IMPORTANCE OF HEAT RECOVERY IN GASIFICATION PLANTS

SCHMIDTSCHE SCHACK | ARVOS GROUP

Bruno Bülow

Gasification India 2016 / February 11 - 12, 2016 / New Delhi, India

NEW OWNER & NEW NAME

In 2014, Triton, a private equity group, has taken over Alstom's Auxiliary Components business consisting of three divisions with approximately 1,500 employees and revenues of about 500 million Euro.

The name changed – excellence remains

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COMPANY HISTORY

2014 Triton acquires Alstom's Auxiliary Components business

ALSTOM Power Energy Recovery GmbH

2001 ALSTOM Power Air Preheater GmbH merges into ALSTOM Power Energy Recovery GmbH

ABB ALSTOM POWER SHG GmbH

2000 merger of the power sectors of Alstom and ABB

ALSTOM Energy Systems SHG GmbH

1998 GEC ALSTHOM listed at the stock exchange in London, Paris and New York

GEC ALSTHOM SHG-SCHACK

1995 merger of SHG with SCHACK into SHG-SCHACK GmbH

+

1931 REKUPERATOR SCHACK GmbH

GEC ALSTHOM Schmidt'sche Heissdampf-Gesellschaft mbH

1989 acquisition of the EVT-Gruppe by GEC ALSTHOM

1979 acquisition by EVT Stuttgart

1956 acquisition by DIDIER AG

1910 Founding of Schmidt'sche Heissdampf -Gesellschaft mbH

FROM KASSEL
WORLDWIDE SUCCESSFUL

ARVOS GMBH | SCHMIDTSCHE SCHACK

350 employees, order intake more than 150 Mio.€/a

Own fabrication in Kassel, Germany

SCHMIDTSCHE SCHACK
PROCESS HEAT TRANSFER

INDUSTRIAL HIGH-PRESSURE/HIGH-TEMPERATURE PROCESSES

PROCESSES	HEAT TRANSFER SOLUTIONS
Ethylene	Transfer Line Exchangers
Gasification	Syngas Coolers (Radiant + Convective)
SNG Methanation	Waste Heat Recovery Systems including Steam Superheaters
Ammonia, Methanol, Hydrogen	Process Gas Coolers, Convection Banks, Fired Heaters, HP Superheaters
Carbon Black	CB Air Preheaters, Quench Boilers, Tailgas Boilers, Rotary Dryers
DRI Metallurgy	Convection Banks
Nitric Acid/Caprolactam	Waste Heat Recovery Systems
Various	Fired Heaters, Waste Heat Boilers for FCC Units
Municipal Sludge Incineration	Waste Heat Recovery Systems
Collaboration with process developers in R&D and engineering for new processes	Solutions, Sophisticated Process Components

