IRON AND STEEL INDUSTRY

ENERGY-SAVING SPRAY NOZZLES

IKEUCHI SPRAY NOZZLES FOR THE IRON AND STEEL MAKING PROCESSES

PROBLEMS DURING THE IRON AND STEEL MAKING PROCESSES

OVERVIEW OF APPLICATIONS OF IKEUCHI SPRAY NOZZLES FOR IRON AND STEEL

- COOLING
- DUST SUPPRESSION
- DESCALING
- BLOWING
- WASHING
- ABSORPTION

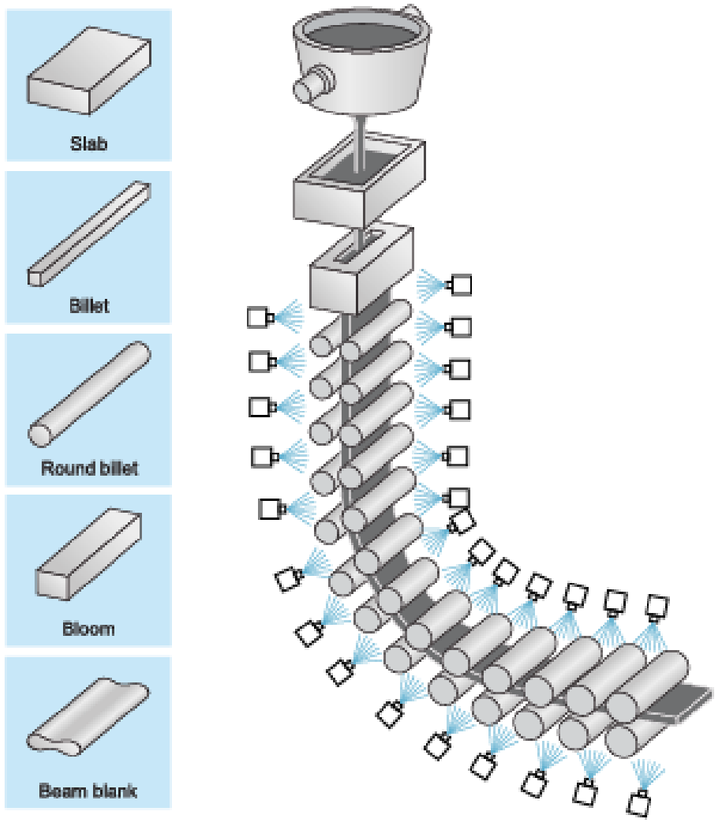
CONSULTING SERVICES

1. *Thermo fluid analysis*
2. *Droplet diameter and speed reference*
3. *Descaling - 2D and 3D data of measurements and simulation.*

SECONDARY COOLING FOR CONTINOUS CASTING MACHINE

The effect of spray cooling depends on the fog, the cooling target, the environment and the cooling medium.

For the secondary cooling process on the CMM, strong impact force is needed to break through the boiling surface. To cool down the steel slabs, it requires an even (uniform) spray distribution with as high impact as possible to ensure a smooth surface texture.



SECONDARY COOLING FOR CONTINOUS CASTING MACHINE **AKIM-IST® “E”**

LARGE TURNDOWN RATIO

DOVEA is a pneumatic spray nozzle solution with compressed air. It can generate a large range of spray capacity without changing the spray angle.

By controlling the spray angle and distribution, it is possible to produce different types of steel on the same CMM without changing the nozzle. Just adapt the spray capacity to the steel’s characteristics. This allows to reduce maintenance time and stock arrangements.

SAVING ENERGY WHILE MAINTAINING A STRONG COOLING PERFORMANCE

DOVEA makes it possible to generate a strong spray impact and cooling performance while maintaining a low air consumption.

