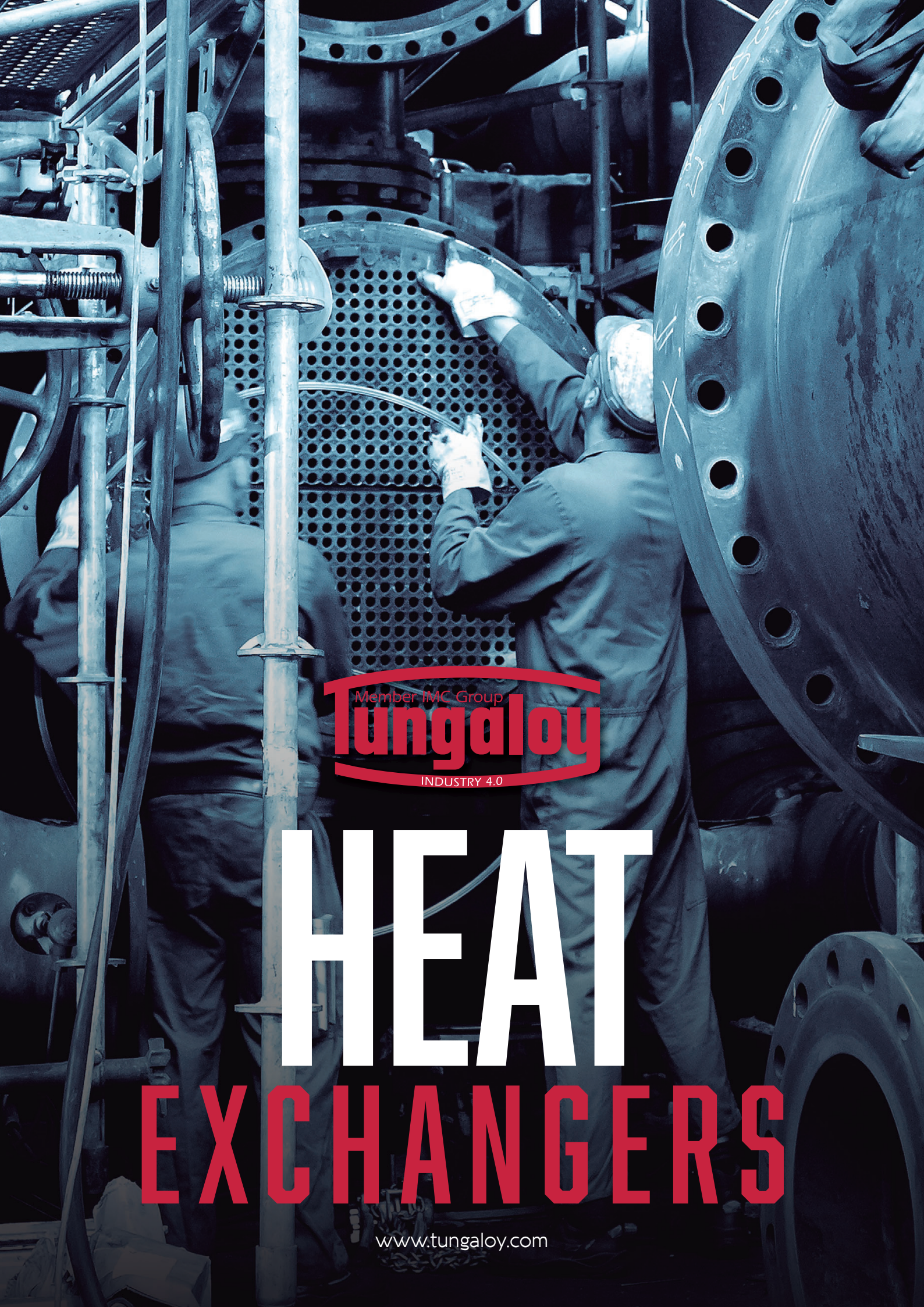
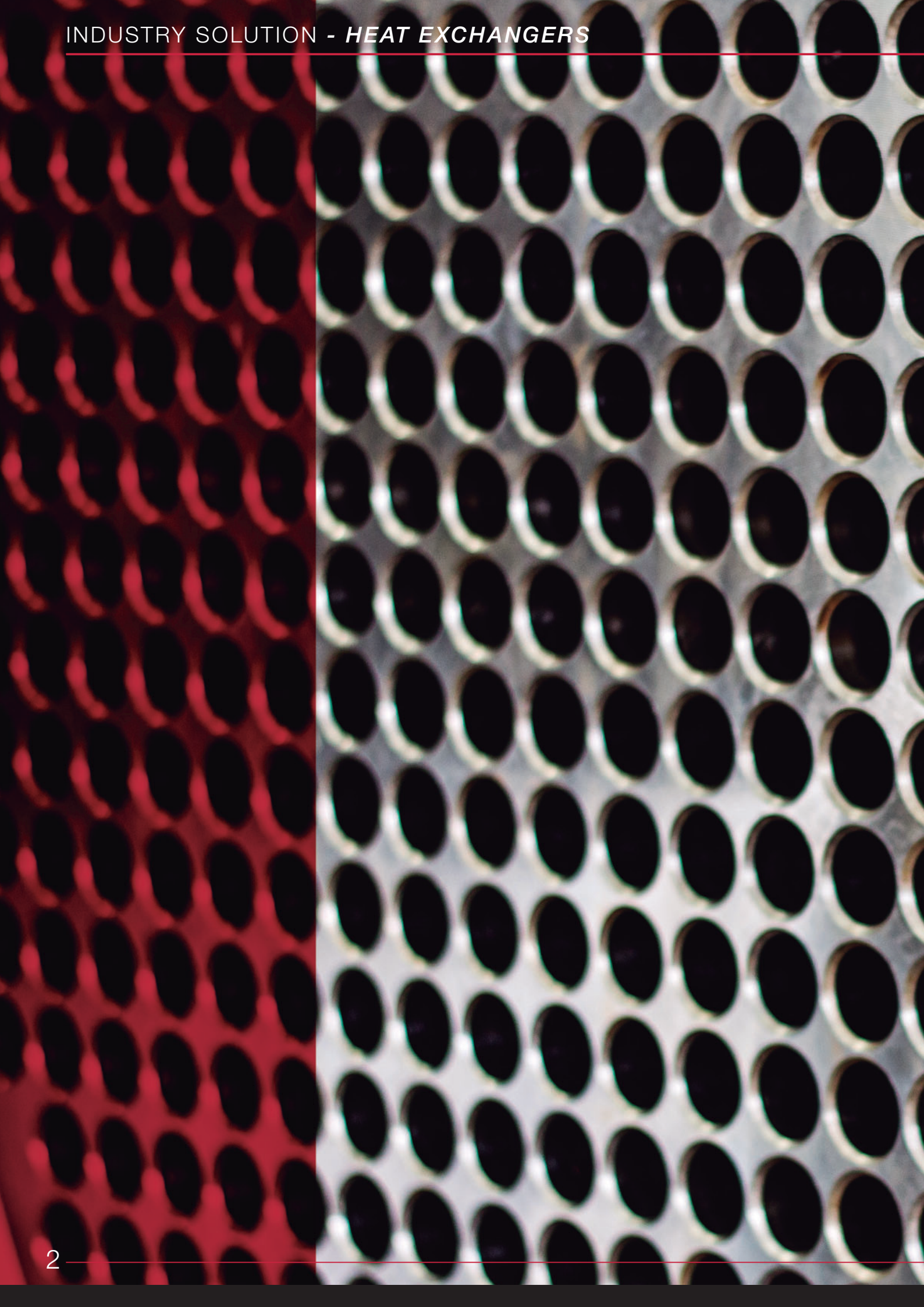
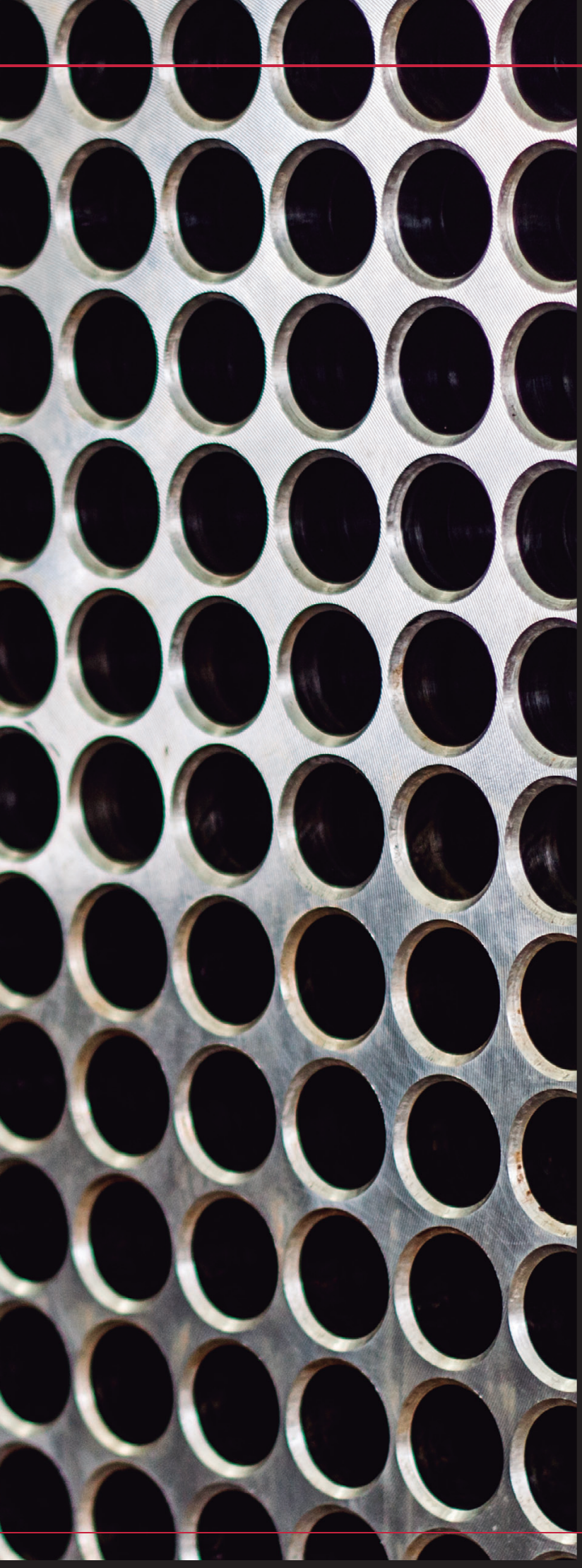

