



Air-cooled UV Curing System

**Robert Rae**

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**UV solutions** for demanding  
printing applications



**...engineering UV**



# Aero LED<sup>®</sup>

Air-cooled UV Curing System



AIR-COOLED



ENERGY  
EFFICIENT

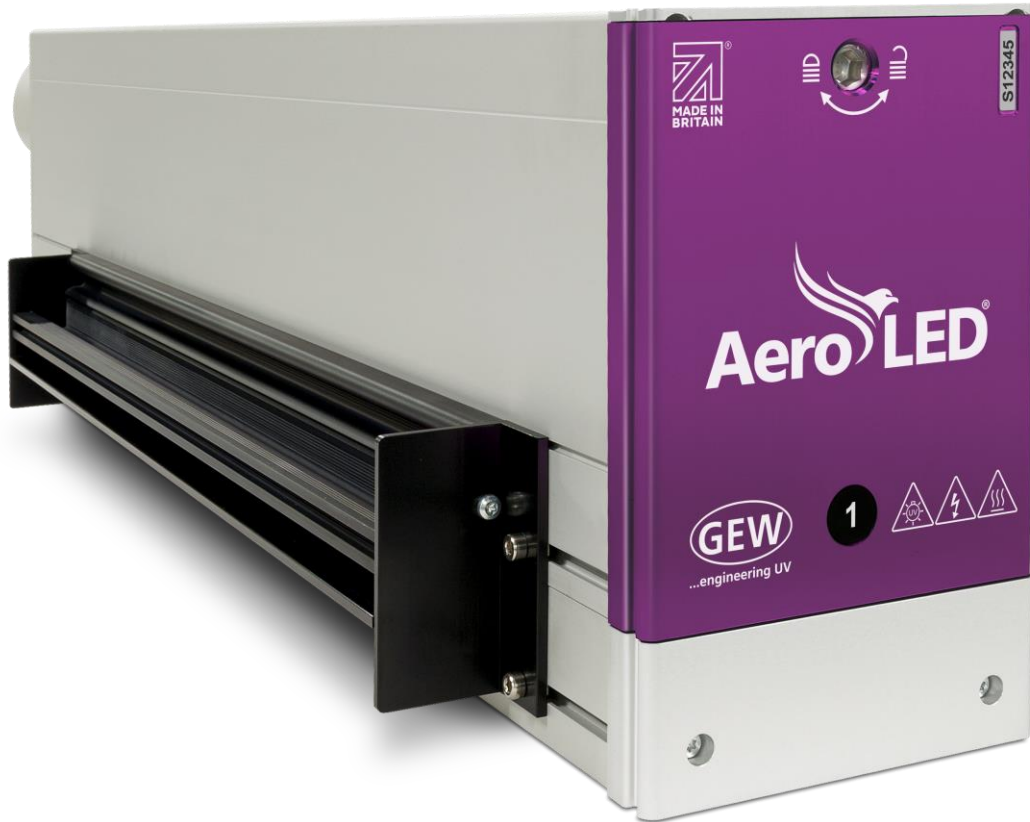


PROCESS  
RELIABILITY

**UV LED...**  
**made simple**



# AeroLED



AIR-COOLED

Fully air cooled from single\* fan with filtered air



ENERGY EFFICIENT

Step change energy consumption and installed power



PROCESS RELIABILITY

Process reliability with consistent output and reliability from shared LeoLED components



...engineering UV

\*Number of lamps per fan length dependent

# Physical Dimensions

## Concept:

- Outer dimensions match E2C
- Outer casing same as E2C
- Maximum 60cm lamp length

## Benefit:

- Any press that fits E2C, can fit AeroLED
- Mounting and shielding is identical to E2C
  - Easy field upgrades
  - No press design changes required

