



IMPROVED, HEAVY-DUTY, CUSTOMIZED

HEAT EXCHANGERS



Technology inspired by nature

APEX-delfino[®] Technology



APEX-delfino® Technology

APEX Group's technological innovation

APEX Group successfully developed the APEX-delfino® Technology, new technology that optimizes flow distribution and influences turbulence for improved operation of Free-flow™ Plate-type Heat Exchangers.

Large amounts of hot Fluegas and Air are guided through the tailored Plate-type Heat Exchanger. The volume flow rates can easily exceed 2,000,000 kg/h with virtually 0% Leakage. The flow is guided in complex flow paths through the modular units such as conventional cross-flow or countercurrent flow arrangement and many novel configurations operating at low Reynolds number with increased heat transfer.

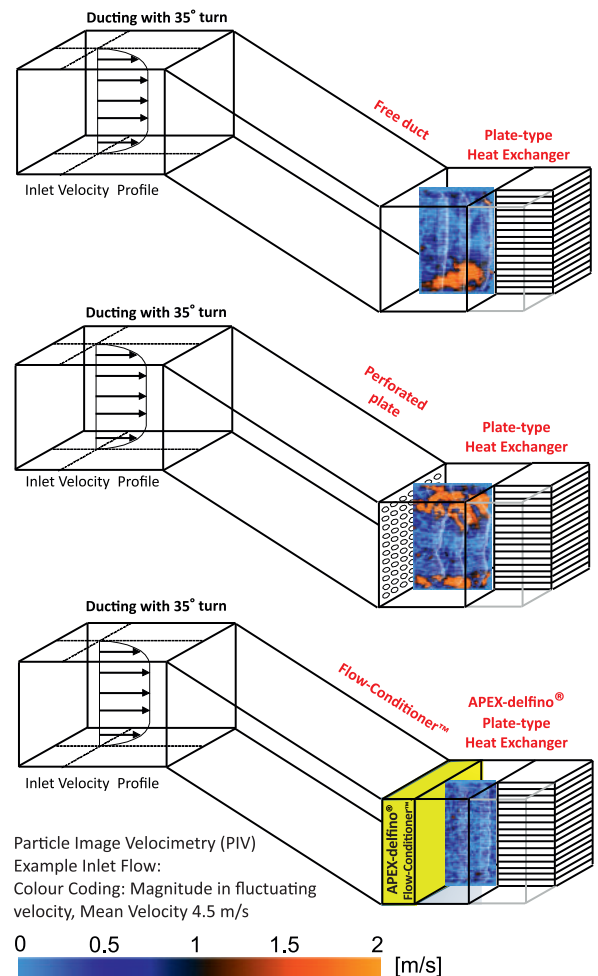
APEX-delfino® increases the effectiveness and the lifetime of the unit, due to corrosion protection, easy-access cleaning and reduced pressure drop at high heat transfer rates. It is designed to achieve a streamlined and uniform flow, closely matching the ideal flow field characteristics with no flow separation.

APEX-delfino® Technology is an agglomeration of improvements along the path of a fluid element, which is traveling through the Heat Exchanger starting at the centrifugal fan.

Amongst others, the **APEX-delfino® Flow Conditioner™**, as well as the **APEX-delfino® Inlet Geometry** and **Guiding Blades**, condition the flow distribution for improved operation of our Plate-type Heat Exchangers.

To sum up, this technology guarantees a uniform flow distribution, proper working conditions and increases the lifetime of the units, which ultimately results in lower energy consumption and smaller units.

Particle Image Velocimetry results downstream of a 35 degree turn with different devices integrated into the ducting.



Perforated Plate Vs. APEX-delfino® Flow-Conditioner™

Perforated Plate

- Due to the small thickness of the perforated plates, they cannot guarantee the removal of swirl and the removal of flow direction perpendicular and width-wise to the heat exchanger's channels.
- Perforated plates have a uniform resistance over the complete cross section, even though velocities vary over the air inlet cross section. This usually results in much higher resistance than necessary and large pressure drop.
- The flow stagnates upstream of the heat exchanger and tends to move in the direction of the walls upstream of the equipment. The result is a strong temporal fluctuation and an increase in velocity non-uniformity.