Member IMC Group
Tungaloy
INDUSTRY 4.0
HEAT
EXCHANGERS
www.tungaloy.com





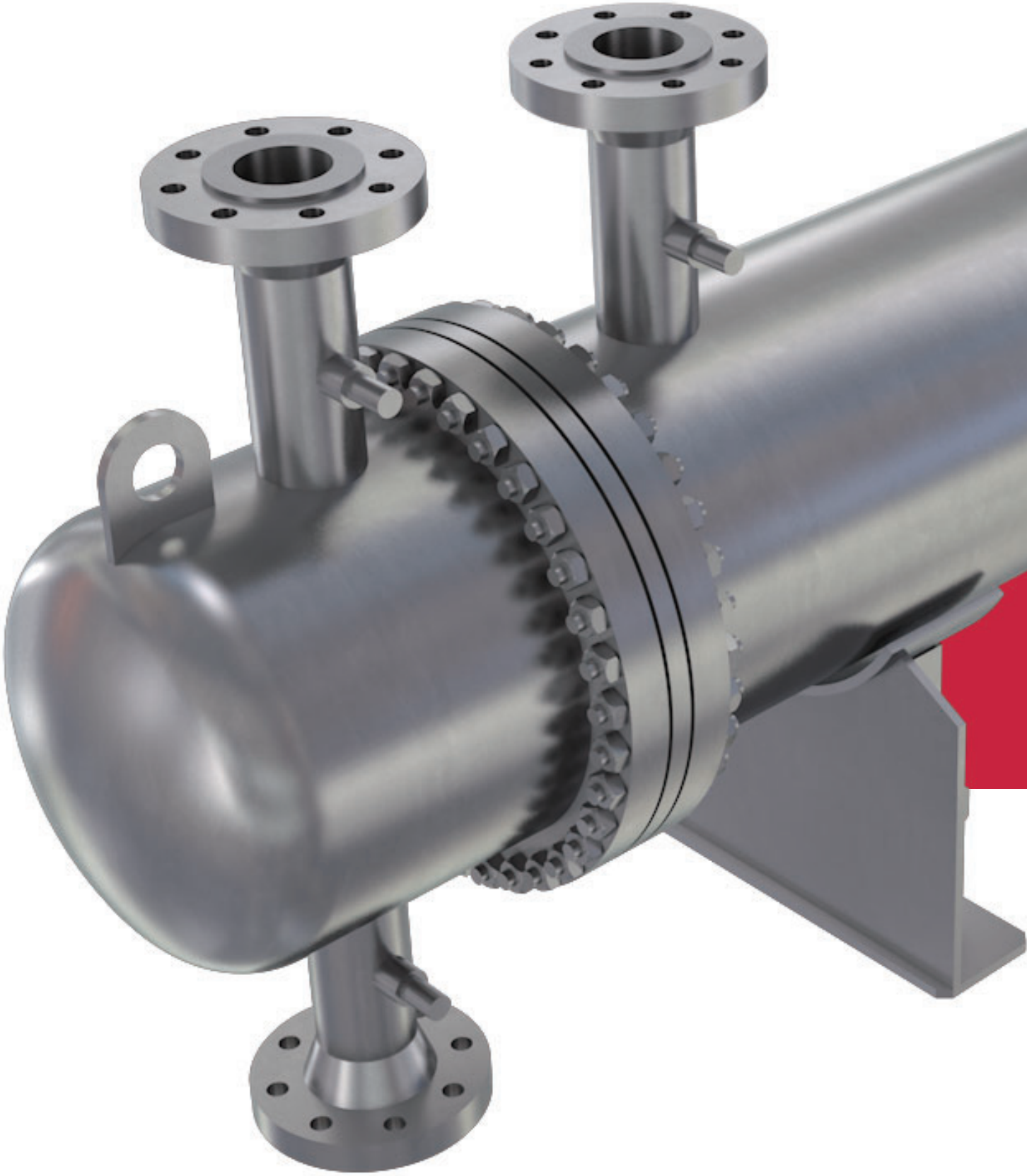
Member IMC Group Tungaloy INDUSTRY 4.0

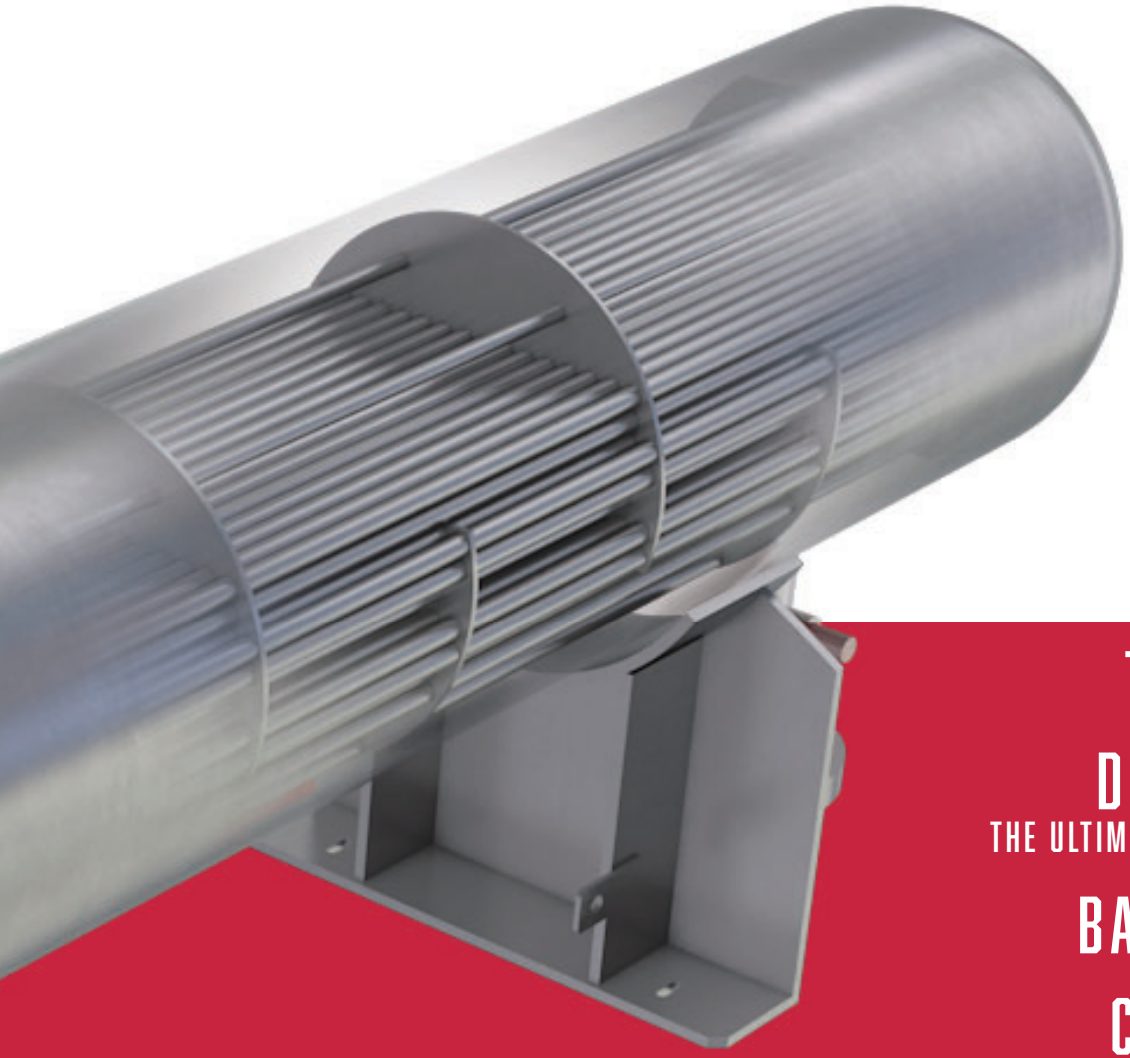
Heat Exchangers play an important role in moving heat from one medium to another and are used in a wide variety of industry segments.

Tungaloy has the knowledge and skill to provide solutions for Heat Exchangers in the Oil and Gas, Nuclear Energy, Power Generation, Water Waste Treatment, and Aerospace industries.

Heat Exchanger producers in such business segments enjoy the benefit of creating reliable products with **Tungaloy's** innovative tool geometries and grades for their drilling, turning, milling, and grooving operations.

