JM & JMv Axial Fans

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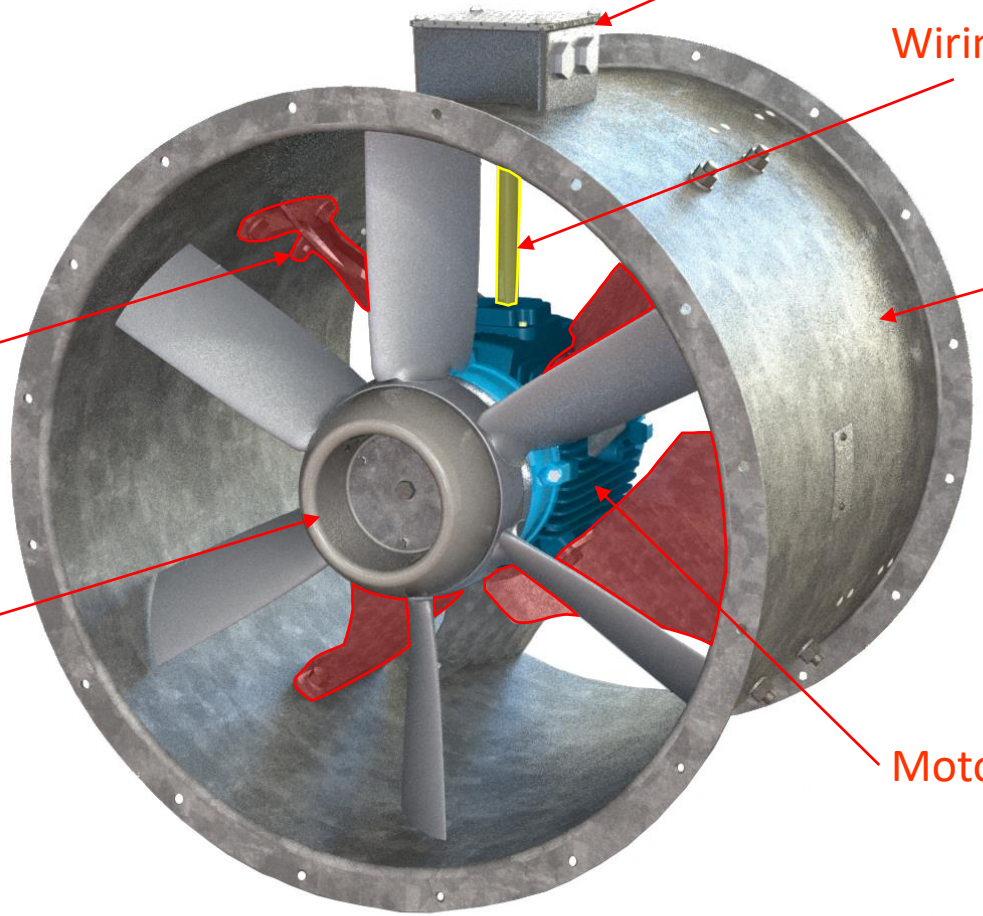
14th July 2021 (v4.0)

JM AXIAL FLOW FAN - TOPICS

- JM fan: Key Fan Components & Variants
- Axial fan Performance capabilities
- Aerofoil impeller blade design
- Axial fan Customer benefits:
  - High Air volumes
  - High Efficiency
  - Easy installation

Axial Flow Fan – Key Components



Axial fan v Centrifugal Fan Comparison

Axial Flow Fan Features

- ✓ Small Footprint
- ✓ Easy Installation & Removal
- ✓ Ductwork is inline (easy to install)
- ✗ Efficiencies up to 85% (v 88%)
- ✓ Direct, Belt or Coupling drive
- ✓ High Frequency Noise, easy to attenuate
- ✓ Adjustable geometry (flexible solution)
- ✓ High Volume / Medium Pressure
- ✗ Limited operating temperature (Aluminium)
- ✓ Extended operating temperatures with Steel impellers