**110mm W**  
**190mm H**



N.B. AeroLED cassette  
is larger than E2C



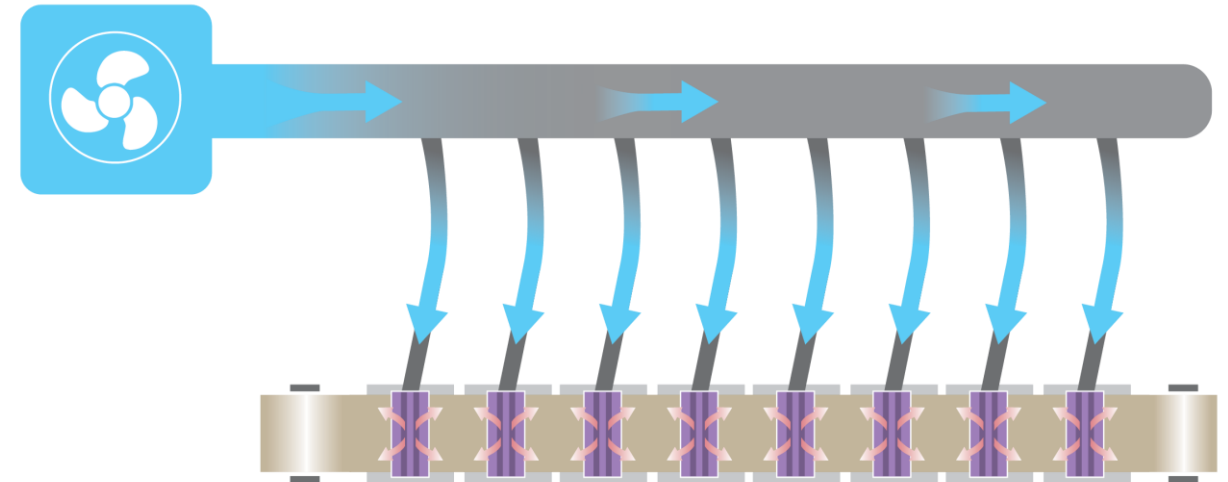
# Distributed Air Cooling

## Concept:

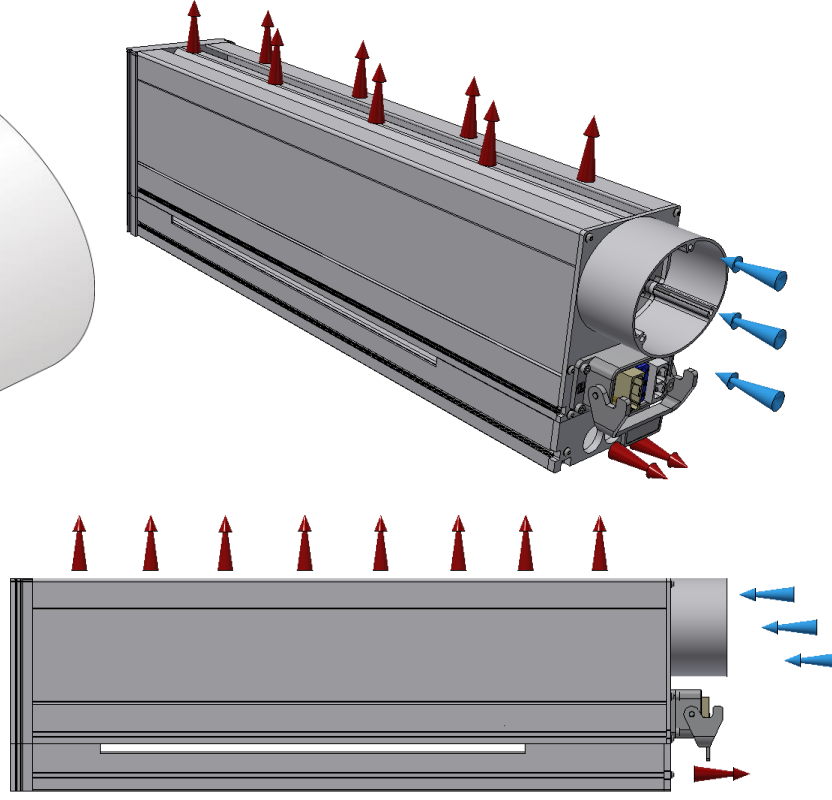