Plate Heat Exchangers and Shell and Tube Heat Exchangers are the major types; this brochure will focus on the Shell and Tube Heat Exchangers as they are known to be more versatile than the Plate type.





TUBE SHEETS

DRILLMEISTER

THE ULTIMATE DRILLING SOLUTION

BAFFLE PLATES

CONNECTIONS

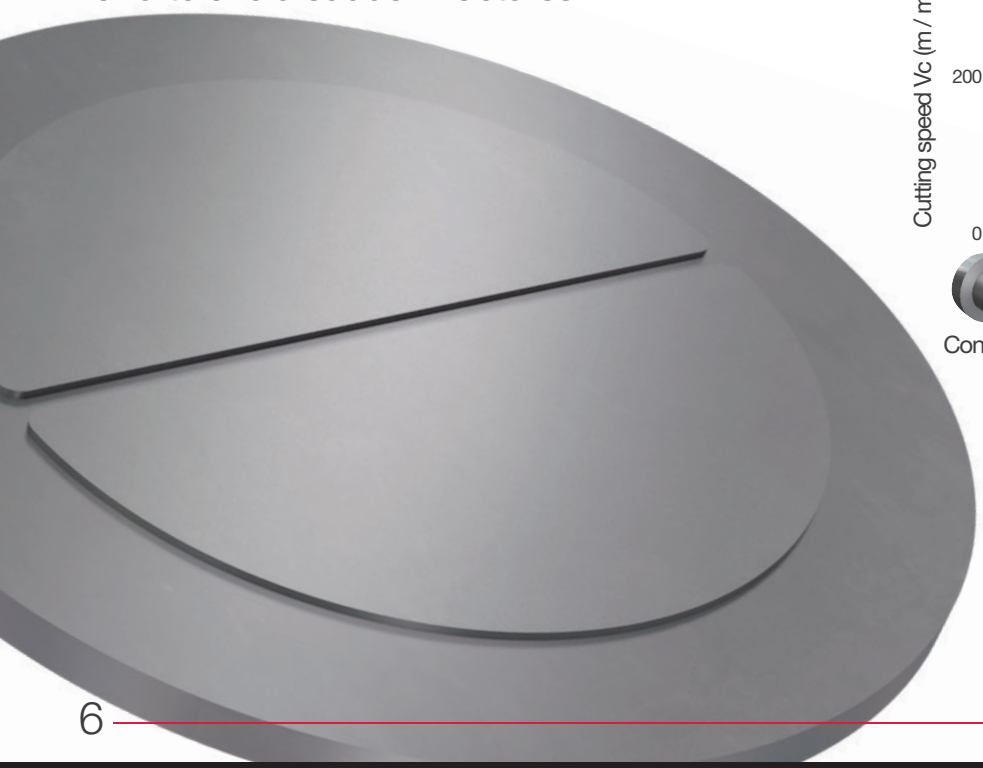
INTERNAL GROOVING & CHAMFERING

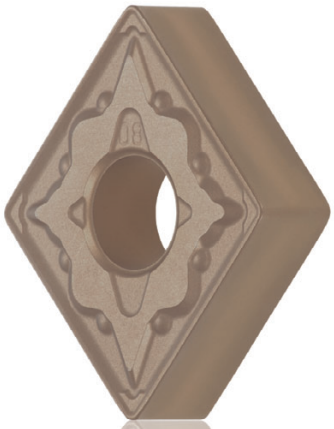
SUCCESS STORIES

TUBE SHEETS

TURNING

Large inserts with **CNMG/M** or **SNMG** geometries and 19/25 sizes are commonly used for turning operations on tube sheets, and excellent chip control is required to handle fluctuations in D.O.C. Grades with high chipping resistance are greatly recommended to assure productive machining processes and to avoid sudden fractures.





