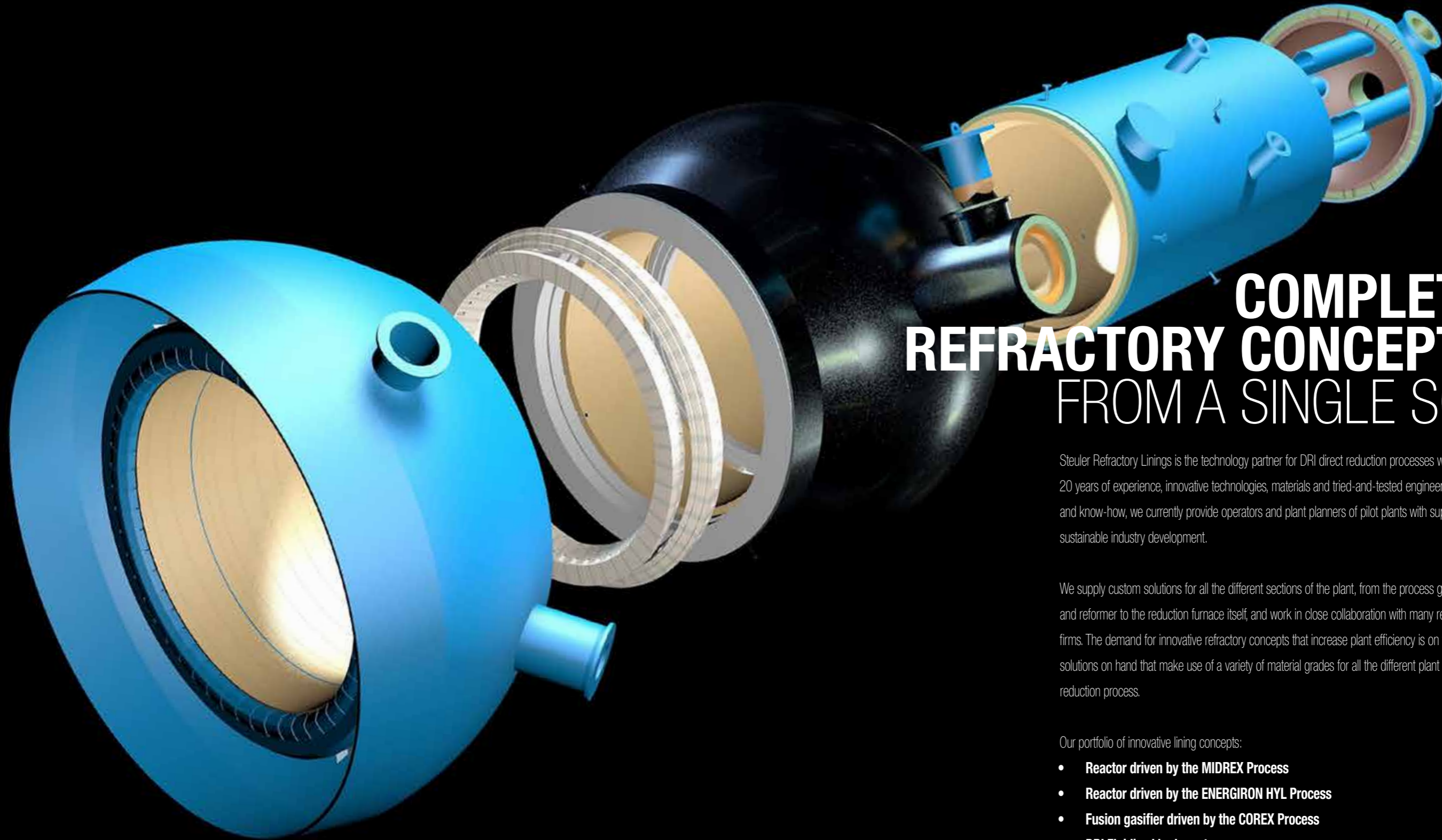




STEULER Refractory | Linings

REFRACTORY TECHNOLOGY FOR
**DIRECT REDUCTION
PLANTS**

FOCUS ON PERFORMANCE



COMPLETE REFRACTORY CONCEPTS FROM A SINGLE SOURCE

Steuler Refractory Linings is the technology partner for DRI direct reduction processes worldwide – with more than 20 years of experience, innovative technologies, materials and tried-and-tested engineering. With continuous advice and know-how, we currently provide operators and plant planners of pilot plants with support and solutions for this sustainable industry development.