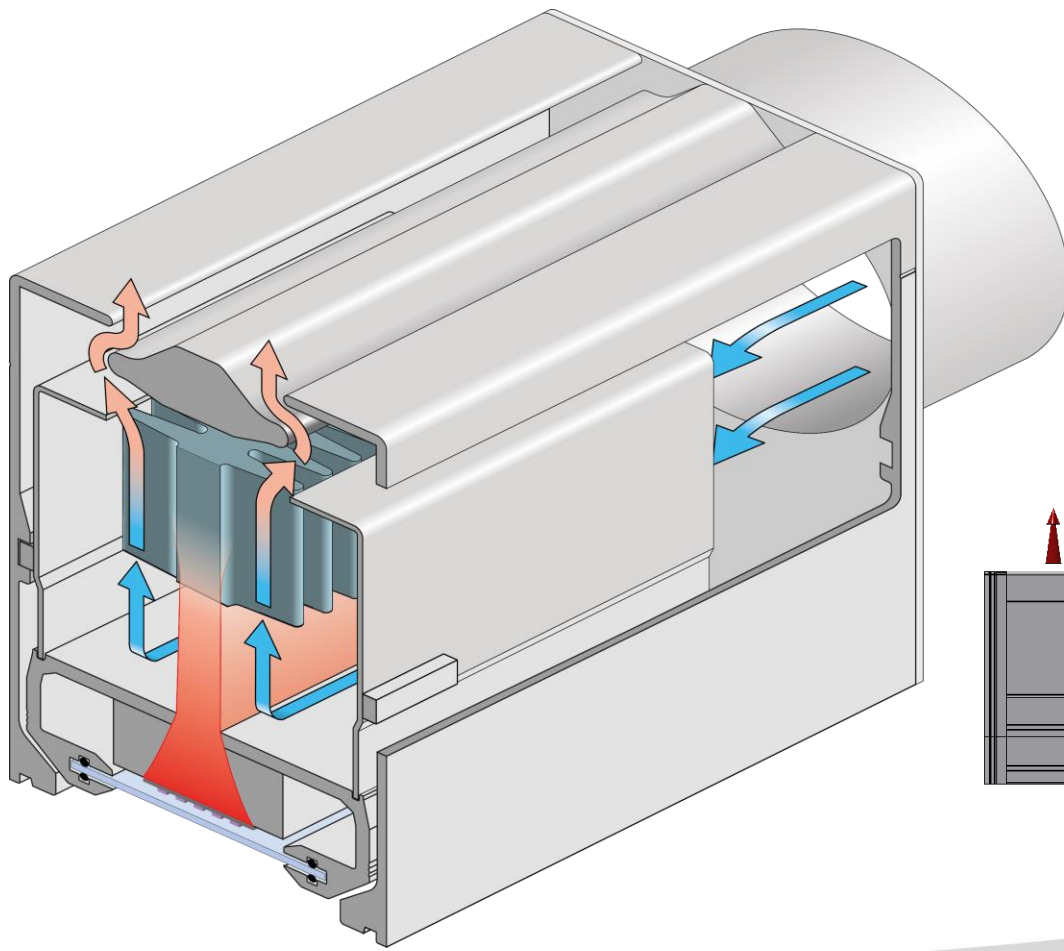
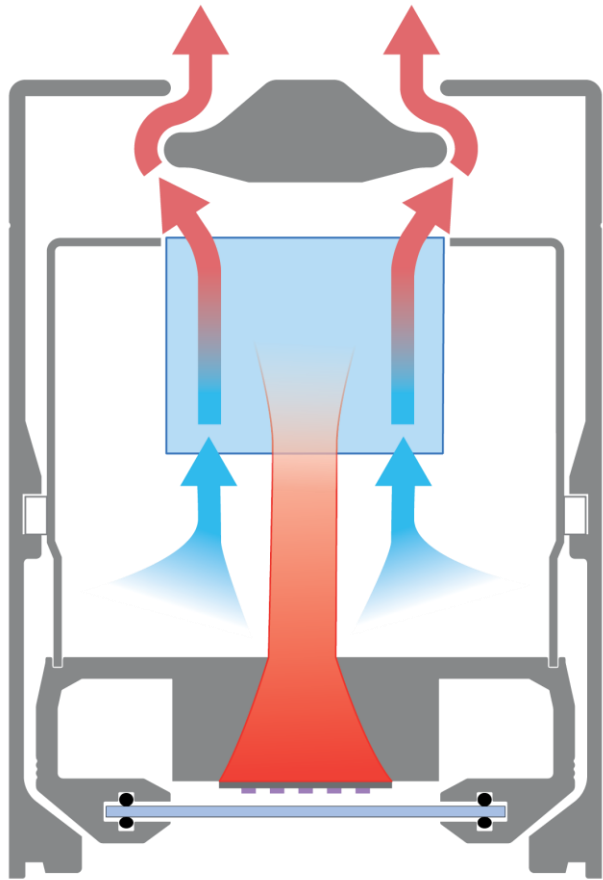
- Forced air cooling brings cool, filtered air into lamphead
- Warm air exits lamphead at top of casing