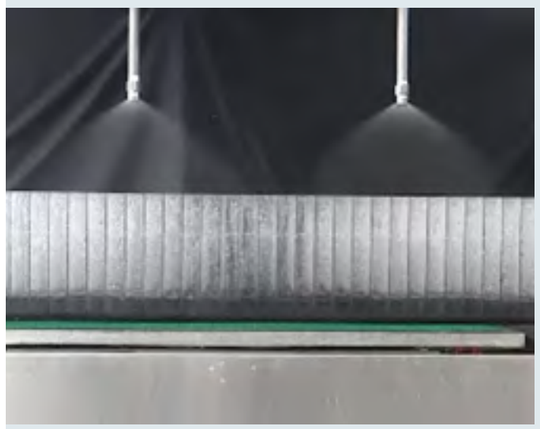
Air/water ratio = 5 at maximum water capacity

LESS CLOGGING STRUCTURE TO KEEP A UNIFORM COOLING PERFORMANCE

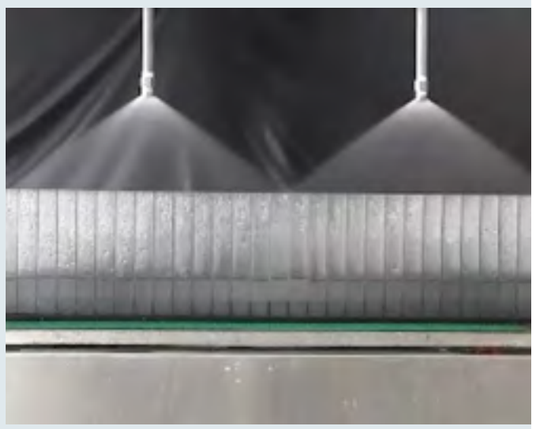
DOVEA has a unique design with a less clogging structure. This ensures a uniform cooling performance and an increased lifetime value, compared to conventional models.

Turndown 1 : 40 (max

With a stable even spray distribution, the cooling impact remians een on the entire surface of the steel without creating weak spots



MINIMUM WATER CAPACITY



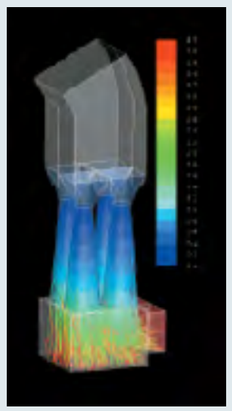
MAXIMUM WATER CAPACITY (40 TIMES HIGHER

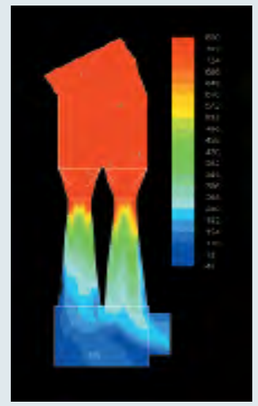
WHY IS COOLING WITH FOG MORE EFFICIENT THAN WITH AIR?

The conventional way to cool down exhast gas during iron and steel production is by extracting the outside air and mixing it with the exhaust gas to clean. However, as the air has a lower cooling capability, the cooling effect is inefficient. Furthermore, air takes up more space in volume in the pipe where the exhaust gas goes through to be cooled down and then cleaned. Thus, less gas can enter the pipe and the volume of gas which is cooled down is lower than expected.

IKEUCHI’S CONSULTING SERVICE FOR COOLING

- Cooling of high temperature flue gas, such as sintering exhaust, requires spray control and droplet diameters that enable complete evaporation.
- Ikeuchi uses CFD simulation when selecting the nozzles and the control system to ensure the complete evaporation of the water sprayed from our cooling nozzles.
- We can perform a variety of measurements and simulations to assist you in choosing the correct nozzle.