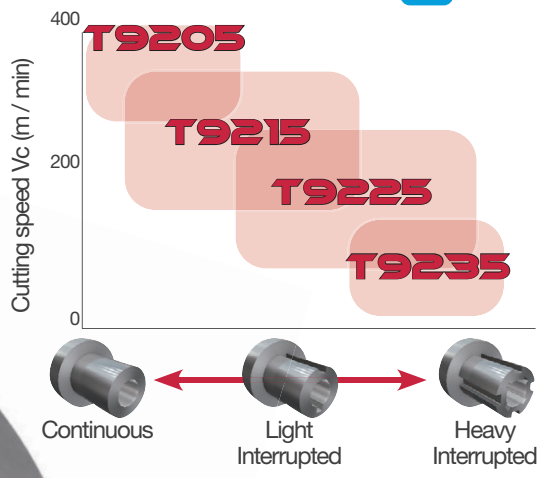
T9200

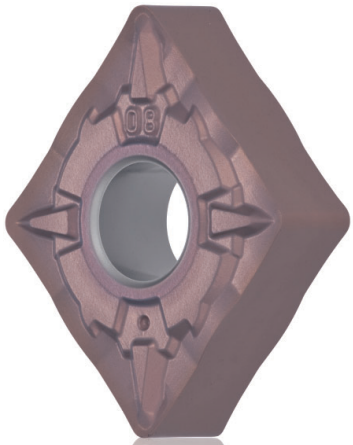
P Steel M Stainless Steel

CVD grades with outstanding productivity especially for steel turning

Nearly unbreakable CVD series for improved machining efficiency

APPLICATION AREA P





T6200
AH6200

M
Stainless Steel

Highly reliable CVD & PVD grades for stainless steel turning

Complete grade line up for stainless steel turning

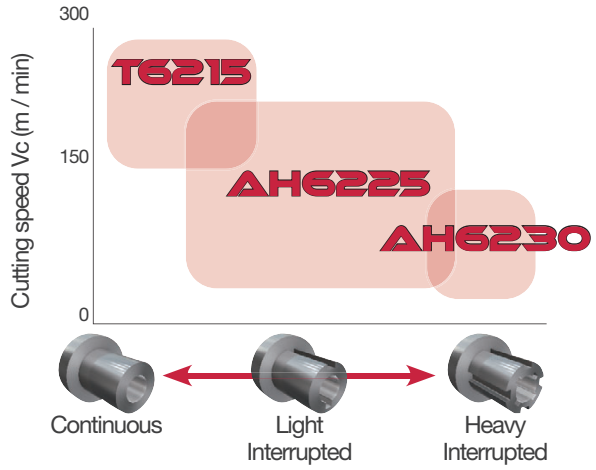
AH8000

S
Super alloys

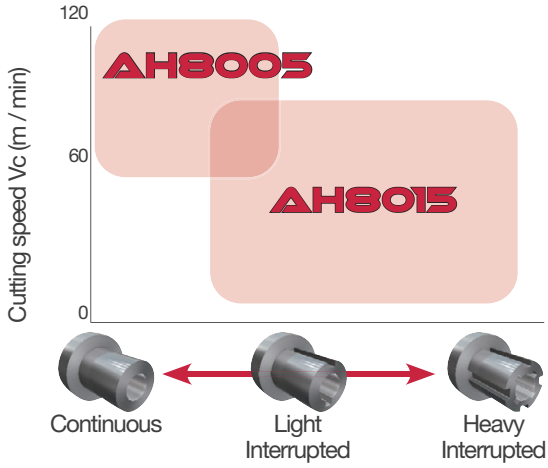
PVD grades for heat-resistant alloys

Incredible reliability in turning of heat-resistant alloy due to Nano-multi-layered AlTiN coating with high Al content

APPLICATION AREA M



APPLICATION AREA S



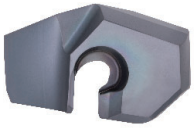
TUBE SHEETS

DRILLING

Single tube sheet contains hundreds and thousands of holes, which makes high productivity, long tool life, and high repeatability mandatory in machining operations.

DRILLFORCE MEISTER

Improves productivity and reliability in heavy drilling with unique drill head and clamping concept



SMP

DRILLMEISTER

Exchangeable head drills for unparalleled tool life and machining performance

DMP DMC DMH

DRILLMEISTER

TIDCF chamfer adaptor to perform chamfering operations and drilling in one shot

Chamfer inserts with 30°, 45° and 60° can be mounted in the same pocket

DRILLMEISTER

THE ULTIMATE SOLUTION FOR DRILLING TUBE SHEETS AND BAFFLE PLATES

Exchangeable head drill system for superior drilling performance and long tool life

Tool inventory and management costs are significantly reduced as there is no need for regrinding.

Drill bodies are offered in a wide range of sizes and styles, allowing optimal tool assembly for secure and productive drilling.

Drill bodies:
TID-F, Flange type:
Available in 1.5×D, 3×D, 5×D, and 8×D

TID-R, Cylindrical shank type:
Available in 3.5×D, 6×D, 8×D, and 12×D

TID-C:
Available in 3×D and 5×D suitable for use with TIDCF chamfer holders.

TIDCF chamfer holder: Available with 3 types of inserts in chamfering angles of 30°, 45°, and 60°

A wide product lineup to cover all of your drilling needs

Each drill body capable of working with 10 different drill head sizes

DMP

Drill dia.:
ø4 - ø25.9 mm
(ø.157" - ø1.02")

General purpose drilling head ideal for various drilling applications

DMH

Drill dia.:
ø6 - ø25.5 mm
(ø.236" - ø1.004")

General purpose head with enhanced cutting edge

DMF

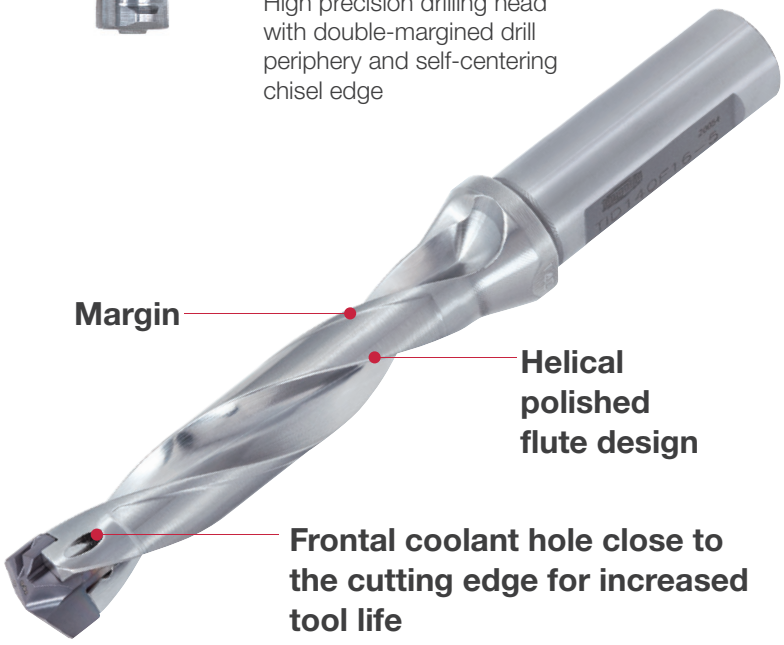
Drill dia.:
ø6 - ø25.9 m
(ø.236" - ø1.02")