## Benefits:

- Same fan and ducting as E2C but in reverse
- No integrated electronics on the lamphead – reduces complexity and increases reliability
- Only 1 fan per system instead of 4-5 small fans per lamp!



# Distributed Air Cooling – further views



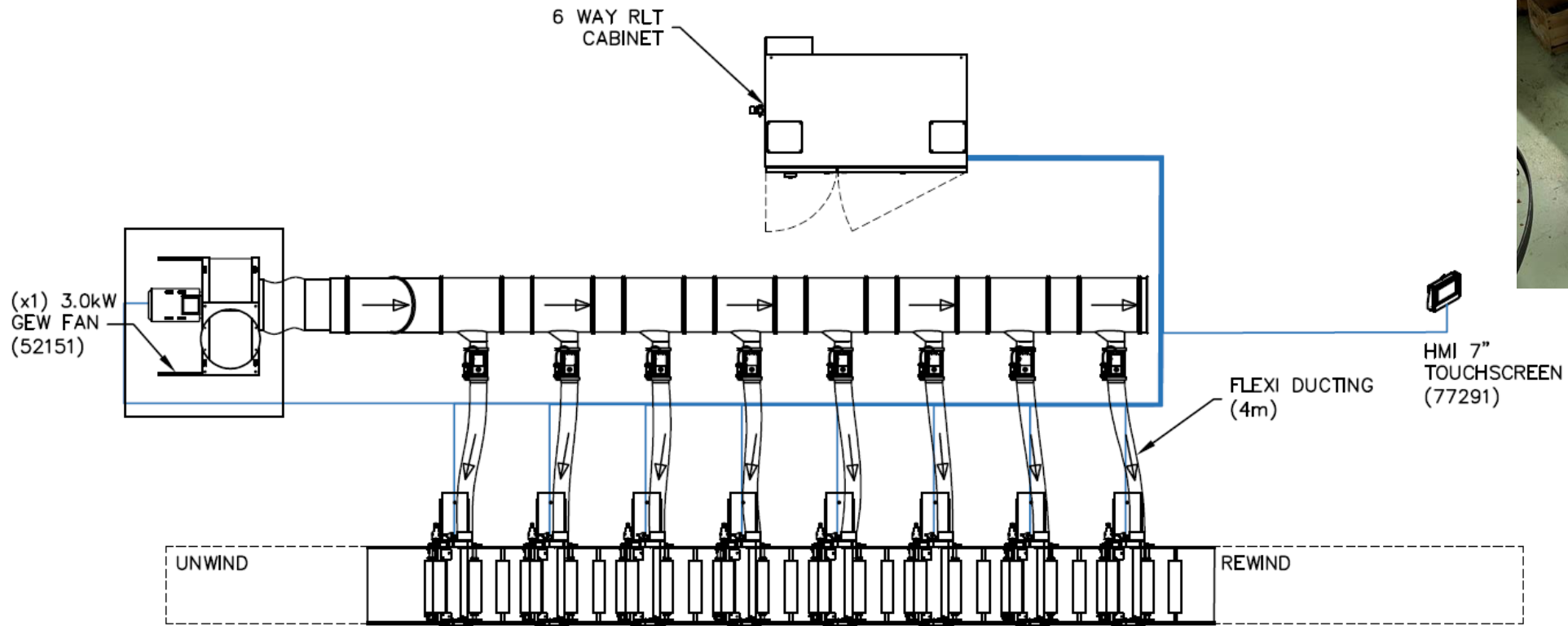
# Distributed Air Cooling

## Concept:

- Forced air cooling distributed from single fan ( $\leq 6$  lamps 60cm) at rear of press

## Benefits:

- Quiet operation at comfortable pitch (i.e. no squealing fans on press)
- Fan filter position behind machine is cleaner (e.g. no ink mist to clog filters)
- Large air filter reduces replacement cycle on filter unit



