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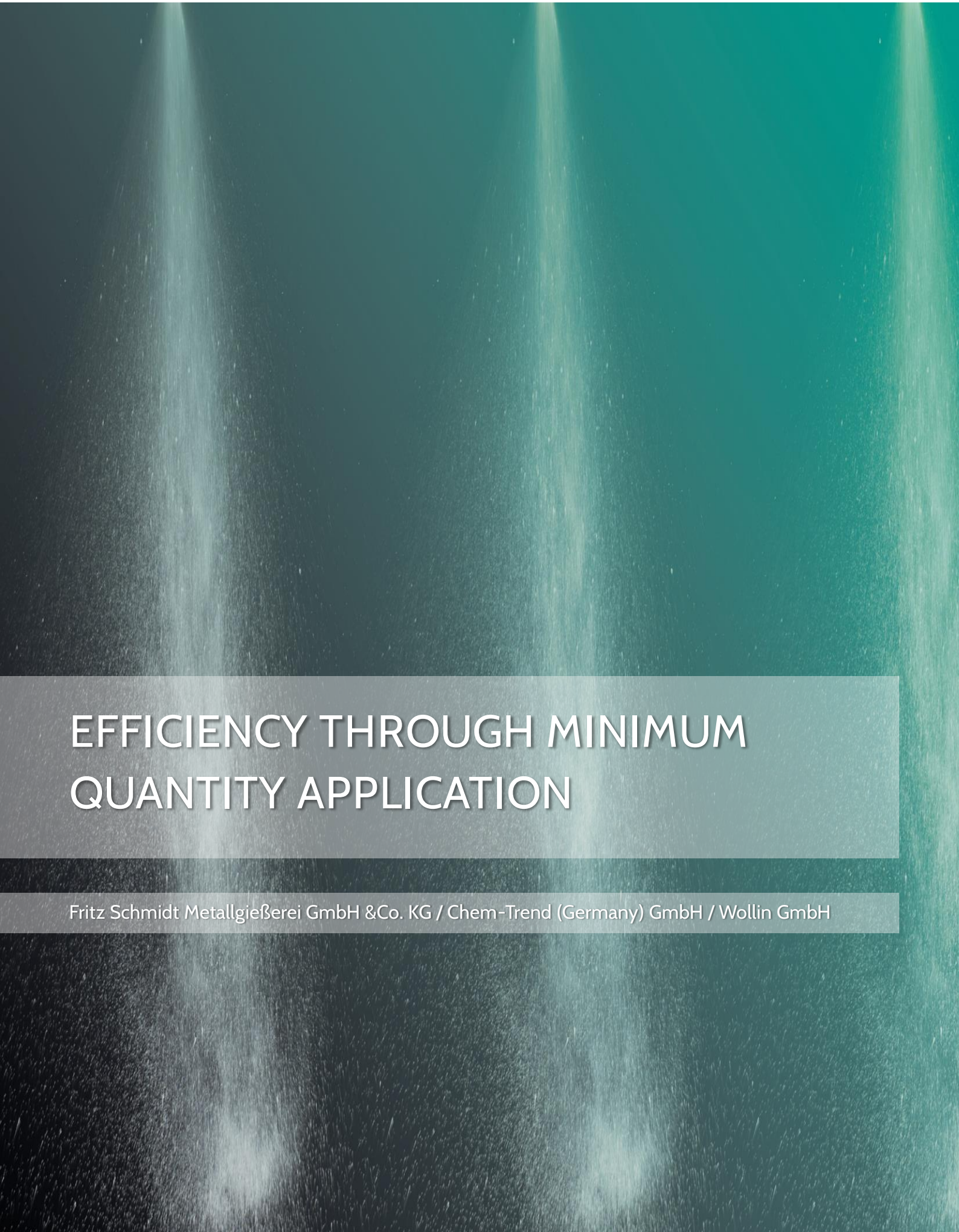
SYSTEMATIC SPRAYING TECHNOLOGY



EFFICIENCY THROUGH MINIMUM QUANTITY APPLICATION

Fritz Schmidt Metallgießerei GmbH &Co. KG / Chem-Trend (Germany) GmbH / Wollin GmbH

Case study - Efficiency through minimum quantity application

Status Quo & Requirements

Fritz Schmidt Metallgießerei GmbH & Co KG carried out a trial to prove the suitability of a simple, standard die tempering system for the use of minimum quantity application ('MQA'). An attempt was made to save costs and increase the output through various measures.

The intended goals were:

- Reduction of energy costs
- Reduction of die costs by achieving longer die service lives
- Reduction of water consumption and waste water costs
- Reduction of cycle times
- Reduction of compressed air consumption (lower noise emission)
- Reduction of rework costs through reduced die wear
- Reduction of air and hall pollution (fire load)
- Less energy required by using FSD nozzles in combination with pressurized water units for increased cooling capacity in less time
- No or less heat transfer oil in use, thus cost reduction in procurement and reduction of the ecological footprint.