APEX-delfino® Flow-Conditioner™

- Ability to match the design velocity distribution at the inlet of the heat exchanger. This means that the *design efficiency of the equipment can be guaranteed*.
- Reduction of spatial and temporal velocity fluctuations. As a result, the equipment faces *reduced risk of corrosion*; thus, its *lifetime* is increased.
- *Reduced pressure drop* compared to perforated plates. This is directly translated into *reduced power consumption* of the existing centrifugal fan.
- *Reduced plot space* required for its installation compared to multiple-sheet perforated plates, with similar performance. The width of the APEX-delfino® Flow-Conditioner™ is only 100-200 mm.

1 APEX-delfino® Transition Duct

- Custom-design of the transition ducts
- Uniform velocity distribution at outlet
- Large static pressure recovery
- Low total pressure drop

2 APEX-delfino® Flow-Conditioner™

- Match design velocity distribution
- Reduction of velocity fluctuations
- Reduced risk of corrosion
- Reduced pressure drop
- Less power consumption
- Small plot space required

3 APEX-delfino® Inlet Geometry

- Low pressure drop
- Turbulent flow starting at $Re = 2200$.
- Well-defined transition
- Increased heat transfer in the low Re range
- Protection of plate and edge-welds
- Easy mechanical installation

4 APEX-delfino® Outlet Geometry

- Low pressure drop
- Large static pressure recovery
- No large-scale flow separation
- Uniform velocity distribution
- Easy mechanical installation

5 APEX-delfino® Return Duct

- Low pressure drop
- No large-scale flow separation
- Uniform velocity distribution
- Aerodynamically optimized design

6 APEX-delfino® Guiding Blades

- No large-scale flow separation
- Uniform velocity distribution
- Low pressure drop
- Guidance of complex flow paths
- Homogeneous static pressure distribution
- Aerodynamically optimized design

7 APEX-delfino® Temperature Equalizer

- Uniform temperature distribution
- Optimized Mixing
- Low pressure drop
- Small plot space

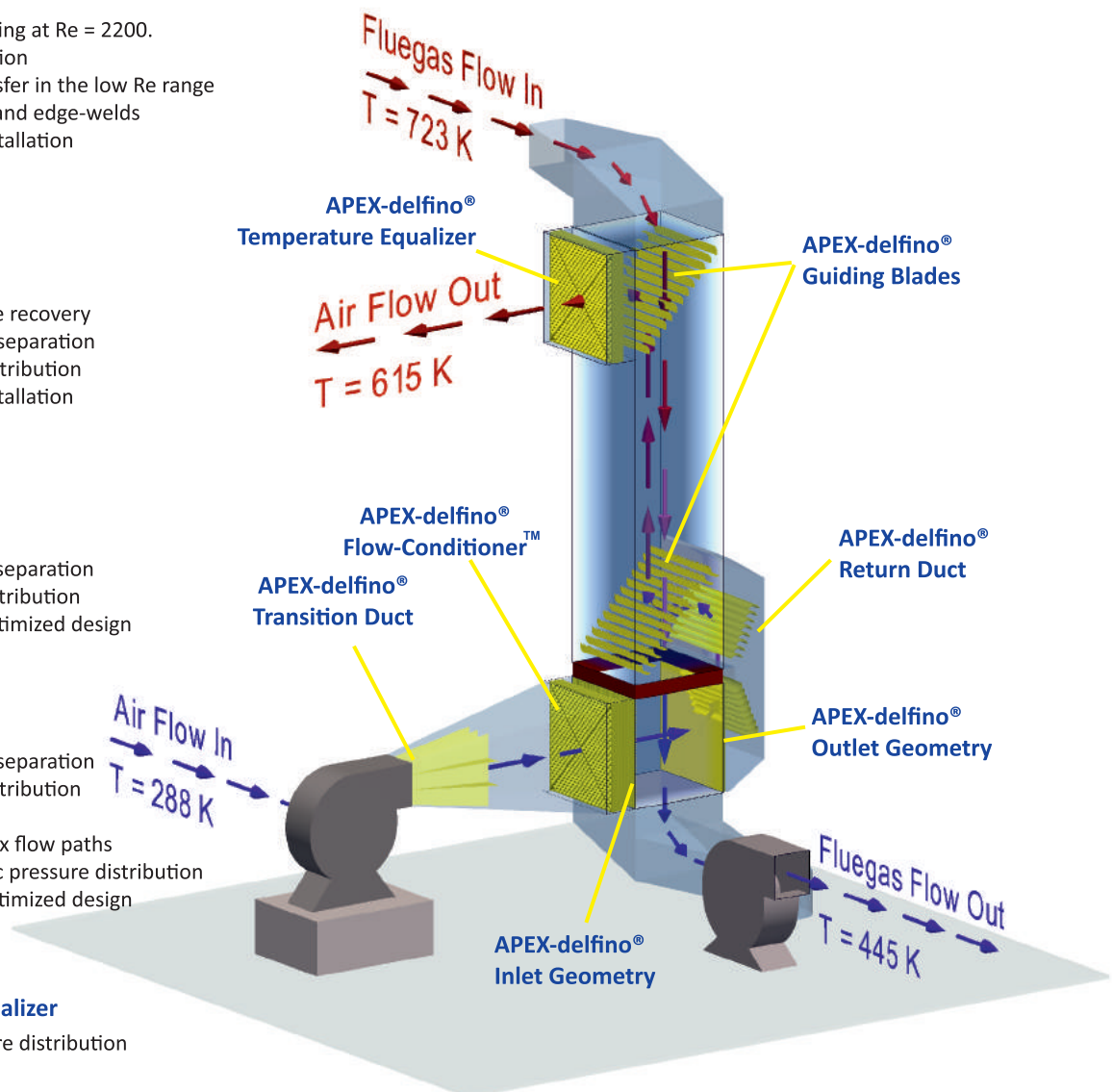
Origin of “delfino”