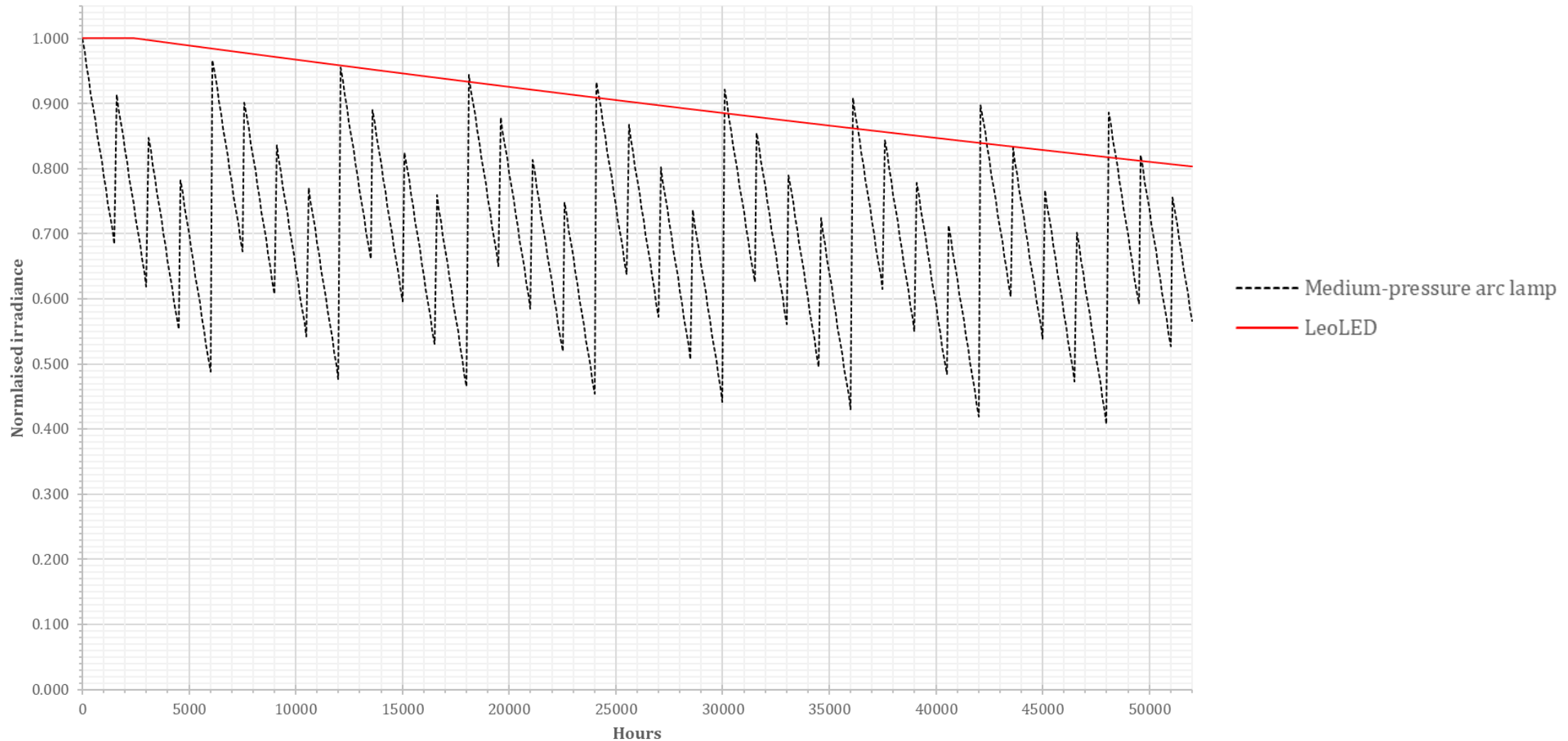
## KEY

- PRESS
- CABLES
- WEB
- LAMPHEAD
- RLT CABINET
- FAN & DUCTING

# Process Reliability

## A step change in process reliability

LED output is stable & predictable – therefore UV curing is stable & predictable

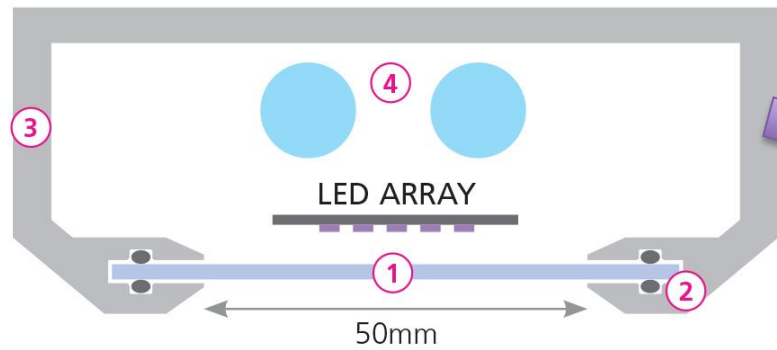




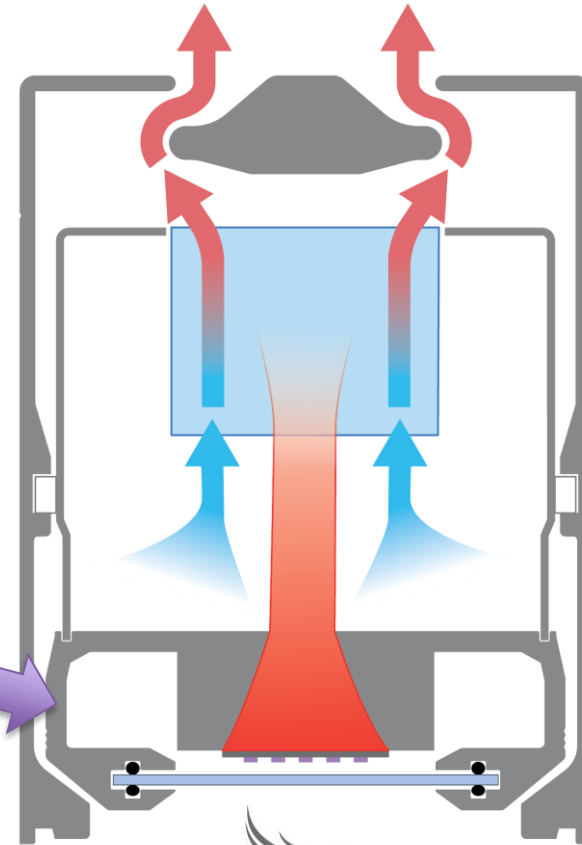
# Product Reliability

## AeroLED is “same” as LeoLED

- Critical elements for reliability are exactly the same as LeoLED:
  - LED modules
  - Quartz window, seals & window holder
  - Electrical connections to LED modules
  - Temperature sensors
  - All cables & connectors



Leo LED®



Aero LED®

New patents pending:  
heat transfer and  
cooling mechanisms

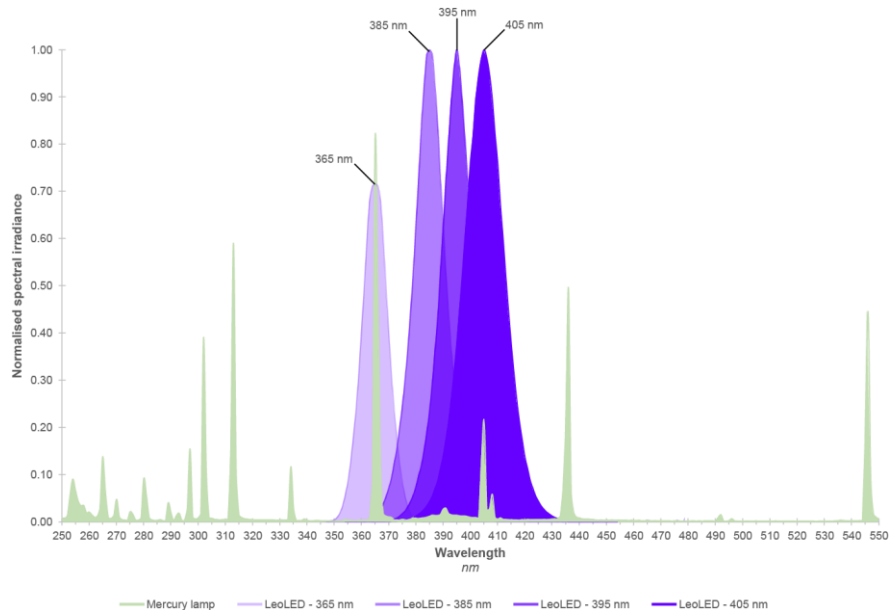
# High power for standard applications

## Concept:

- 62W/cm
- 20W/cm<sup>2</sup>
- 180mJ/cm<sup>2</sup>
- 395nm as standard (365, 385, 405nm available)