The test was carried out using Wollin's EcoSpray technology and the water-based release agent concentrate HERA™-light Chem-Trend® SL-68504 from Chem-Trend.

Test preparation

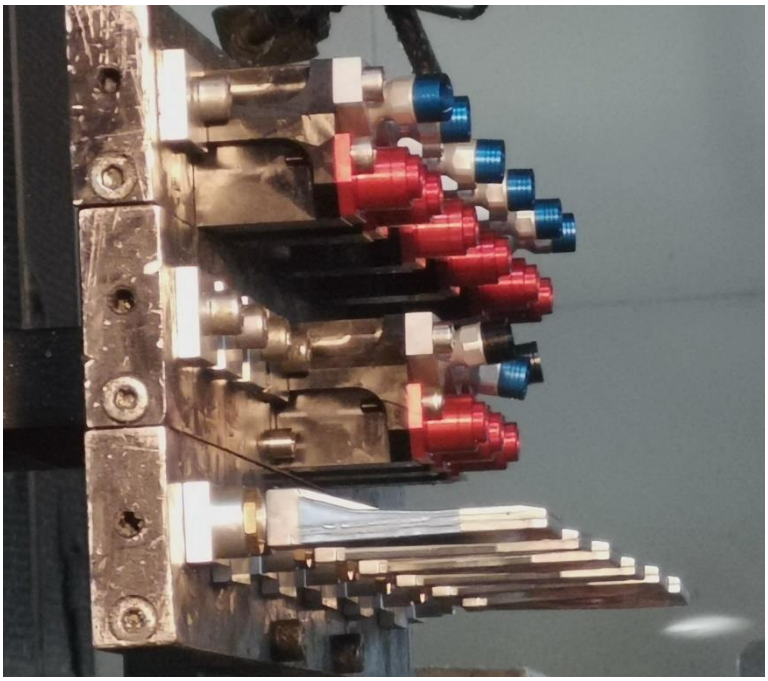
In the run-up to the experiment, all relevant parameters of the conventional spraying and casting process were documented. IR images were also taken for this purpose. Chem-Trend® SL-7732 was used as the release agent in a dilution of 1:83.

In order to be able to carry out the minimum quantity application, some modifications had to be made to the system and the spraying tool. Among other things, a release agent supply system from Wollin was connected, the spraying tool was modified, two single-circuit oil heating and cooling units were replaced by a dual-circuit water heating and cooling unit, and a float flow meter was installed. The lines carrying the release agent were flushed with Chem-Trend® DC-456 system cleaner and then rinsed with water. The Wollin OSA release agent storage tank was filled with Chem-Trend® SL-68504 diluted 1:5.

Ball nozzle type	KD-A-L-06	NEW KD-A-L-08	NEW KD-A-L-10	NEW KD-A-L-12	NEW
Spray pattern	Flat jet	Flat jet	Flat jet	Flat jet	
Bore diameter of parting agent bores	0,6 mm	0,8 mm	1,0 mm	1,2 mm	
					