SCHMIDTSCHE SCHACK | ARVOS GMBH
LEADER IN TECHNOLOGY

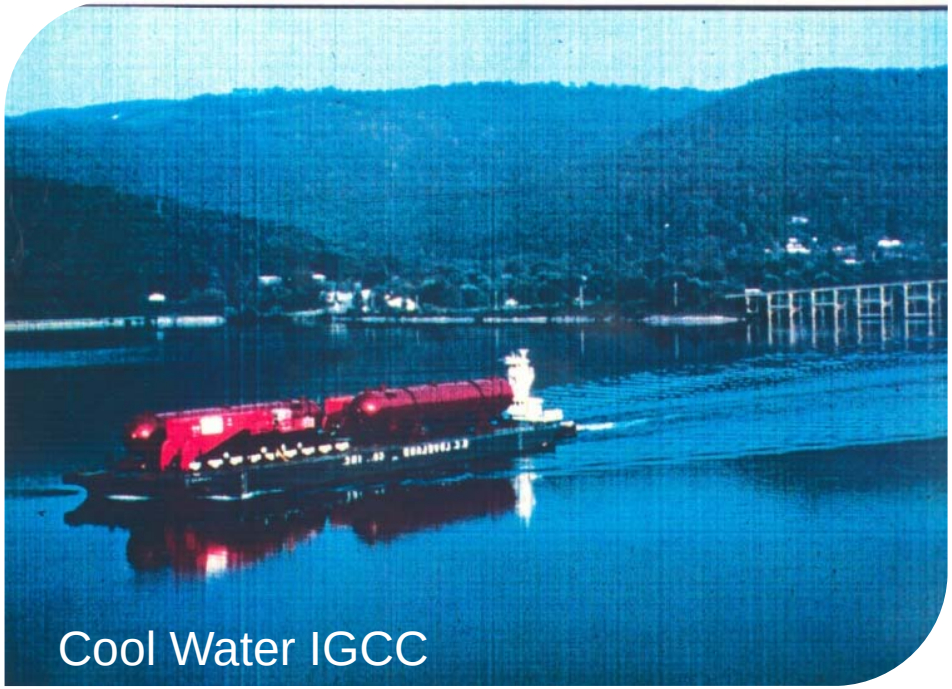
SCHMIDTSCHE SCHACK HAS SUPERIOR EXPERTISE IN PROCESS HEAT TRANSFER TECHNOLOGY FOR CHEMICAL, PETROCHEMICAL AND METALLURGICAL REACTION PROCESSES

e. g. ethylene production

- **Unique product platform:** Oval header/double tube design
- Rapid crack gas cooling to freeze chemical reaction and stabilize the formulated ethylene
- Additional achievement: process heat recovery improves efficiency of the process/plant

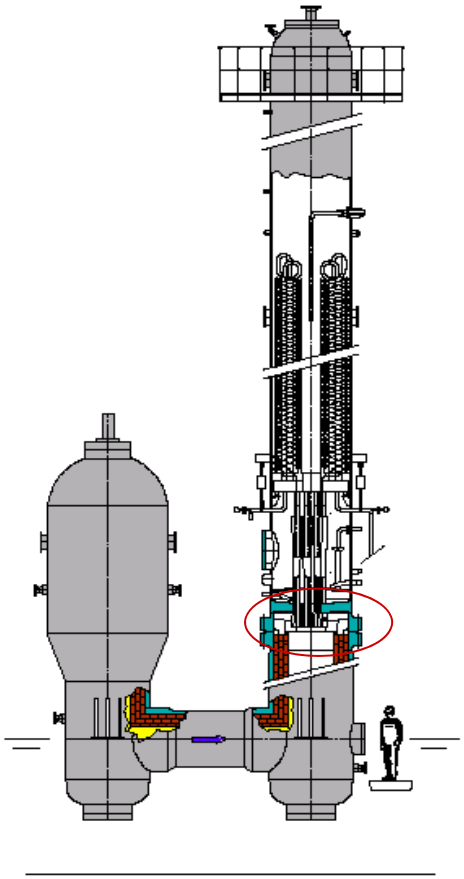
SCHMIDTSCHE SCHACK´S APPARATUSES ARE INTEGRAL COMPONENTS OF PRODUCTION PROCESSES AND IMPROVE THE EFFICIENCY OF THE PLANT OPERATION