Basic Product Variants: Scope & Features

JM Axial Fan

- **315 – 1600 mm diameter**
- **Adjustable Pitch Die Cast Impellers**
- R20 Series Progression
- **Multiple Motors Options**

  : 2 to 8 Pole Speed
- **Multiple Impeller combinations**:

  : 6 Hub diameters; 3, 6, 9 or 12 Blades
- **Long, Short and Plate Mounted**
- Pad & Foot Mounted Motor alternatives
- **Steel Casing & Arms Hot Dip Galvanised**
- Range of Guide Vane variants
- **Unique high Efficiency, low noise Aerofoil Blade Section**
- **X-Ray examined Impeller parts**

JM Axial – Casing Options

Long Case Fans

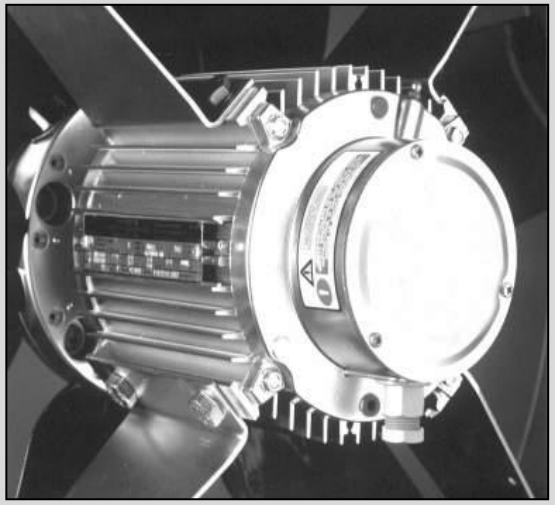
- Duct covers both Impeller and Motor
- Easy to remove from Ductwork
- Standard choice for HVAC

Short Case Fans

- Duct only covers Impeller – motor is exposed
- Often used at the start of a duct run
- Suited for OEM equipment cooling

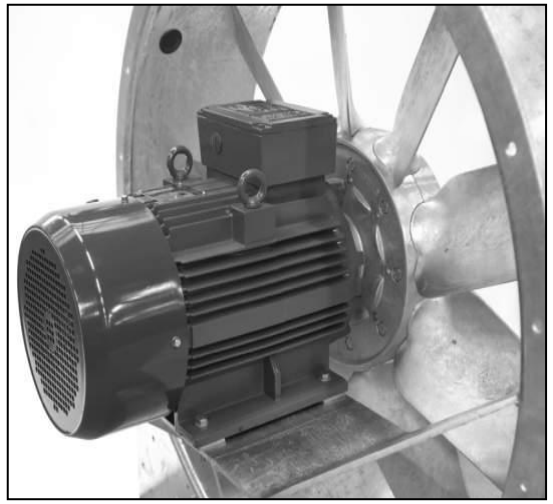
JM Axial – Motor Mounting Types

Pad Mounted



Motor is centred in Duct using four Mounting Arms. Aerodynamically preferable in smaller Fans. Only available from a limited number of suppliers