We supply custom solutions for all the different sections of the plant, from the process gas and air heating equipment and reformer to the reduction furnace itself, and work in close collaboration with many renowned plant engineering firms. The demand for innovative refractory concepts that increase plant efficiency is on the rise. We have individual solutions on hand that make use of a variety of material grades for all the different plant equipment used in the direct reduction process.

Our portfolio of innovative lining concepts:

- **Reactor driven by the MIDREX Process**
- **Reactor driven by the ENERGIROH HYL Process**
- **Fusion gasifier driven by the COREX Process**
- **DRI Fluidized bed reactor**
- **Reduction gas line**
- **Feed bins**
- **Melter**
- **Reformer**

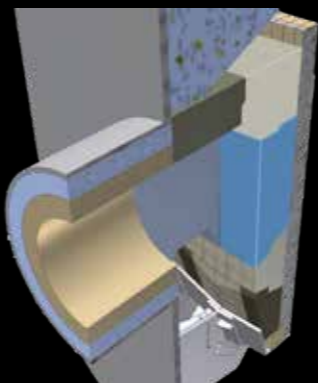
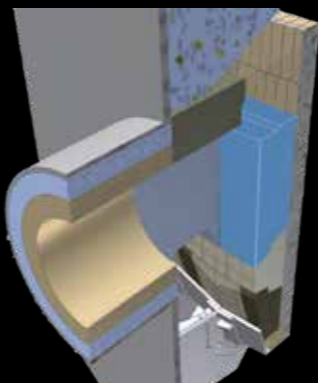
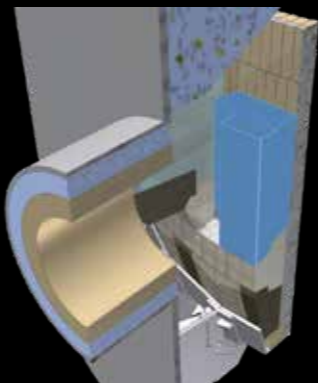
Competence, efficiency, durability, resistance, product life: values that define performance for us! To live up to this standard, we direct our primary focus on the continuous advancement of our refractory linings while at the same time keeping an eye on improving our DRI customers' production processes as well as the maximum availability of the systems to be lined. Steuler Refractory Linings supplies engineering, linings and installation for all state-of-the-art DRI processes.