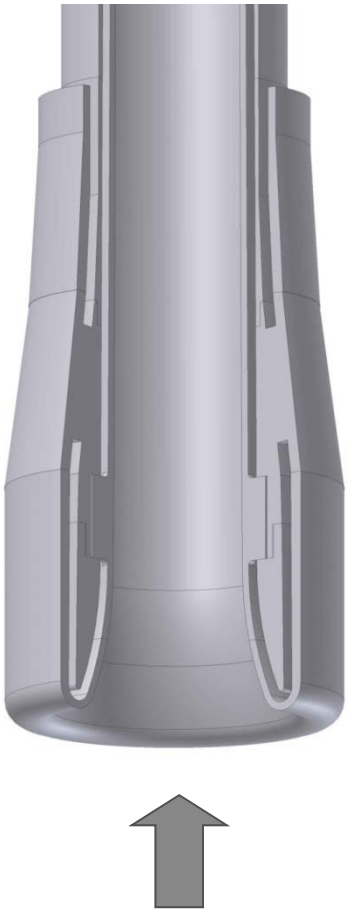
RADIANT SYNGAS COOLER REFERENCES


Cool Water IGCC

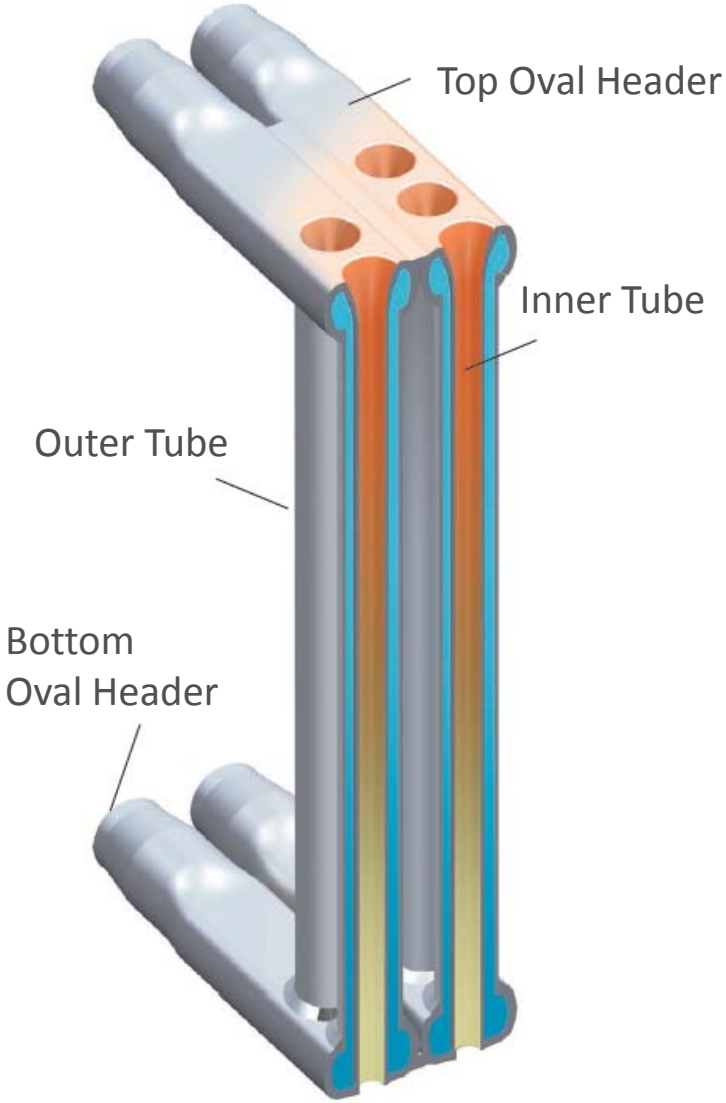

Tampa 270MW IGCC

SYNGAS COOLER FOR PARTIAL OXIDATION





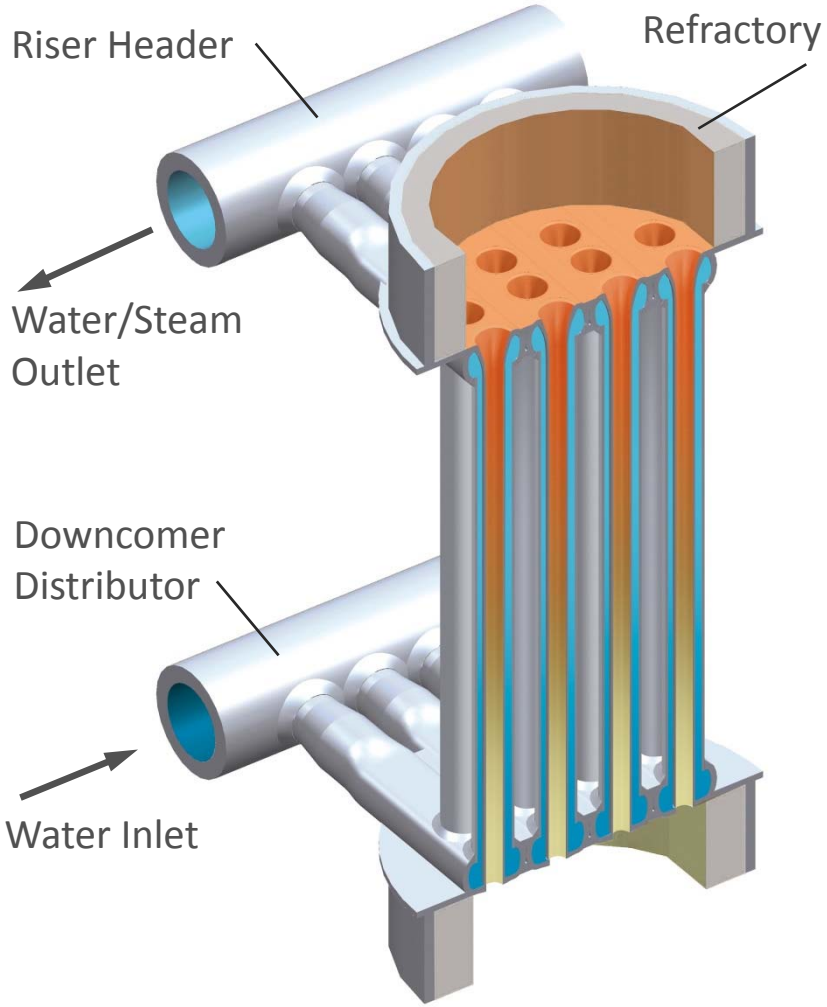
SCHMIDT‘SCHE®
OVAL HEADER/ DOUBLE TUBE DESIGN



Design Principles - Double Tube

- Well-defined flow paths on both sides
- Intensive cooling of each tube
- Straight tubes
- Vertical downflow
- Low water volume for faster response to load variations