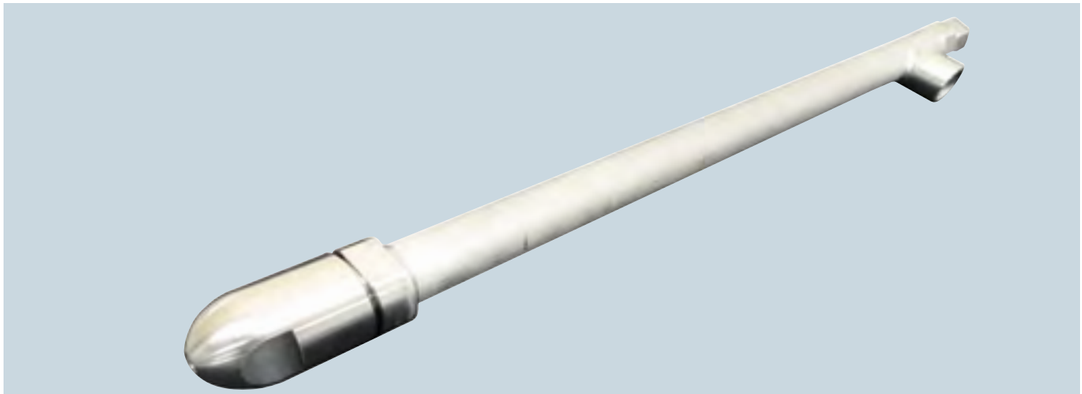




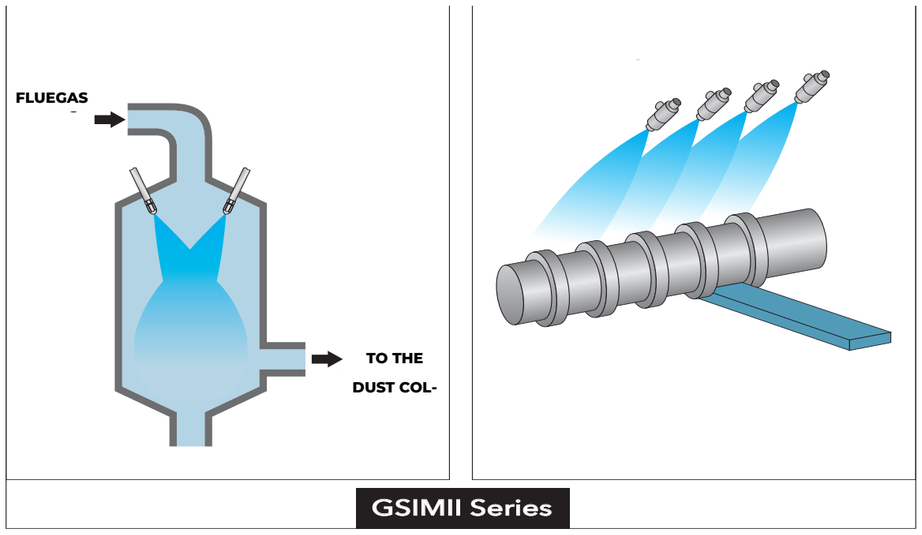
CFD ANALYSIS OF THE GAS COOLING PROCESS

USED FOR POLLUTION CONTROL, THE GSIM II SERIES NOZZLE COMBINES A LARGE SPRAY CAPACITY WITH A FINE FOG SPRAY OF 50 UM (MEAN DROPLET DIAMETER MEASURED BY LASER DOPPLER

- Efficient gas cooling nozzle: Gas cooling before bag-filter or turbine
- Cooling refractories of torpedo car, heating furnace and converter, befoe maintenance
- Cooling converter shell before maintenance
- Cooling flue gas from electric furnace, converter, sinter plant etc.



The GSIM II series is available in spray angles of 60° and 20°. This means that it can be installed in a smaller gas cooling tower than comparative products. This reduces the construction and maintenance costs.



SURFACE FINISH

BRASIKAN® SERIES FOR DEGREASING, RINSING AND PICKLING ON THE SURFACE OF STEEL PLATES

MANUAL BRUSH-CLEANING NOZZLE HEADER

By turning the handwheel, an internal rotating brush scubs the nozzle orifice and removes foreign objects.

AIR-DRIVEN AUTOMATIC BRUSH-CLEANING NOZZLE HEADER

Driven by air, the automatic brush-cleaning BRASIKan® series allows remote control of spray and cleaning mode. Therefore, it can be installed in a narrow, inaccesible place. With a timer. it can also be programmed to clean automatically.