Foot Mounted

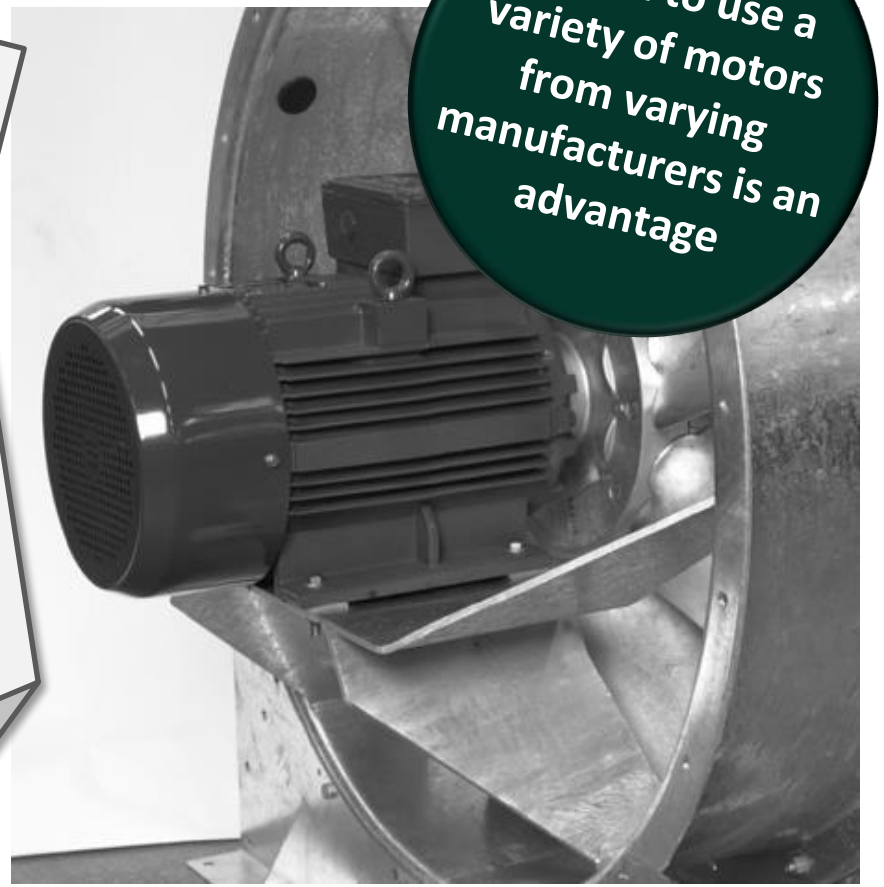


Motor is bolted to horizontal platform. Heavier and more expensive Fan. Motor format is standard for many Motor suppliers. Not suitable for Fans less than 500mm diameter due to high aerodynamic losses