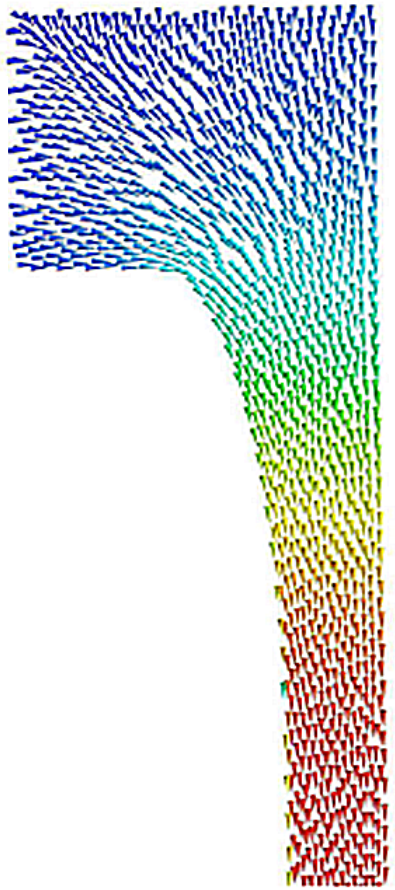
SCHMIDT‘SCHE®
OVAL HEADER/DOUBLE TUBE DESIGN



Special Features

- Gas inlet temperature up to 1.600 °C
- Applicable for high gas and dust load
- Resistant against erosion on tube inlet
- No ferrules

SCHMIDT‘SCHE® OVAL HEADER/DOUBLE TUBE DESIGN



Gas Flow Pattern

Funnel-tube inlets guarantees an equal gas distribution into each individual tube

- Low turbulence
- No gas recirculation
- Limited erosion rate
- No temperature peaks