APEX-delfino® Technology came into existence from the long-term obsession of the inventor and the developer of APEX Group's plate-type heat exchanger products, Mr. Mircea Dinulescu, of continuously perfecting the products by improving the flow uniformity, and, in particular and utmost, of eliminating the flow separation and dead-water regions.

By observing the dolphins playing in water practically without disturbing it at all, he exclaimed: **“We need a heat-transfer geometry similar to these dolphins!”**

And so:

- the dolphin's nose became APEX-delfino® Inlet Geometry
- the dolphin's fins became APEX-delfino® Guiding Blades
- the dolphin's tail became APEX-delfino® Outlet Geometry
- the dolphin's streamlined body became APEX-delfino® Transition Duct
- the Flow-Conditioner™ and the Temperature Equalizer, exterior to the dolphin's body, came as logical extensions



New technology to optimize flow distribution and influence turbulence for improved operation of Free-flow™ Plate-type Heat Exchangers



“APEX Group is dedicated to offering engineering solutions, not just a commodity.”

Mircea Dinulescu, Founder of APEX Group

APEX Group is specialized in designing and manufacturing high quality heat transfer equipment. CORPEX®, A-CORREX® & APEX-delfino® plate-type and tubular exchangers are designed to bear the most extreme requirements. We provide innovative engineering solutions for high performing heavy-duty gas/gas and gas/liquid equipment for heat recovery and environmental projects.

Experience and Vision

We encompass 45+ years of experience and expertise of our founder, Mr. Mircea Dinulescu, and share his vision - **to research, create and provide engineering solutions** for heat transfer industrial applications. To this day, our *Credo* remains unchanged, creating the strong foundation for APEX Group’s position in the international market:

Started in 1990 as a small independent business, APEX GROUP will grow into a reputable designer and manufacturer of high quality low-priced industrial heat transfer and combustion equipment for the international market operating according to the quality principles laid out by international standard ISO 9001.
Dinulescu, 1991

Quality and Innovation

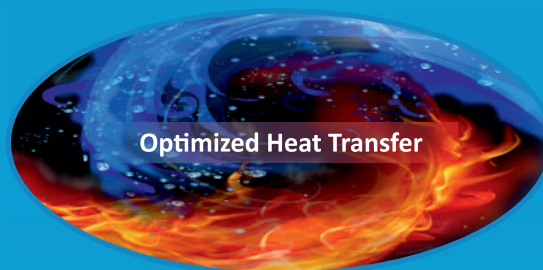
APEX Group’s strength consists of know-how, patented technology, professionalism and leading-edge engineering. Our Research and Development Department supports APEX Group’s activities by providing new solutions for continuously upgrading APEX Group’s products and guaranteeing efficient heat transfer, long lifetime, trouble-free and user friendly operation.

Customers Worldwide

We take pride in being a family-owned company, which allows us to build close connections with our customers and guarantees a personal approach to each project. We strive to support our customers by engaging in dialogue and developing long-term partnerships. Our company is renowned worldwide and naturally we deliver to every corner of the world.

Broadening Horizons

By encouraging feedback from customers, APEX Group develops solutions and products that anticipate market needs. To materialize our concepts we have expanded our Engineering, Research and Fabrication facilities. Apex engineers are continuously keeping up to date with the newest industrial developments in order to provide optimum design for our customers.



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