JM Axial – Product Variants: Short Cased Fans

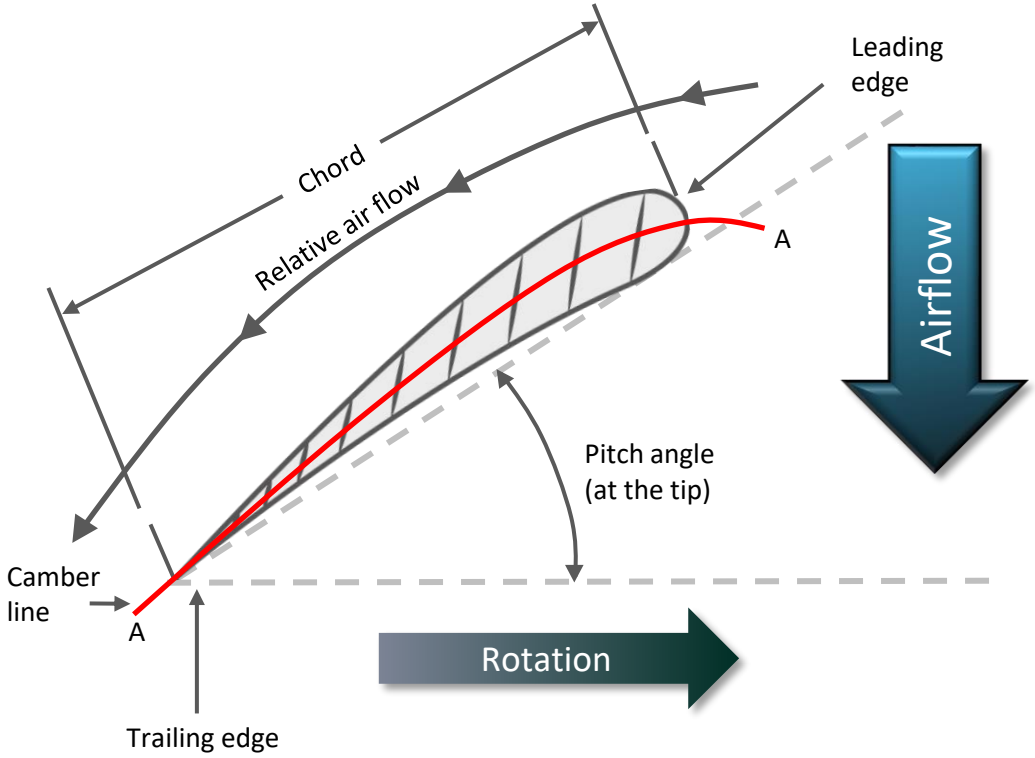
Short Cased Fan Range

- 500 – 1600 mm
- R20 Series Progression
- 2, 4, 6 & 8 Pole Speeds available
- Multiple Impeller Combinations
  - 6 Hub diameters
  - 3, 6, 9 or 12 Blades (hub dependant)
- Short Cased
- Same performance as Pad
- Alternative Motor Voltages



JM Axial – Aerofoil Impeller Blade design

Typical aerofoil cross-section



Truly Reversible **JMTSP** impellers also available

NARAD Section – Airbus technology

- **Unique Fläkt Woods' Design**
- **Low noise**
- **High Efficiency**

- Features Modified Leading Edge
- 10° Linear Twist (Left hand)
- 26° Non-Linear Twist (Right hand)
- Aluminium Impellers:
  - High Pressure Die Cast (up to 1000 mm)
  - Gravity Cast (up to 1600 mm)