SCHMIDT‘SCHE®
OVAL HEADER/DOUBLE TUBE DESIGN

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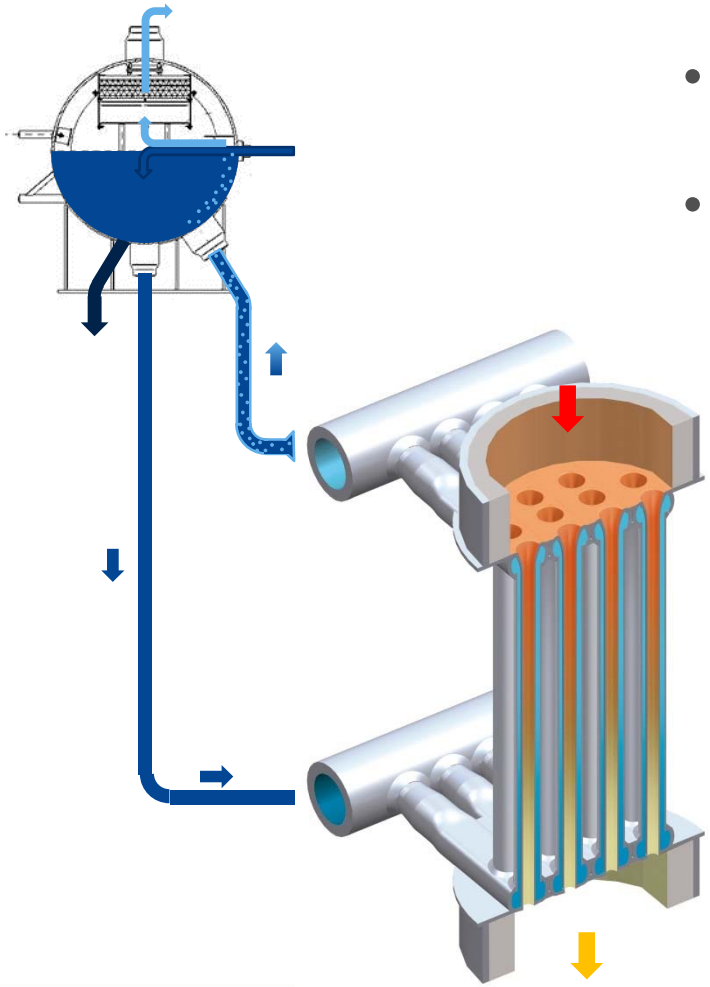
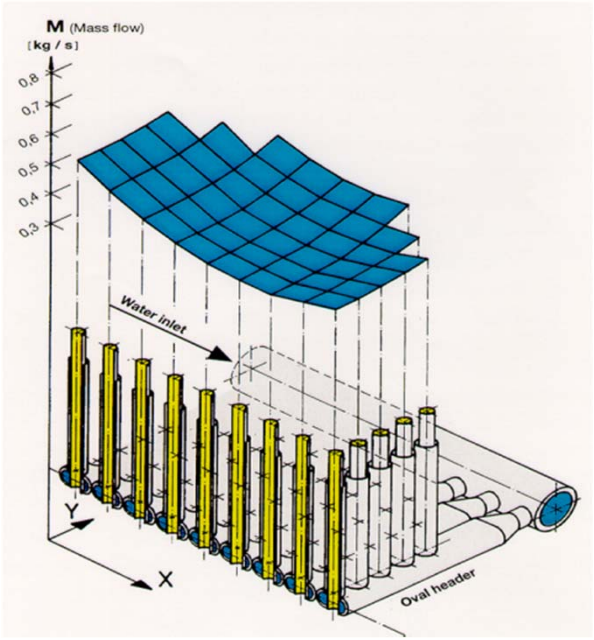
Steam/Water Side Circulation



- Natural circulation
- The overall mass flow through the system is limited by the pressure drops