180° flat edges for counterboring and flat bottoms

DMC

Drill dia.:
ø4 - ø25.9 mm
(ø.157" - ø1.02")

High precision drilling head with double-margined drill periphery and self-centering chisel edge

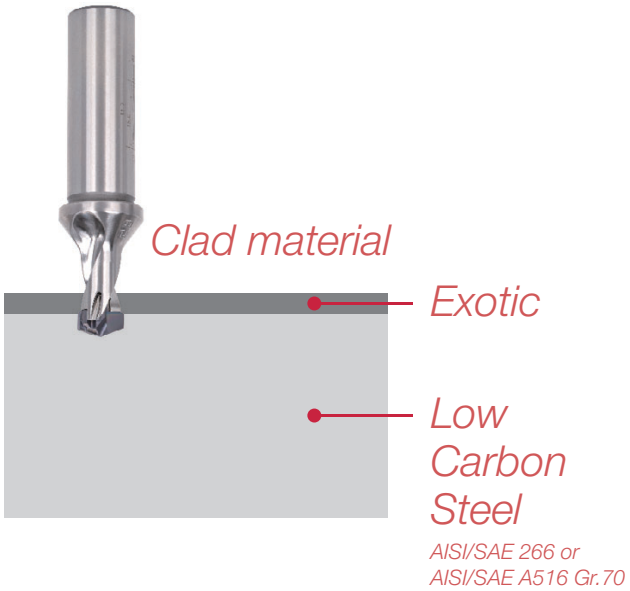


DRILLMEISTER

CLAD MATERIAL

Drilling procedures for tube sheets and stacked baffle plates made of clad materials (L/D>5)

Step 1: Drilling a pre-hole
Drill body: DrillMeister 1.5xD
Drill head: DMP/DMC
Drill head diameter:
19.3 mm (.760")
25.7 mm (1.012")
The pre-hole should penetrate into the second material by 1mm (.04")
Parameters to suit Clad material

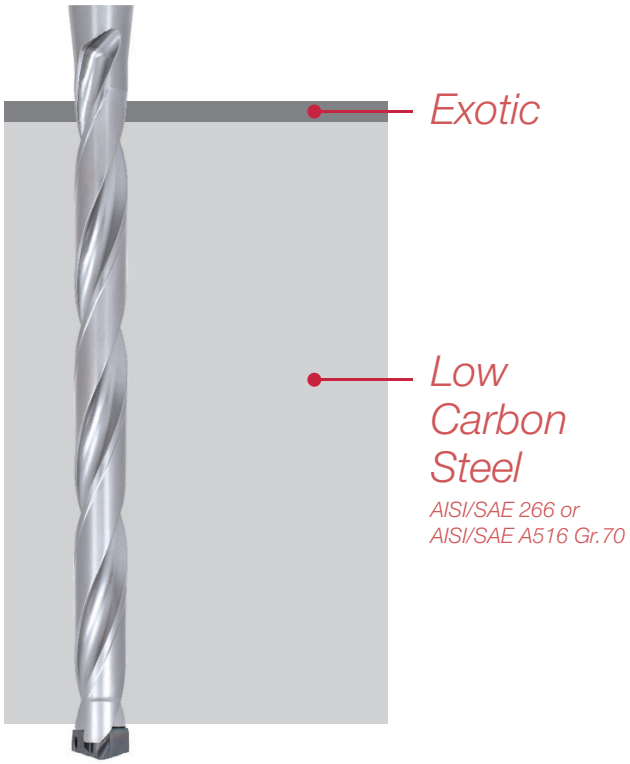


Step 2: Drilling through hole
Drill body: DrillMeister 5xD, 8xD, 12xD
Drill head: DMP/DMC
Drill head diameter:
19.27 mm (.759")
25.67 mm (1.011")
Drilling Procedure:
- Rotate the drill at 100RPM to enter the pre-drilled pilot hole

- Increase RPM to 100%, about 2mm (.08") above the bottom of the pilot hole

- Apply 80% feed to start drilling into the material for 2mm (.08") depth

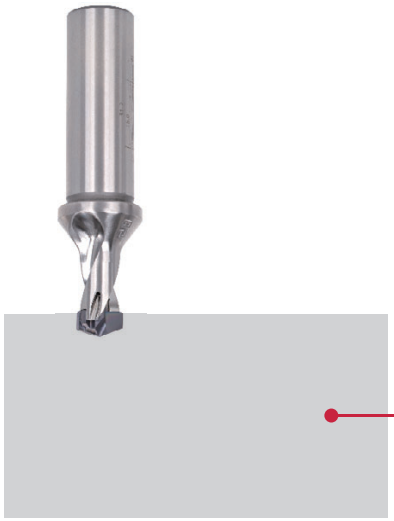
- Finish drilling with 100% feed until the drill head passes through the work-piece by 2 mm (.08")



NON-CLAD MATERIAL

Drilling procedures for uniform tube sheets and stacked baffle plates (L/D>5)

Step 1: Drilling a pre-hole
Drill body: DrillMeister 1.5xD
Drill head: DMP/DMC
Drill head diameter:
19.27 mm (.759")
25.67 mm (1.011")
Pre hole depth: 6mm (.024")



Low Carbon Steel
AISI/SAE 266 or AISI/SAE A516 Gr.70

Step 2: Drilling through hole
Drill body: DrillMeister 5xD, 8xD, 12xD
Drill head: DMP/DMC
Drill head diameter:
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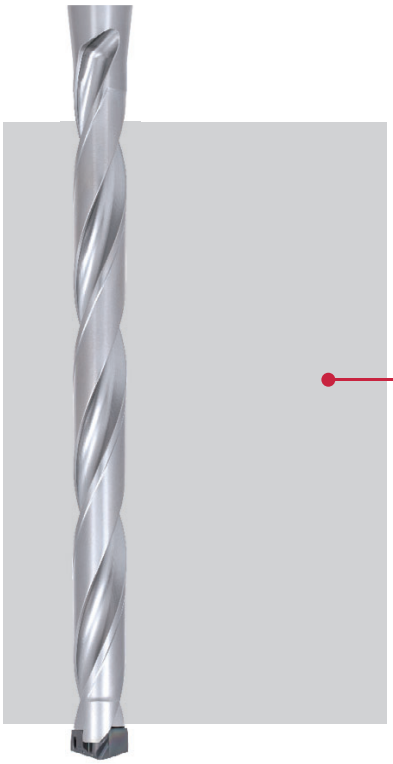
25.67 mm (1.011")
Drilling Procedure:
- Rotate the drill at 100RPM to enter the pre-drilled pilot hole

- Increase RPM to 100%, about 2mm (.08") above the bottom of the pilot hole

- Apply 80% feed to start drilling into the material for 2mm (.08") depth

- Finish drilling with 100% feed until the drill head passes through the work-piece by 2 mm (.08")



Low Carbon Steel
AISI/SAE 266 or AISI/SAE A516 Gr.70

TUBE SHEETS

DEEP DRILLING

The hole-making process of tube sheets can be performed with 3 types of tools: indexable gundrills, indexable BTA tools, and brazed BTA tools.

Each type has its own advantages, and **Tungaloy** offers machining solutions with all 3 types of tools to meet the needs of each customer.

