highest economic performance.



## Competence and resources

- Longstanding experience in vacuum heat treatment
- Specialized know how in process technology and quality control
- Qualified team of R&D engineers
- Vast experience in serial production. In ALD's own heat treat service centers more than 100 million motor components have been case hardened since 1999 and more than 5 million gear boxes were case hardened since 2006
- Simulation of LPC-processes with a special software developed by ALD
- Competence center in Germany with most advanced heat treat systems ModulTherm® and SyncroTherm® in full industrial scale
- Heat treat service center in Port Huron (USA) with 6 full lines of the most advanced heat treat system ModulTherm®
- Application of precise sensors and advanced tools for process analysis
- Large material data-base for case hardening steels as well as quench and temper steels
- Large component data-base

A selection of ALD's engineering partners:



**LPC-Engineering-Service**



## Interested in more information?

We would be glad to provide more details about the business activities of the LPC-Engineering-Service of ALD. Please contact us!

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