Pre-assembly of gas inlet nozzles, made out of special mullite/corundum material



Assembly of gas inlet area with special tongue and groove bricks

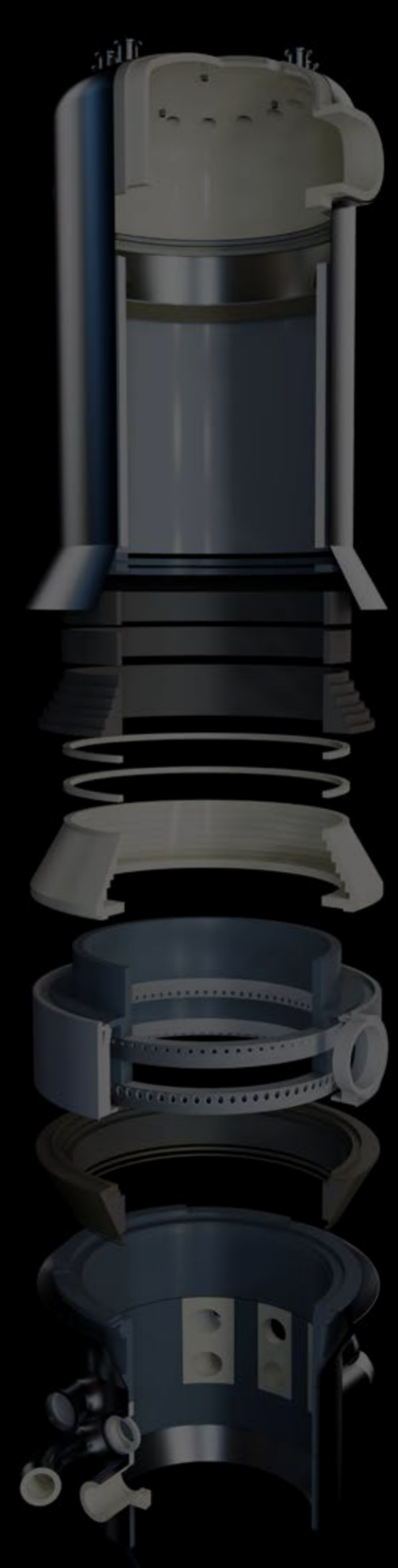


DETAILED ENGINEERING IN EVERY STEP

Every DRI plant has individual challenges! Steuler Refractory Linings is used to develop tailor-made linings. We don't want to offer just any refractory solution – together with our customers we want to develop the perfectly fitting solution for your production processes. Our in-house engineering service includes:

- Detailed installation drawings
- Single brick drawings
- Expansion calculations
- Load calculations
- Heat-transfer calculations
- Detailed installation instructions
- Finite elements analysis
- Heating-up recommendation