BRAZED BTA

Wide range of chipbreakers and grades for maximum machining efficiency with the highest accuracy

FINE-BEAM

BTA heads with indexable inserts and guide pads

FBM/FBH

DEEP TRI DRILL

Indexable gun drill with exceptional efficiency

TOHT

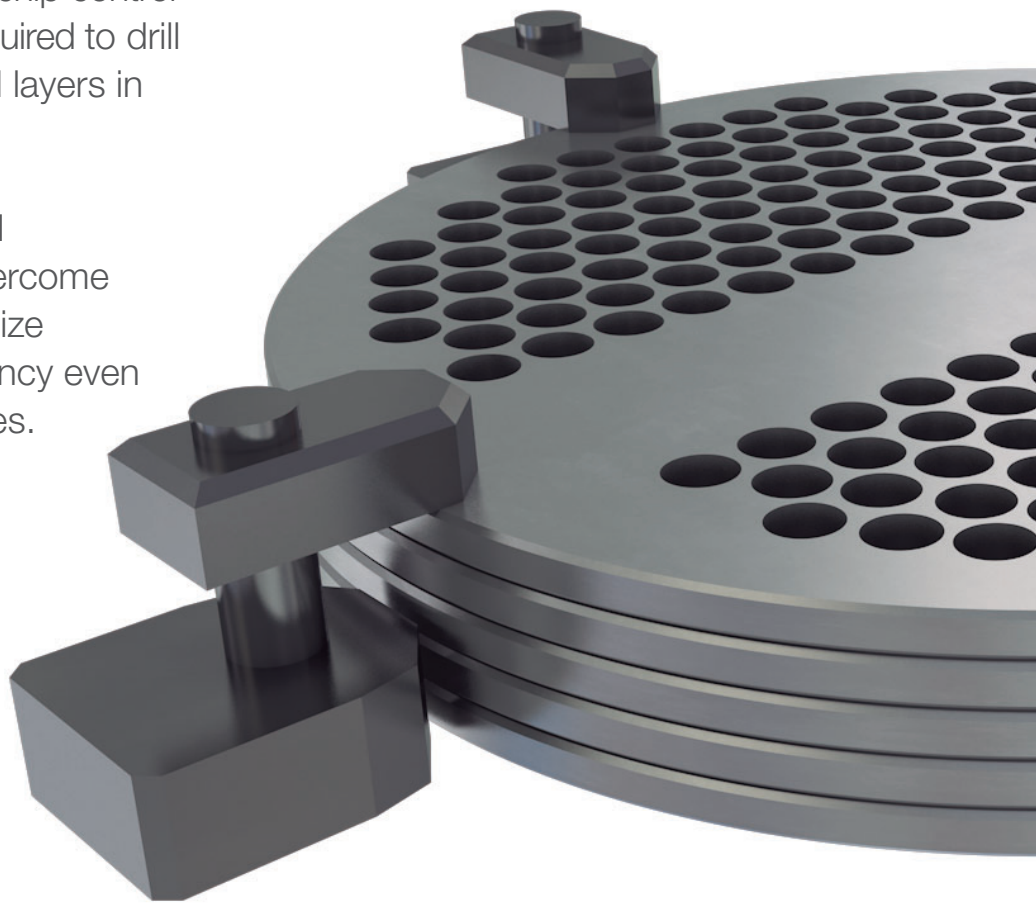
LOGT

BAFFLE PLATES

DRILLING

Drilling baffle plates involves complex machining operations. To maximize productivity, several baffle plates are usually stacked together to be drilled in one shot; tools with excellent chip control and low cutting forces are required to drill in and out of several material layers in the same operation.

Tungaloy's DrillMeister and **DrillForceMeister** series overcome these challenges and maximize productivity as well as efficiency even in such demanding processes.



DRILLMEISTER

Exchangeable head drills for unparalleled tool life and machining performance

DMP

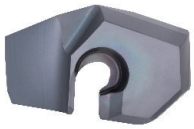
DMC

DMH

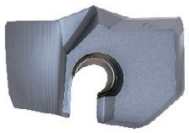
DMF

DRILLFORCEMEISTER

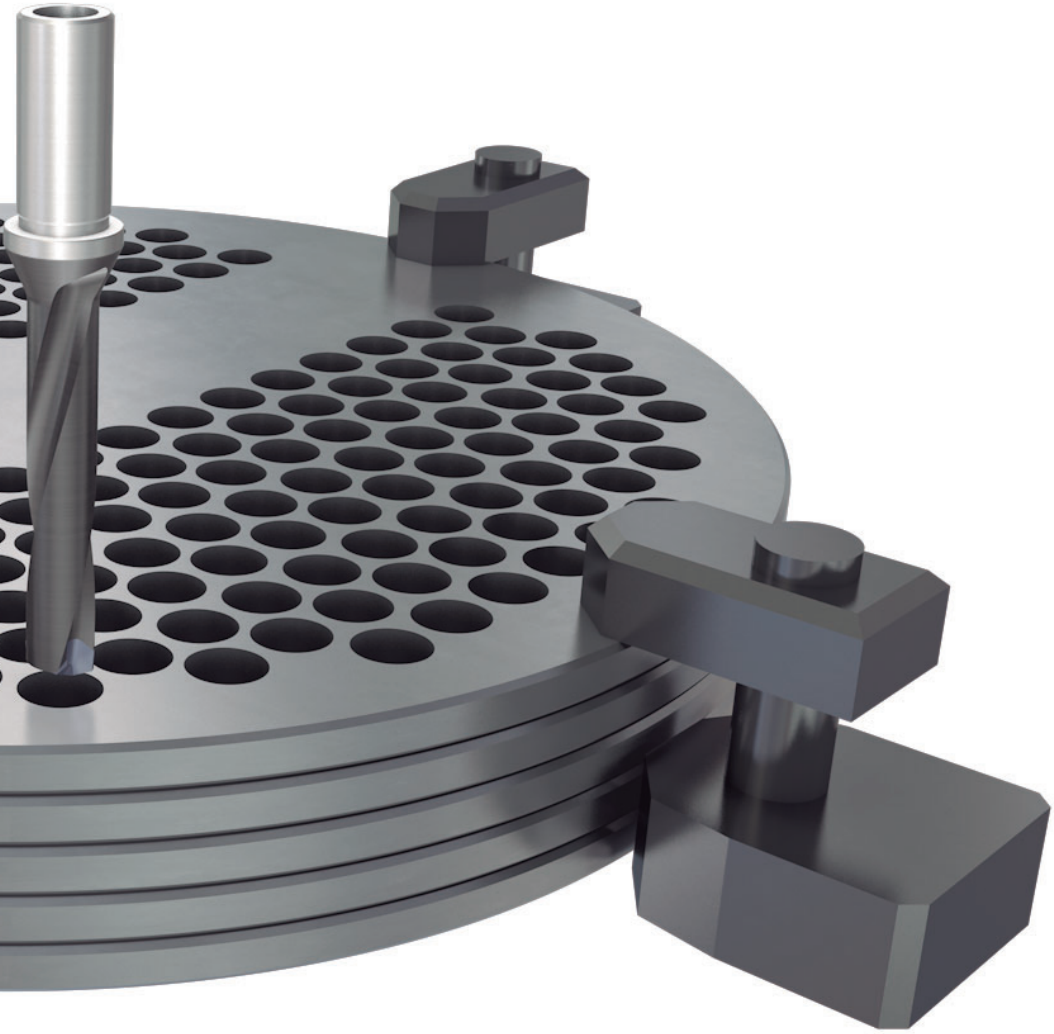
Improves productivity and reliability in heavy drilling with unique drill head and clamping concept



SMP



SMF



CONNECTIONS

DRILLING & MILLING

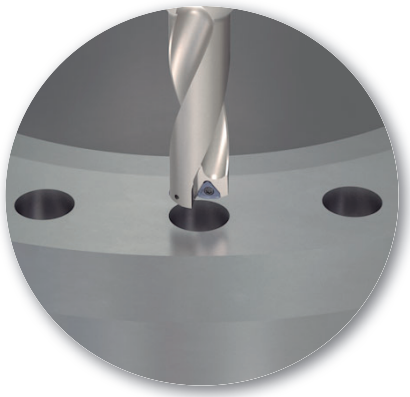
Machining connection parts requires low cutting forces for both hole-making and milling operations.