SCHMIDT‘SCHE®
OVAL HEADER/DOUBLE TUBE DESIGN

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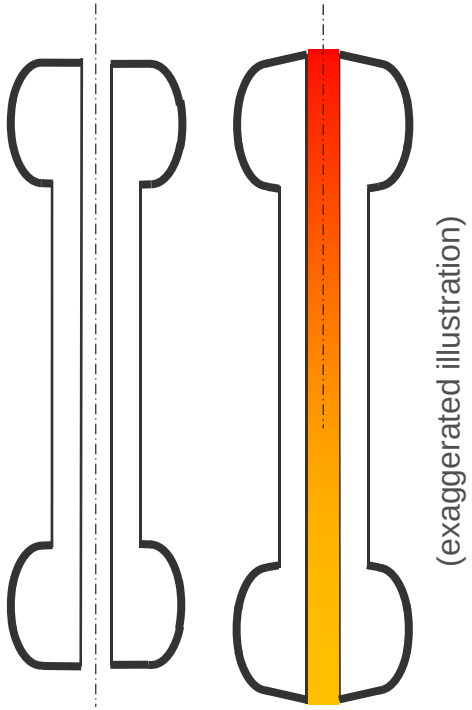
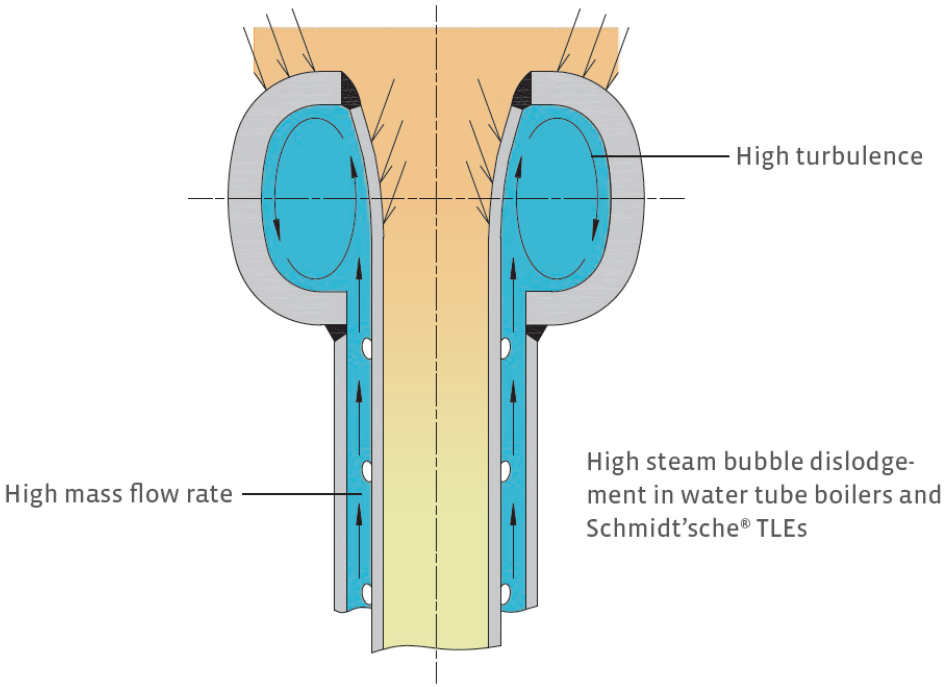
Design Principles – Oval Header: Flexible Member



- Mechanical and thermal stresses are reduced by using thin-walled oval headers and tubes
- Thin-walled systems are more flexible and temperature gradients across the wall thickness are lower
- Protecting the magnetite layer by mitigating and/or eliminating high thermal and mechanical stresses

SCHMIDT‘SCHE®
OVAL HEADER/DOUBLE TUBE DESIGN



Long Lifetime

- High flow velocities
- Short residence time
- High dislodgement frequency
- Low temperature amplitudes