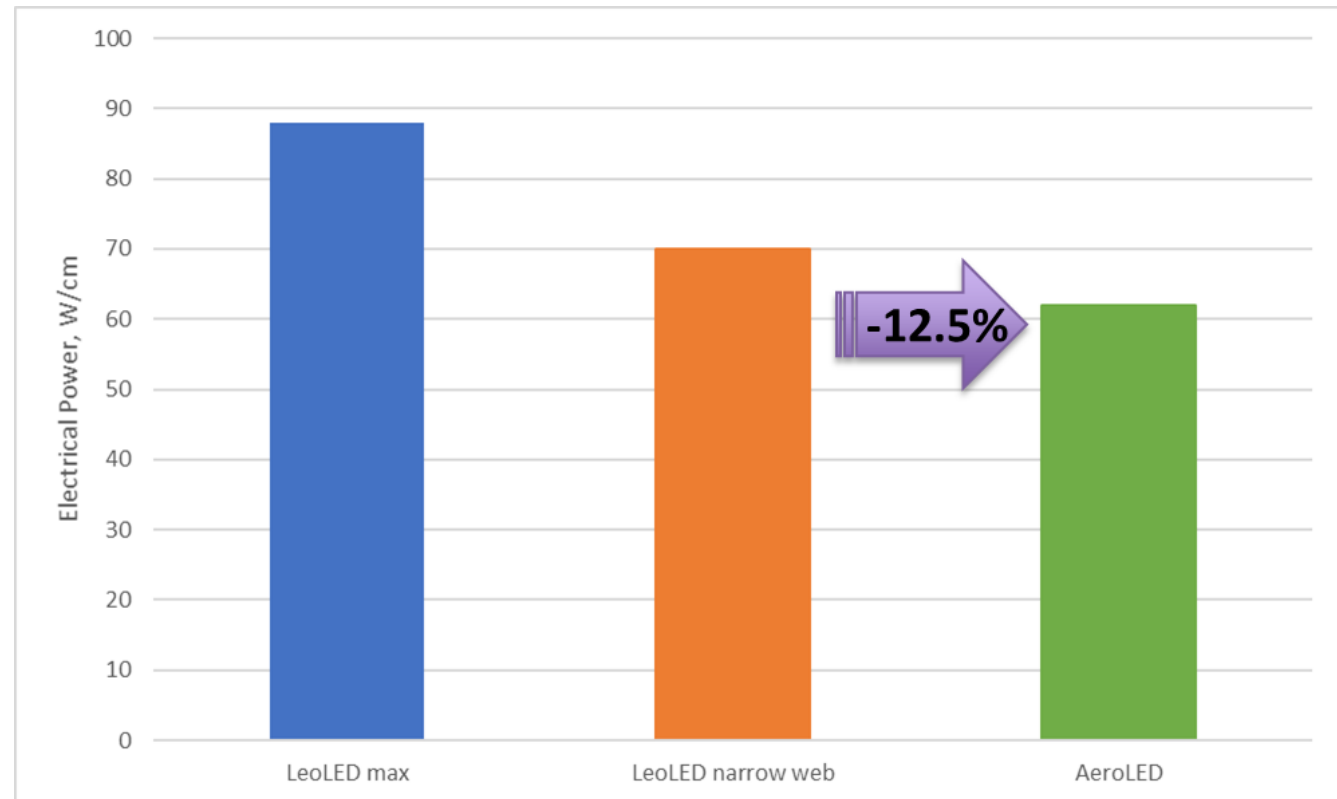
## Benefit:

- Only 12.5% less power than LeoLED for narrow web
- For standard applications this is plenty of power



## Notes:

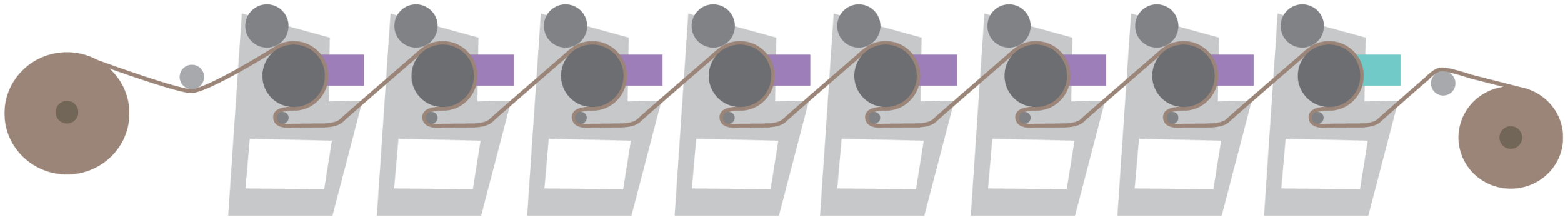
- For demanding applications and ArcLED → LeoLED required



# DualTech

## DualTech versatility

- AeroLED can be combined with Arc lamp curing technology on the same press
- Same Rhino power and control but **fixed print stations**
- Cassettes cannot be interchanged



■ AeroLED lamphead

■ Arc lamphead

\*Arc and AeroLED cassettes are not interchangeable, each print station will need to be specified to run one type only.