Impact of Impeller Tip Gap on Performance

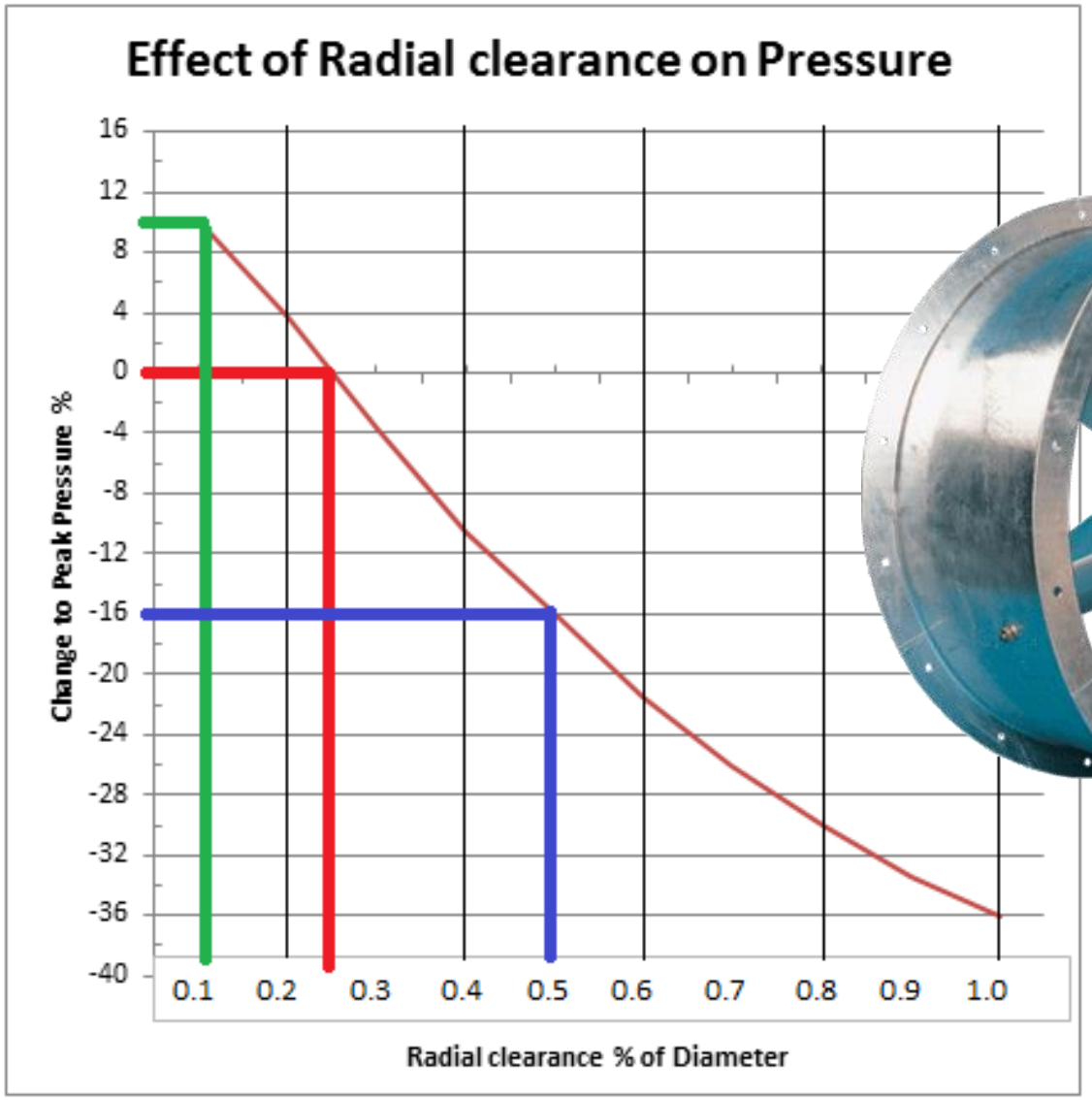
+10%

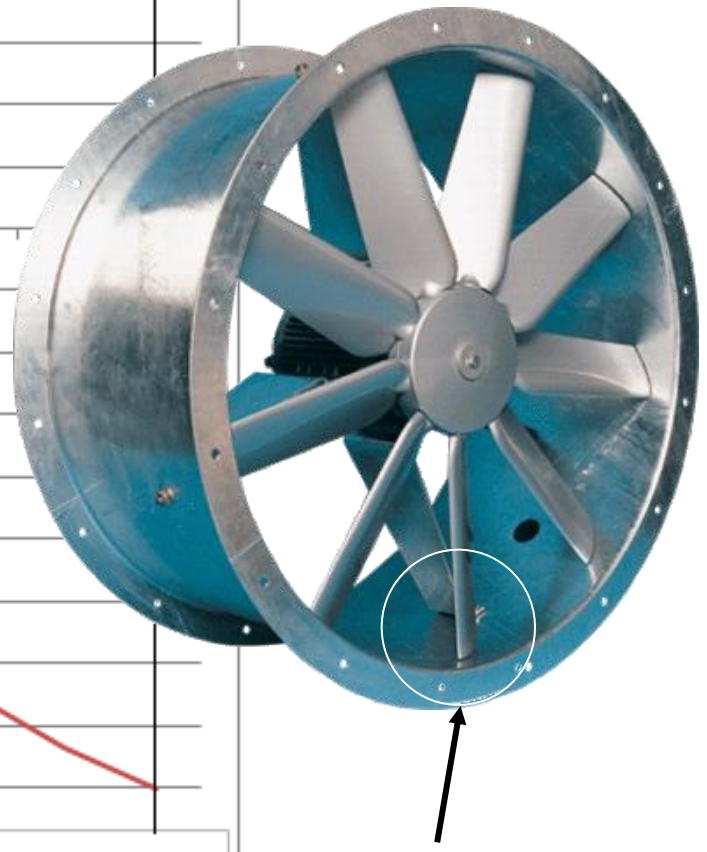
Catalogue

-16%

1000mm dia. Fan

0.10% = 1.0 mm
0.25% = 2.5 mm
0.50% = 5.0 mm

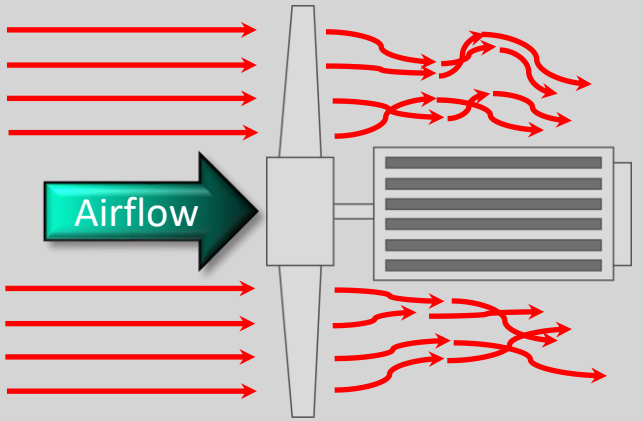




Form of Running: Performance Impact

Form B

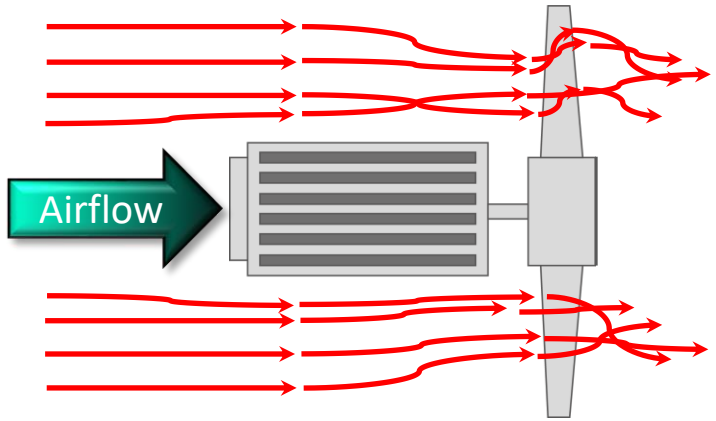
- Air passes over the **Impeller first**
- Standard form **for JM Fan**
- **Quieter**
- **Optimum** performance (ducted systems)



Preferred form of running

Form A