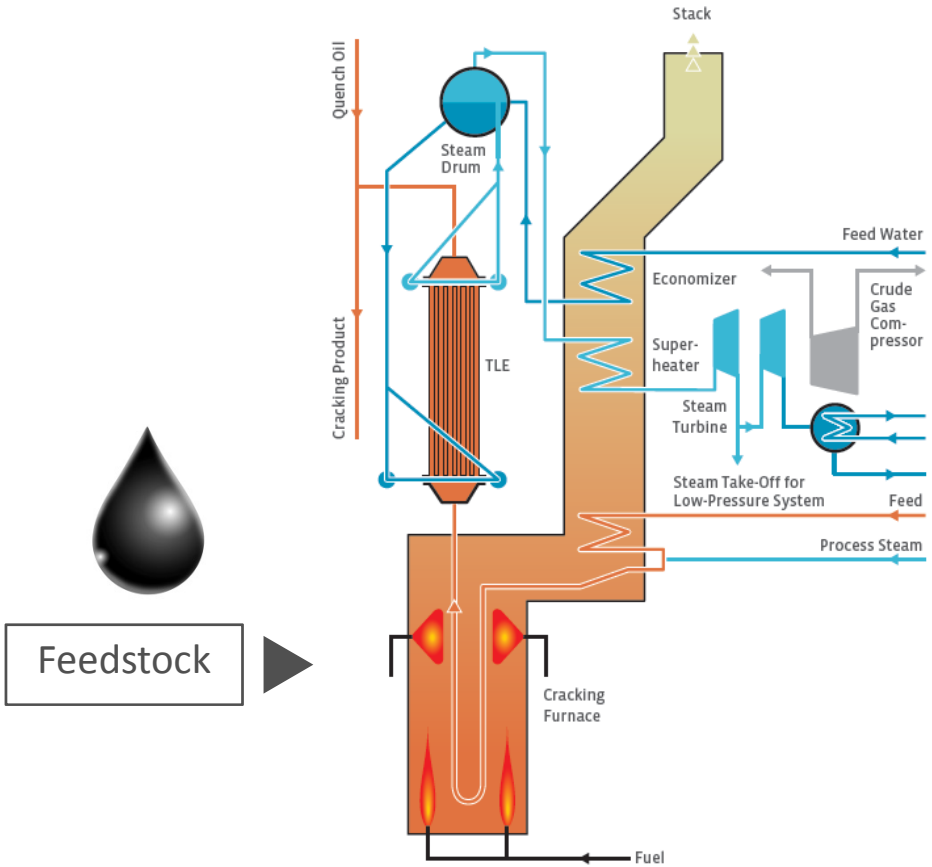
SCHMIDT´SCHE® SYNGAS COOLERS
BIGGEST GASIFICATION PLANT WORLDWIDE

Reference: Jamnagar

- 10 Schmidt'sche® Syngas Coolers ordered for the world's biggest gasification plant under construction in India
- Biggest and heaviest Syngas Coolers ever built
- Feedstock: Petcoke/Coal
- Gasification process: CB&I (E-Gas)
- Each syngas cooler has a transportation weight of 700 t and a length of 45 m
- Start-up in 2016

SCHMIDT'SCHE®
OVAL HEADER/DOUBLE TUBE DESIGN
FOR ETHYLENE PRODUCTION

SCHMIDTSCHE SCHACK | ARVOS GROUP



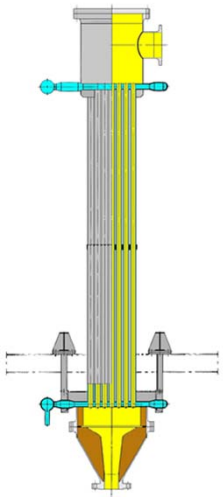
Ethylene

60 % of the globally produced plastics are generated by means of Schmidt'sche® Transfer Line Exchangers - 7.000 TLEs delivered

SCHMIDT‘SCHE®
OVAL HEADER/DOUBLE TUBE DESIGN

SCHMIDTSCHE SCHACK | ARVOS GROUP

Based on SCS‘s success in manufacturing 7000 Schmidtsche ® oval header/ double tube heat exchangers for ethylene plants, SCS has also been applying this design for syngas coolers for gasification processes.