Increase productivity

- Better productivity as there is no need to interrupt the production line

Increased quality

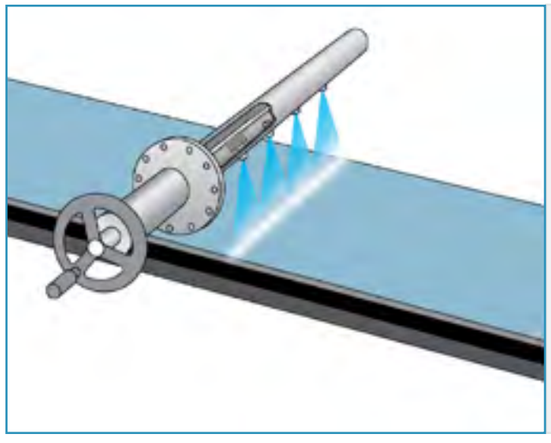
- Higher product quality with steady spraying and a uniform cleaning/ cooling.

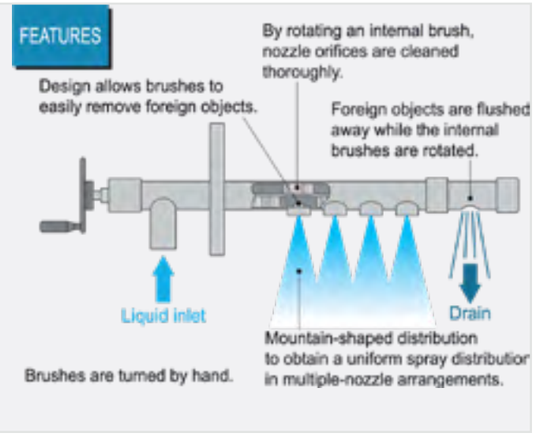
Cost reduction

- Maintenance time and down-time costs are reduced

Simplicity

- Simple to use with a drain, flushing out the foreign objects inside the pipe





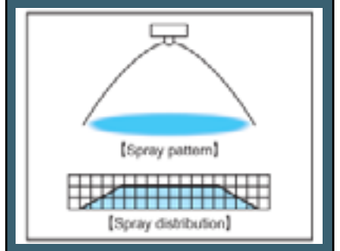
BIM SERIES FOR COOLING

SMALL CAPACITY FINE FOG PNEUMATIC NOZZLE

With a mean droplet diamter of 100 µm or less (measured by Laser Doppler method), the BIM series nozzle produces a fine atomization suitable for:

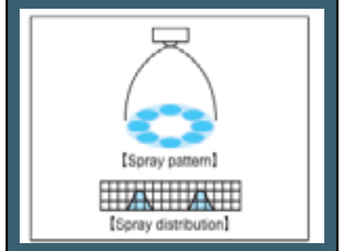
- Cooling steel sheet before top roll after galvaniizing line (CCL)
- Minimizing the spangle treatment at the CGL
- Soft cooling of steel Cooling flue gas from electric furnace, converter, sinter plant etc.
- Cooling steel plates after coating and drying at the continous coating line (CCL)