N.B. Separate fan and ducting required for arc lamps

# Cut energy costs

## Energy savings of 50-70% versus arc lamps

UV ROIs on retrofit can be <2 years!

No chiller/heat exchanger makes big difference to total price & energy costs

### ROI example:

- 45cm 8 lamp system
- **€29,000 annual savings** → Typically ~24 month ROI

UV system specifications	E2C	AeroLED	Notes
Length	45cm	45cm	Length of lamp / LED array
Power	140W/cm	62W/cm	Input power of lamphead
Number of UV lamps	8	8	Number of UV lampheads on the press

Total operating cost	E2C	AeroLED	Notes
Total annual operating cost	46,271 EUR	17,376 EUR	Estimated annual operating cost

Comparison		Notes
Annual savings from AeroLED	<b>28,895 EUR</b>	Estimated annual savings of AeroLED system over arc system
Energy saved annually	<b>92,195kWh</b>	53.6% reduction in energy usage annually
Carbon footprint reduction	<b>23.60 Tonnes of CO<sub>2</sub></b>	Estimated carbon footprint reduction per annum

Assumptions	
Mains Voltage (V)	380V
Mains Frequency (Hz)	50Hz
Duty cycle	60%
Days per year	312
Shifts per day	2
Hours per shift	8
Energy cost	0.2 EUR

# Free up mains capacity

## Concept/Benefit:

- No chiller/heat exchanger required
- Fan is powered through GEW cabinet
- Only 1 power connection for the UV system → Total installed power reduced 40-60% over LeoLED & 50-70% over arc

## E2C

E2C-47-8



Cabinet – 65kVA

## Leo LED

LEO-47-8



Cabinet – 35kVA  
Chiller – 20kVA

**-15% (10kVA)**

## Aero LED

AERO-47-8



Cabinet – 30kVA

**-54% (35kVA)**

# Free up mains capacity

Retrofit 2 machines → Save enough power for a new press!

**E2C**  
E2C-47-8



Cabinet – 93A  
Press - 63A\*  
Total – 156A

**x2 = 312A**

**AeroLED®**  
AERO-47-8



Cabinet – 45A  
Press – 63A\*  
Total – 108A

**x3 = 324A**

\*Based on basic 8 colour press

# Retrofit in less than 1 day

IF YOU HAVE  
any of the  
list below

You will need these  
AeroLED system components:

	AeroLED Lamphead	RHINO/RLT & HMI	Fan & Ducting	Shielding	
E2C & RHINO/RLT system	✓	✗	✗	✗	→ >20,000 lampheads
E2C & eBrick system	✓	✓	✗	✗	→ >20,000 lampheads
Any other system	✓	✓	✓	✓	



...the most affordable route to LED printing

Air-cooled UV Curing System



# AeroLED key attributes

- Fully air cooled from single fan
- Proven reliability – same chassis as LeoLED
- Only 12.5% less power than LeoLED narrow web
  - 20W/cm<sup>2</sup>, 62W/cm
- Typical energy savings 50-70% over E2C
- Installed power reductions 50-70% over E2C
- ~35% cost savings over LeoLED
  - ROIs for end customer retrofit ~2 years.
  
- Maximum 35°C ambient at full power (de-rated thereafter)
- ArcLED not available
  - But fixed station hybrid systems possible (“DualTech”)



# Specifications: AeroLED vs LeoLED

Parameter	LeoLED	AeroLED
Max electrical power	88W / cm	62W / cm
Peak wavelength	395nm**	395nm**
Irradiance at window	30W / cm <sup>2</sup> *	20W / cm <sup>2</sup> *
Typical dose @ 100m / min	270mJ / cm <sup>2</sup> *	180mJ / cm <sup>2</sup> *
Maximum length	170cm	60cm
Standard cross section	110mm W x 190mm H	110mm W x 190mm H
Cooling	Water	Air
Standard max operating temperature	40°C (104°F)	35°C (95°F)
Standard max humidity	Non-condensing	Non-condensing
ArcLED compatible	Yes	No
DualTech system***	Yes	Yes

\*Measured under standard GEW lab conditions with a standard lamphood configuration