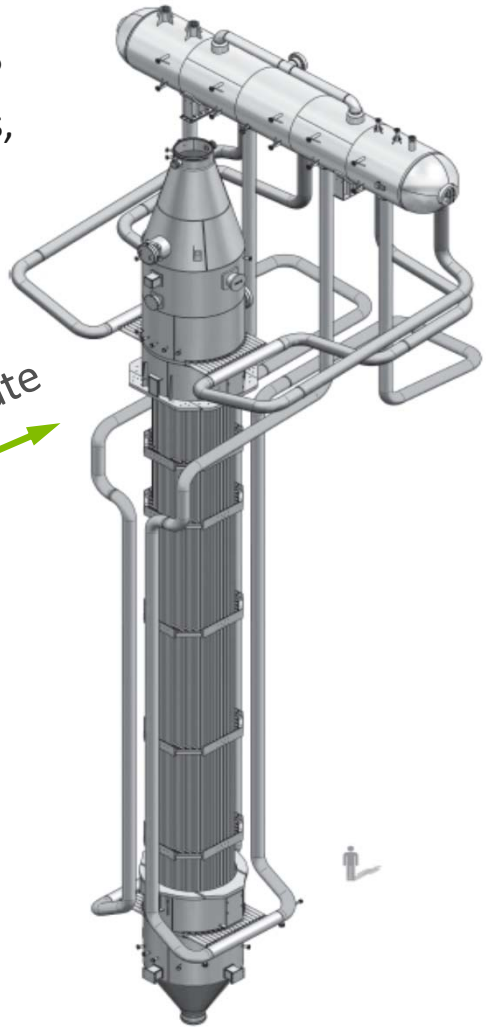
Gas pressure / Gas analysis

Special-shaped tube inlet / low erosion rate

Gas inlet channel geometry

Circumferential tube welds

Weld overlay / tube sheets



RETROFIT AND DESIGN STUDIES

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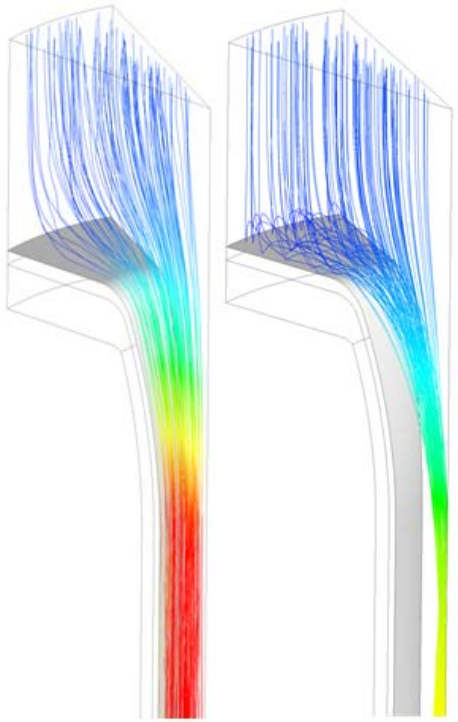
IMPROVEMENTS FOR EXISTING GASIFICATION PLANTS



Retrofit and Design Studies

- Analysis of bottlenecks via recalculation
- Improvement of efficiency and reliability
- Reliable information for financial planning
- Ensuring overall success of a project

SCS's experts are pleased to share their experience with plant owners and operators to identify ways of optimizing the operation of their process heat recovery systems.

SUMMARY

- SCHMIDTSCHE SCHACK has more than 50 years experience in the design and fabrication of Syngas Cooling Systems for gasification processes
- Well-proven, best fitting and optimized heat transfer solution will be selected and offered for any kind of gasification process
- Design studies support the project from the very first beginning to find the optimal solution
- Design, Engineering, Manufacturing and Project Management is in one hand and thus warrants the overall success

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THANK YOU FOR YOUR ATTENTION!

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