BIMV FLAT SPRAY



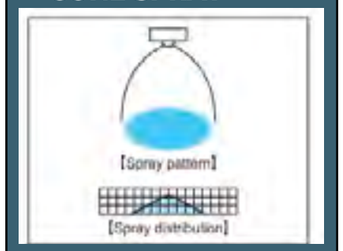
SPRAY ANGLE 45°, 80°, 110° AVAILABLE

BIMK HOLLOW CONE



SPRAY ANGLE 60° AVAILABLE

BIMJ FULL CONE CONE SPRAY



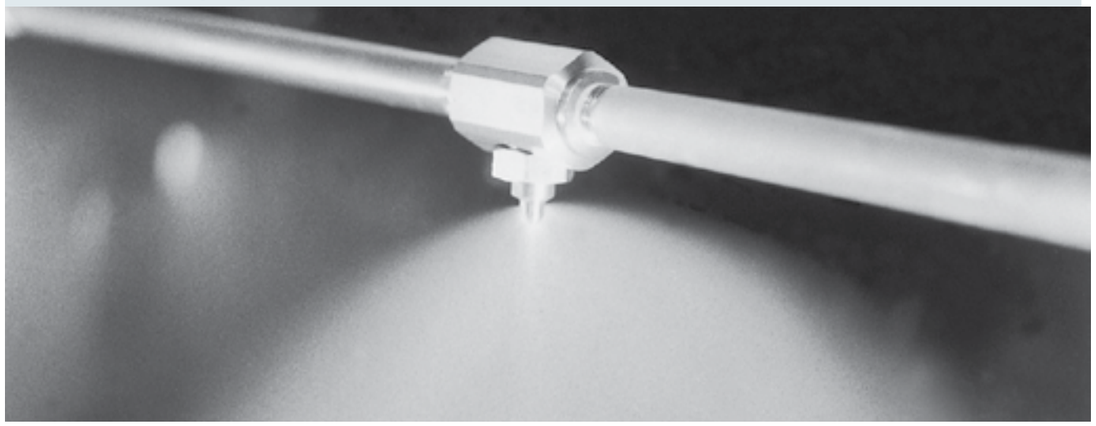
SPRAY ANGLE 20° AND 70° AVAILABLE

Available in 3 types of spray patterns

The BIM series nozzles can be integrated in a spray header to produce a unifirm spray distribution across the entire spray area. It can spray on steel plates effectively and uniformly at high speed.

Compact, efficient and easy installation and maintenance

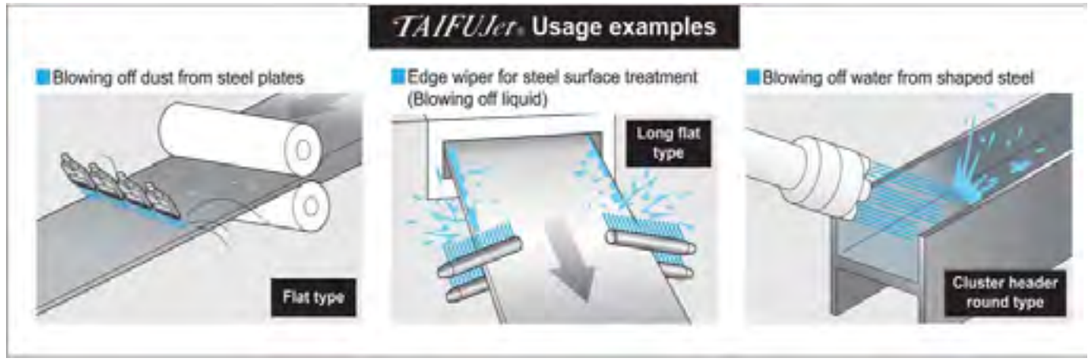
The unique design of the BIM series minimizes clogging and achieves a long-time continuos spray



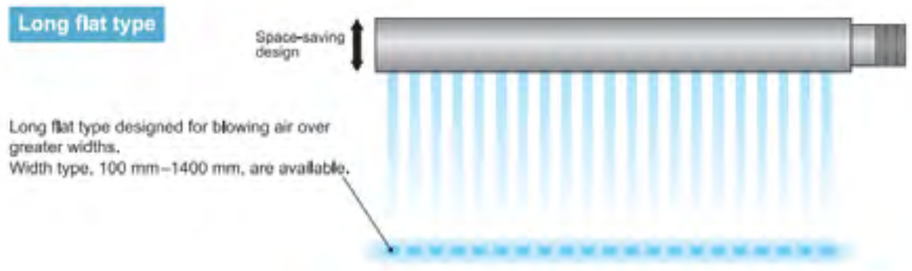
BLOWING OFF

AIR NOZZLES - TAIFU JET SERIES FOR BLOWING OFF DURING THE SURFACE FINISH PROCESS

With a mean droplet diamter of 100 µm or less (measured by Laser Doppler method), the BIM series nozzle produces a fine atomization suitable for:



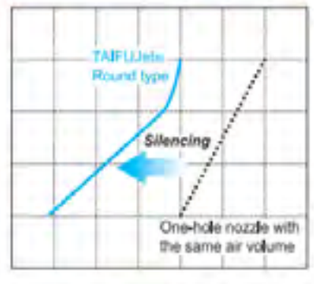
Long flat type



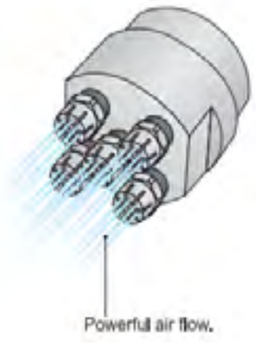
Round type

Noise level reduced by more than 10 dB compared to a conventional one-hole air nozzle with the same air volume.