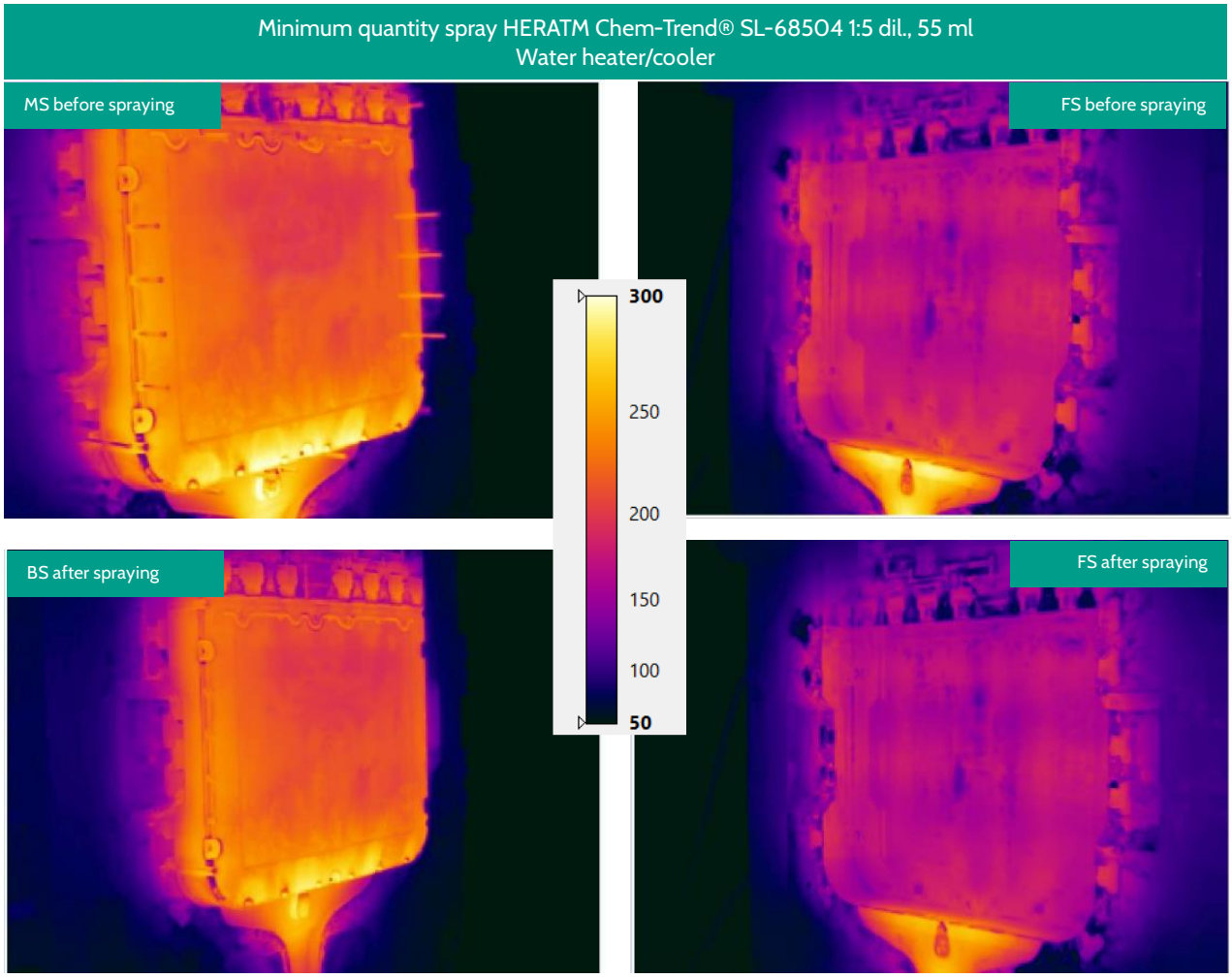
After the rebuild phase, the spray tool was also flushed, cleaned and fitted with adapter modules to achieve a spray distance of less than 150 mm. All Wollin SD nozzles were removed and replaced with Wollin FSD nozzles. Except for 2 KD-A-06 ball nozzles, only KD-A-L-08 and KD-A-L-10 were installed.

A spray program was created and the spray and medium pressure were also adjusted.



Wollin spraying tool with FDS nozzles and KD-A-L ball nozzles

Images of the experiment



Result summary from test execution

In the test, sufficient die temperature control was achieved by minimum quantity application with the release agent HERA™ Chem-Trend® SL-68504 diluted 1:5.

In summary, it can be said that for successful performance of minimum quantity application, a water-operated heating-cooling unit is necessary for sufficient die temperature control. Approximately 200 shots were fired in the test and the separation effect could be evaluated as acceptable after adjusting the nozzle orientation. The part surface showed slight streaking, but was good according to Fritz Schmidt's quality assurance department. Dimensional accuracy was also within tolerance.

All defined targets could be achieved with the minimum quantity application process.

By using it with a simple, standard die temperature control system, the minimum quantity application process achieved energy savings of 72% for the heating/cooling equipment.

By reducing the quantity of release agent spray, the consumption of release agent concentrate was reduced by ~60%, and the lower release agent application reduces the thermal load, which means that a longer die service life can be expected.

In addition, the use of MQA technology has reduced the cycle time by 18%. This means that more parts can be produced in the same time, which leads to an increase in output.

Another goal of the trial was to reduce water consumption and wastewater disposal costs. By using Wollin EcoSpray technology, water consumption was reduced by 97%, resulting in significant cost savings. The costs for wastewater disposal are eliminated completely.

The reduction in compressed air consumption also led to a reduction in noise emissions, which improved working conditions in the foundry. The shorter spray/blow time at lower pressure reduced compressed air consumption by ~ 76%.

Comparison of conventional spraying and minimum quantity application at Fritz Schmidt

Results of the spray test	Conventional Spraying	EcoSpray	Comparison
Concentrate usage	21 ml	8,3 ml	-60%
Cycle Time	59 s	48 s	-18%
Energy savings (tempering of die cast mould)	0,178kW	0,05kW	72%
Compressed air (Standard litre)	2.100	500	-76%
Fresh water	~ 1.800 ml	~50 ml	-97%
Waste water	> 1.500 ml	~ 0 ml	-100%
Output shots	61	75	+22%

* the measured values refer to per shot

A comparison video can be viewed here.

Conclusion

Overall, the use of MQA technology in combination with the water-based release agent HERA™ Chem-Trend® SL-68504 resulted in significant cost savings and productivity improvements.

The trial shows that even a simple die tempering system of standard design can be suitable for the use of minimum spray technology when combined with the right equipment and technology.

In conclusion, it can be stated that Fritz Schmidt Metallgießerei GmbH & Co. KG was able to increase productivity and reduce costs by using MQA technology and the water-based release agent HERA™ Chem-Trend® SL-68504. The trial shows that it pays off to use innovative technologies in the foundry industry to produce more economically and sustainably.

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