Above: Detailed installation instruction for casting of cooling gas outlet duct



H₂ CHANGE

REFRACTORY TECHNOLOGIES TO MASTER
THE CHALLENGE OF H₂ ATMOSPHERE

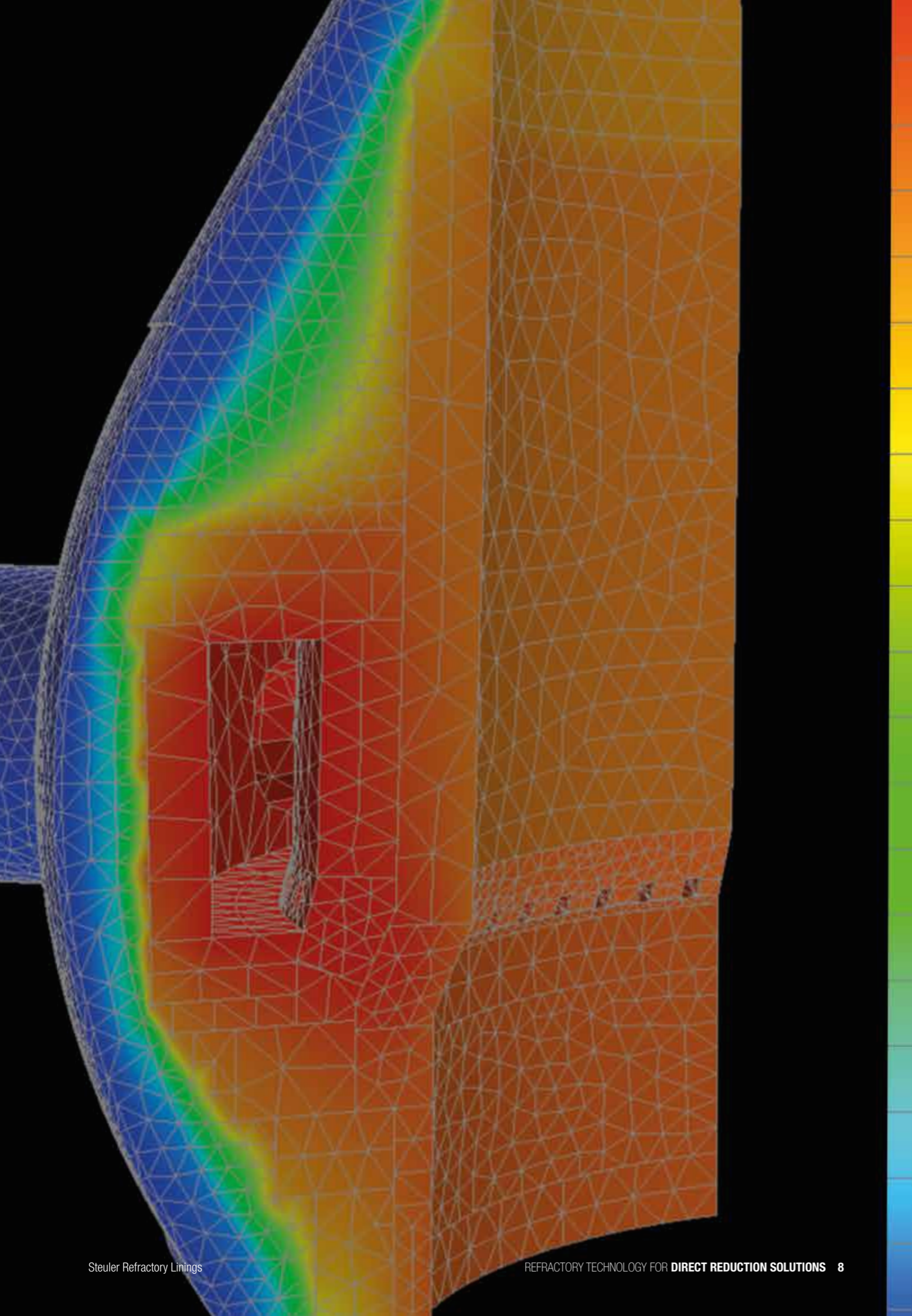


Our modern industrialised society is focussing on a new challenge regarding our own living environment. Therefore, a change in mind and a change in economy is unavoidable. We can call this a global green deal as a basis for a sustainable economy.

To reach this target the emissions of greenhouse gases have to be reduced. Consequently, a lot of transformation of industrial processes are needed, especially the decrease of emissions in the iron and steel industry gets into the focus, mainly

the traditional blast furnace process. As a greener alternative, the direct reduction process will be one of the major production routes for iron and steel in the future. Towards a fossil free future, Steuler Refractory Linings is your constant and reliable partner for the required transformation process. Whether using the traditional reformed natural gas for the reduction of iron, hydrogen boosted coke oven gas in an integrated steel plant or pure hydrogen - Steuler can offer a wide range of different refractory materials, perfectly fitted for our customer's transformation process.

Especially for tomorrow's fossil free DRI processes Steuler developed a new series of hot face brick material for the lining of DRI shaft furnaces – **the H-IRON series**.



PERFORMANCE MATERIALS FOR MAXIMUM PLANT AVAILABILITY

Steuler produces in state-of-the-art production facilities in Germany with a large degree of automation. However, we also produce special parts like the Bustle Blocks in the style of a manufacture. We engineer and build our own moulds so we can realize even the most complicated geometries quickly and effectively.

For DRI shaft furnaces we supply lining concepts with:

- **High resistance against abrasion caused by sliding pellets in DRI shaft furnace**
- **Excellent reduction resistance in CO and H₂ atmospheres**
- **Same time good thermal shock resistance especially for the bustle port blocks**

We also advise engineering companies and operators on how to increase the efficiency and safety of the required production units and on the engineering details that help avoid risks and potential damage. We are a supporting partner and an experienced consultant that optimizes plant design and layout along with the lining concept to boost productivity and potential damage by adjusting the detail-engineering.

THE SUITABLE MATERIAL FOR EVERY APPLICATION

It takes specific development departments to create comprehensive refractory solutions that are optimized for your needs. This is the only way the materials can be adjusted to the specific process requirements as basis on which individual material concepts are defined or developed. From the careful selection of raw materials and comprehensive production monitoring all the way to wear and slag resistance analyses based on the respective operation parameters of the plant – our professional development and application engineers are part of the project implementation from the get-go.

SUPERVISION AND INSTALLATION WORLDWIDE

- More than 300 experienced refractory installers are part of the Steuler Group – they are ready to install your made-to-measure lining.
- On your demand, exclusively experienced Steuler specialists carry out technical consultations and supervision of third party installation crews. Also technical seminars and pre-installation trainings are offered.
- Steuler operates its own tool distribution and maintenance center in Germany. All tools are based on latest technology and HSE standards.
- We continuously train, qualify and develop our installation crews – we are dedicated to supply cutting-edge installations.

REFRACTORY MANAGEMENT – WE DELIVER SAFETY

Steuler offers competence and performance across all supply levels and processes – we keep the bigger picture in mind whilst also not losing sight of the special details, from the first consultation through to delivery, supervision and installation. Our customers always have a strong team on hand for all project levels.

This team plans and coordinates the qualified implementation, agreements and details for the production. They provide the specifications for professional control of all factors, so that made-to-measure linings can be installed precisely.

STEULER - MORE THAN JUST REFRACTORIES



STEULER

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