Noise level comparison



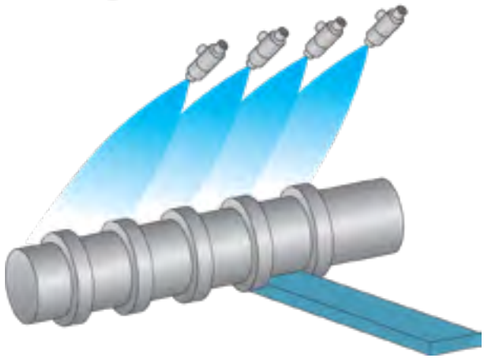
Cluster header round type



DUST SUPPRESSION

Suppressing or containing dust can be done by either lightly wetting the substance you wish to contain, or by fogging. When suppressing dust by spraying water, our fogging units spray small water droplets the same size as dust particles. These water droplets collide with the dust particles mid air and weigh them to the ground.

Dust suppression around exit of rolling mill



DUST SUPPRESSION DURING THE IRON AND STEEL MAKING PROCESS:

- AT THE CONVEYOR LINES FOR IRON ORE, LIMESTONE AND COKING COAL
- AT THE COKE PLANT ON CDQ
- AT THE BLAST FURNACE FOR SCATTERING CRUDE IRON
- AT THE SLAG YARD AND PIT

ADVANTAGES:

- Low cost dust suppression solution
- Avoid hazardeous airborn contamination
- Avoid dust related defects
- I mprove the working

HYDRAULIC NOZZLES:

- VVP series (flat spray)
- AJP series (full cone spray)
- KB series (hollow cone spray)

PNEUMATIC NOZZLES

- BIM series
- GSIIMII series

AIR NOZZLES

- Air nozzles

With air suction: EJA series

- Cooling fan unit: CLJ series

GSIIMII series

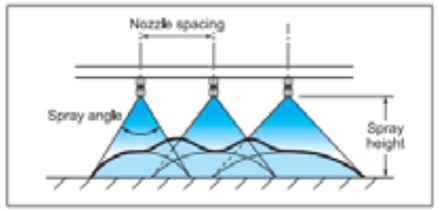
VVEP SERIES FOR COOLING OF PLATES AND ROLLS IN HOT STRIP MILLS

EVEN DISTRIBUTION NOZZLE MADE IN FULL METAL, FOR ROLL COOLING AT THE ROUGH ROLLING AND FINISH ROLLING

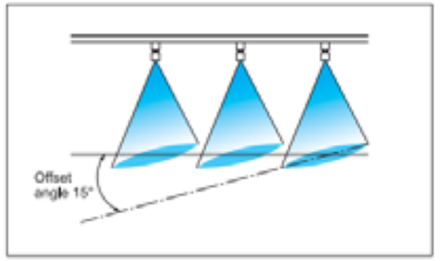
The VVEP is available with an ultra-wide spray angle of 130º and with a spray capacity from 10.0 L/min and up.

Uniform spray distribution with multiple VVP nozzle alignment

The standard flat spray nozzle is designed to produce a mountain-shaped distribution in order to obtain uniform spray distribution in multiple nozzle alignment.
If some nozzles do not spray as specified, the desired spray distribution in nozzle alignment can not be obtained.
This is why IKEUCHI guarantees our precision nozzle performance.



By positioning nozzles with an offset angle of 15° and overlapping at both ends, interference from adjacent sprays is prevented and uniform spray distribution can be maintained.



For inquiries / information requests / quotations related this product, please contact us

Ikeuchi Europe
いけうち The fog engineers

"Taking the path less traveled"

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