\*\*365nm, 385nm & 405nm available upon request

\*\*\* Arc and LED "hybrid" system possible in fixed positions on machine



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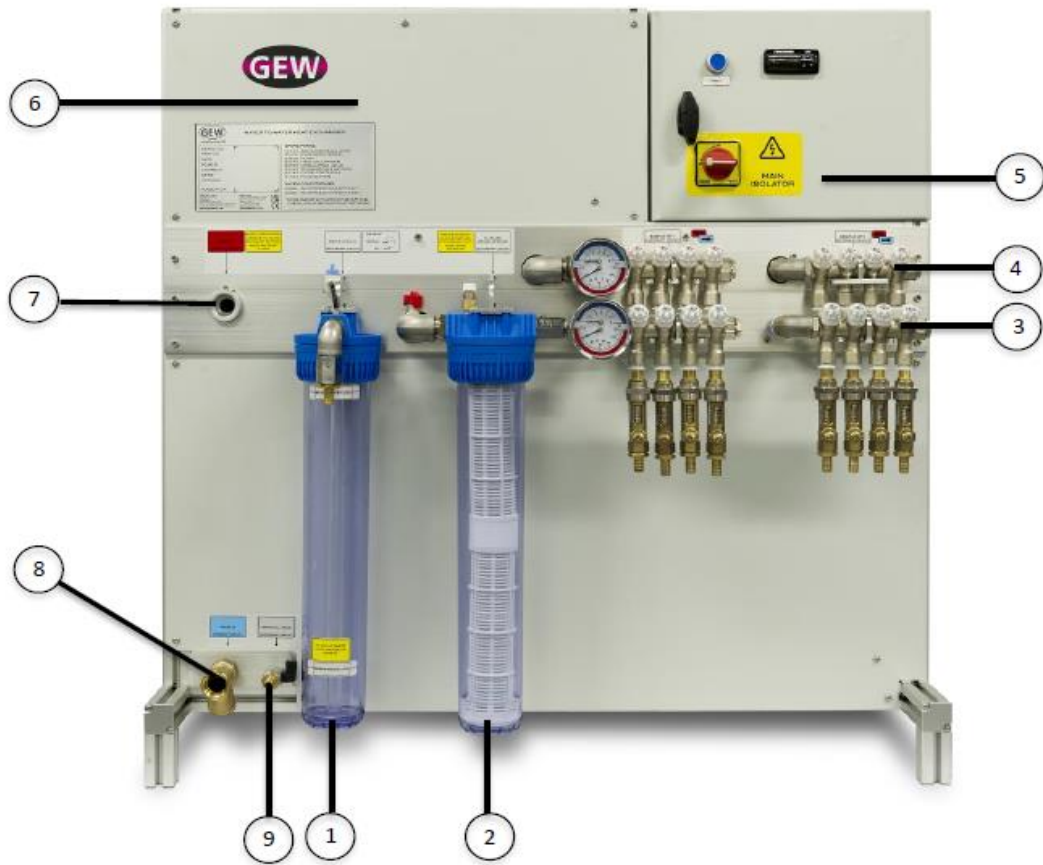


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# GEW Heat Exchanger



- 1 Auto-fill unit, secondary circuit.
- 2 Filter, secondary circuit.
- 3 Water manifold – FLOW, secondary circuit.
- 4 Water manifold – RETURN, secondary circuit.
- 5 Control box.
- 6 Service panel.
- 7 Water – OUT, primary circuit.
- 8 Water – IN, Primary circuit. Includes strainer.
- 9 Fill / Drain, secondary circuit.

- Opportunity to reduce cost & complexity on water cooled systems
- Too many refrigeration systems for presses with water cooled UV!

# GEW Heat Exchanger

PHYSICAL ATTRIBUTES	
Physical dimensions (mm)	W1082 x D712 x H1060
Construction	Anodised aluminium extrusion frame with 1.2mm Zintec powder coated panels
Mounting type	4 x aluminium feet
Acceptable environment	Indoors
Dry weight (kg)	130kg
Wet weight (kg)	140kg
Noise level (dB(A)@1m)	55dB@1m
Toolless access	No
TEMPERATURE CONTROL ATTRIBUTES	
Technology	Water-to-water heat exchanger
Control method	Modulating valve
Temperature stability	±0.5°C
Cooling capacity condition 1	50kW (primary flow minimum 5°C below process set-point)
Maximum ambient	+40°C
Design flowrate	100L/min
Temperature range (standard)	+15°C to 40°C
Temperature resolution	0.1°C
Maximum Total Heat Rejection	Applied load, plus power in

WATER CIRCUIT ATTRIBUTES	
System volume	10L plus application volume
Pressure relief control	6 Bar bypass valve, 10 Bar PRV
Standard fittings	1" BSPP F
Standard chemical compatibility	Water, Prop. Glycol
ELECTRICAL ATTRIBUTES	
Range	380-480Vac +/-10% – 50/60Hz 3ph + Earth
Power	3kVA @ 380Vac 50Hz
Current	6A @ 380Vac 50Hz
Overcurrent restart mode	Manual
SAFETY INTERLOCKS, STANDARDS & INDICATORS	
1st party approvals	UKCA, CE, self-cert
Low fluid flow alarm	No
House water pressure alarm 1	No
Process water pressure alarm 1	No
Temperature out of range alarm 1	Yes – to stop "chiller OK" signal
Temperature out of range alarm 2	Yes – to stop pump until manual reset
Motor thermal overload	Yes – in inverter control
Emergency off	No
Interlock restored restart mode 1	>8°C above set point (Automatic reset) >40°C High alarm (Manual reset)

# GEW Compact Cassette Laboratory

## Quality control tool for customers

- Detect ageing of UV lamps
- Detect ageing of reflectors
- Detect spot contamination on lamps/quartz

<https://youtu.be/O6RCFsv2sQs>



**Compact Cassette Laboratory Unit:** 1- Cassette adaptor housing. 2- Sample carrier & access hatch. 3- Densitometer, mounting slider & guide rule. 4- GEW Touchscreen<sup>2</sup> HMI. 5- Control panel.





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