Tungaloy's TungSix-Drill series offers 6 cutting edges per insert and helps customers reduce not only cutting forces but also tooling costs in their drilling processes.
Tungaloy's DrillForce-Meister is also an excellent tool for producing connection parts as it excels in maximizing productivity for heavy drilling operations.

For roughing face milling operations, **MillQuadFeed** cutters are ideal due to their tough cutting edges and ability to change entry angles on workpiece materials.
For finishing operations, **TungEight-Mill** series offers economical and efficient solution with 8 cutting edges on an insert.

TUNGSIX-DRILL

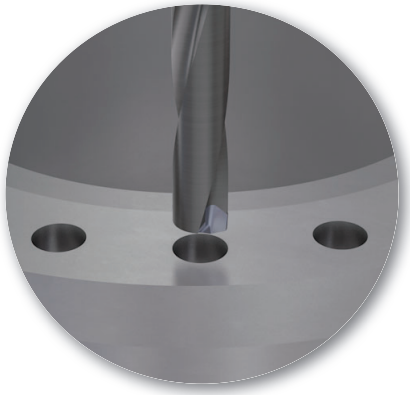
Indexable drill with economical 6 cutting edged insert

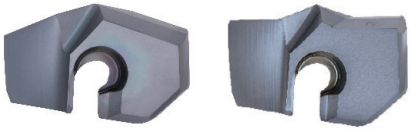


DJ DS

DRILLFORCE MEISTER

Improves productivity and reliability in heavy drilling with unique drill head and clamping concept

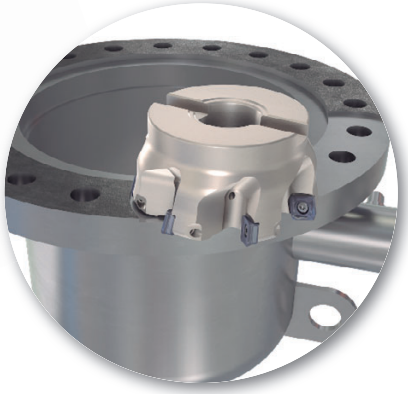




SMP SMF

MILLQUAD FEED

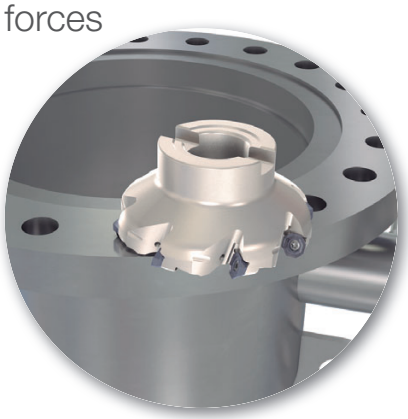
A new generation of versatile, high-feed milling cutter



SWMT

TUNGEIGHT MILL

Face milling cutter with economical 8-edged inserts that reduce cutting forces



OWMT

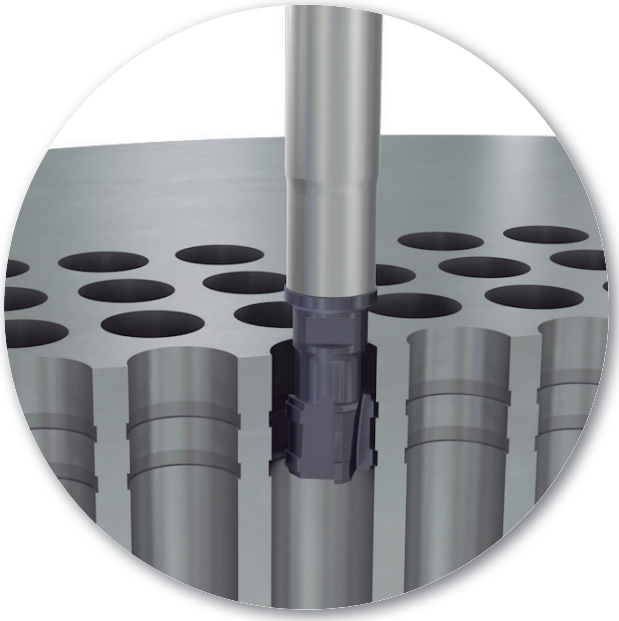
INTERNAL GROOVING & CHAMFERING

Tungaloy's TungMeister series provides an efficient solution for machining inner grooves used for fitting pipes in tube sheets and baffle plates.

For internal slitting of small grooves. Unique chatter free design for improved material removal rate and low vibration.

TUNGMEISTER

The special **TungMeister** head capable of creating two grooves in one shot, which improves efficiency and productivity of the machining process

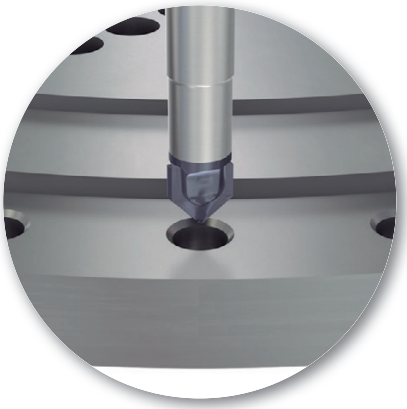


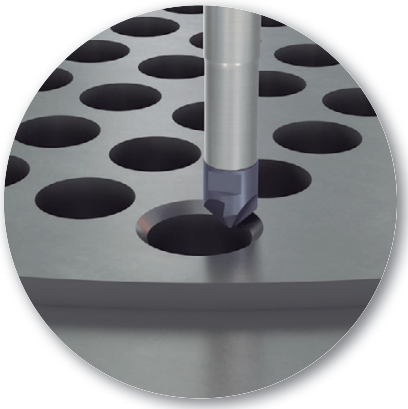
TUNGMEISTER

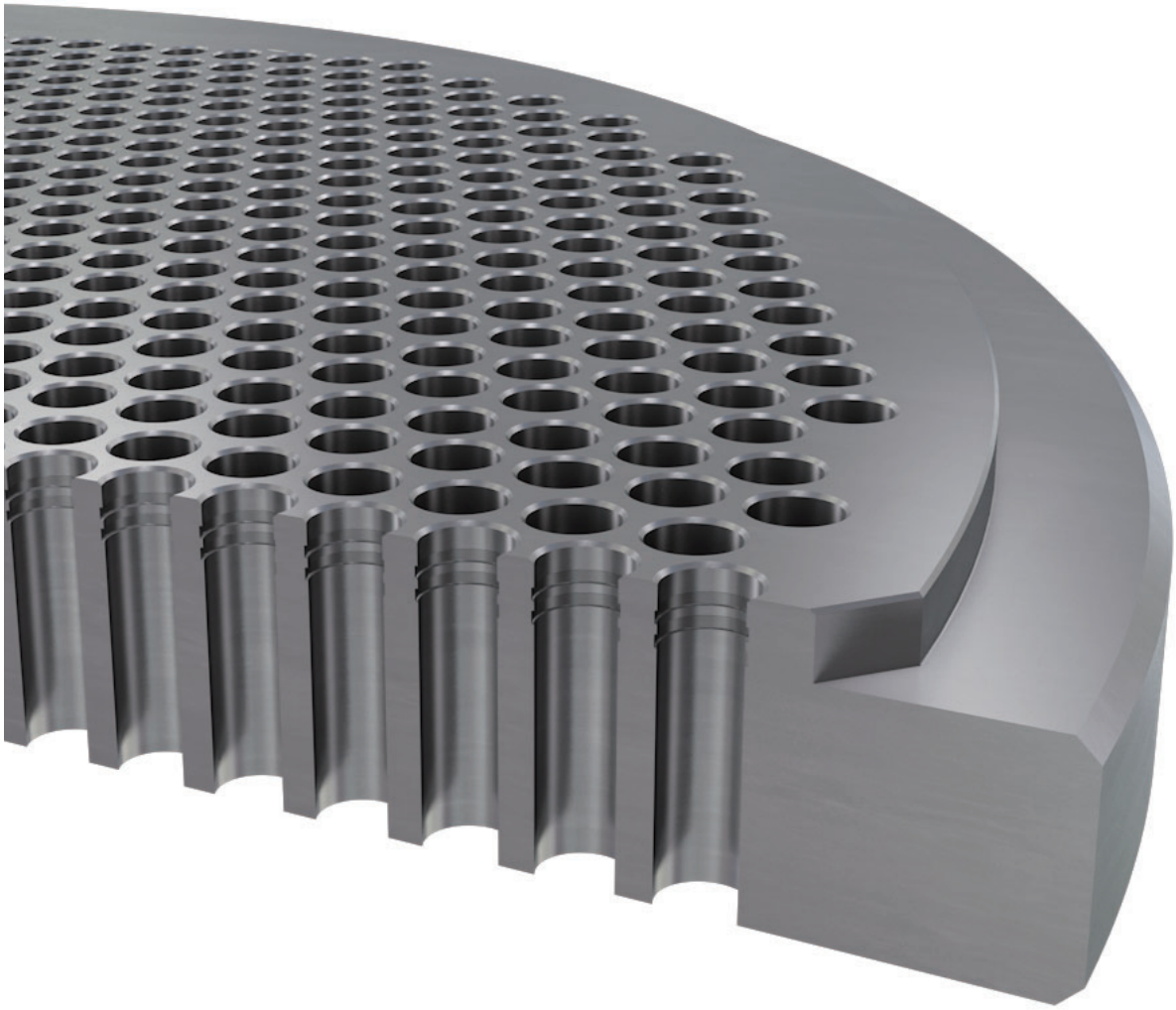
Endmill with exchangeable chamfering heads for reduced tool replacement time and improved productivity

VCW

VDS







SUCCESS STORIES

DRILLMEISTER

+75% better tool life and +90% better productivity have been achieved against the existing exchangeable drill due to combination of self-centering geometry and AH9130 grade.

Part: Baffle plate
Material: AISI/SAE A516 .70
Operation: Through - Horizontal M/C BT50
Drill Body: TID190F25-5
Drill Head: DMC1927
Diameter: 19.27 mm (.759")
Depth: 38.1 mm (1.500")
Grade: AH9130
Cutting Conditions:
Vc = 120 m/min (394 sfm)
Vf = 595 mm/min (23.4 ipm)
***f* =** 0.3 mm/rev (.012 ipr)

DRILLMEISTER

+150% better tool life has been achieved against existing exchangeable drill due to high wear resistant grade AH9130.

Part: Baffle plate
Material: SUS304 (X5CrNi18-10)
Operation: Through - Horizontal MC BT40
Drill Body: TID125F16-5
Drill Head: DMP128
Diameter: 12.8 mm (.504")
Depth: 52 mm (2.05")
Grade: AH9130
Cutting Conditions:
Vc = 50 m/min (164 sfm)
Vf = 186.6 mm/min (7.35 ipm)
***f* =** 0.15 mm/rev (.006 ipr)

DRILLMEISTER

+33% better tool life and +38% better productivity have been achieved against the existing exchangeable drill due to combination of self-centering geometry and AH9130 grade.

Part: Tube sheet
Material: AISI/SAE A516 .70
Operation: Through - MC BT50
Drill Body: TID250F32-5
Drill Head: DMC2567
Diameter: 25.67 mm (1.011")
Depth: 101.6 mm (4")
Grade: AH9130

Cutting Conditions:

Vc = 115.2 m/min (378 sfm)
Vf = 428.8 mm/min (16.8 ipm)
***f* =** 0.3 mm/rev (.012 ipr)

DEEP TRI DRILL

+300% better productivity has been achieved against the existing brazed carbide gundrill with Tungaloy's indexable gun drill.

Part: Tube sheet
Material: AISI/SAE A516 .70
Operation: Through hole - BTA machine
Drill Body: TRLG22.45X800-A62X
Drill Head: TOHT110405-NDJ
Diameter: 22.45 mm (.884")
Depth: 200 mm (7.874")
Grade: AH9130

Cutting Conditions:

Vc = 90 m/min (295 sfm)
Vf = 102 mm/min (4.02 ipm)
***f* =** 0.08 mm/rev (.003 ipr)

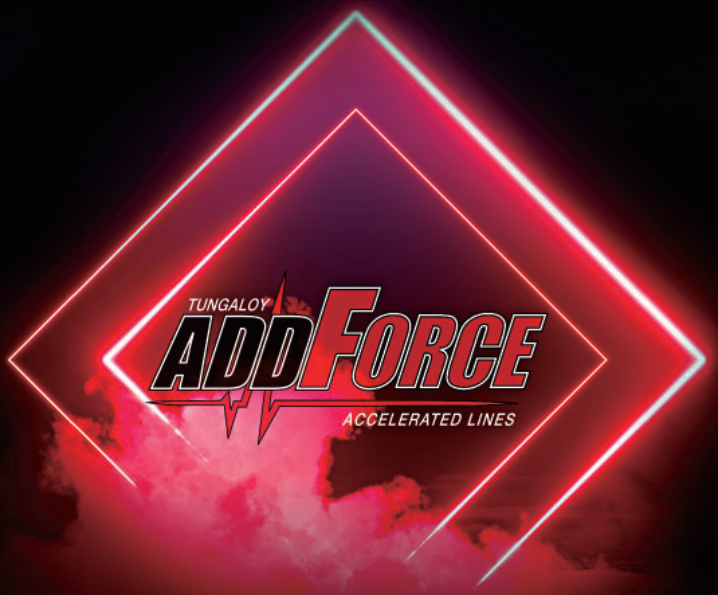
BRAZED BTA

+30% better productivity has been achieved against the existing brazed carbide gundrill.

Part: Tube sheet
Material: SA508 Gr.3 Cl.2 + Inconel 690
Operation: Through hole - BTA machine
Brazed Drill Head: BTU-002BA 19.28 1132
Diameter: 19.27 mm (.759")
Depth: 300 mm (11.81")
Grade: 1132

Cutting Conditions:

Vc = 50 m/min (164 sfm)
Vf = 33.03 mm/min (1.3 ipm)
***f* =** 0.04 mm/rev (.002 ipr)



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Tungaloy

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