- Air passes over the **Motor first**
- Often **used on Short Cased or Plate mounted Fans** for equipment cooling
- Slightly **less performance: 2% less than form B**
- Slightly **noisier: 2 to 3dB**



Turbulence reduces Efficiency!

Woods AIR MOVEMENT

Casing Finish

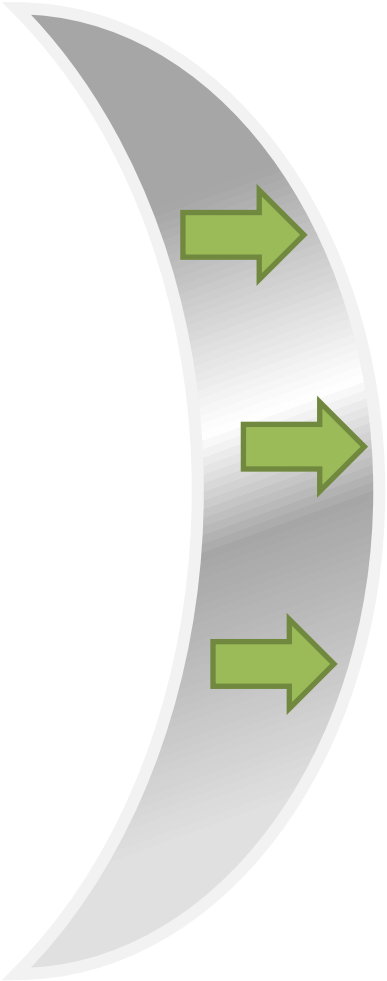
- Steel - Hot Dip Zinc Galvanised to BS EN ISO 1461
- Galvanising thickness varies based on steel thickness
- Excellent Anti-Corrosion protection properties
- L type Casing also includes an easy access Bolt on Terminal Box

Anti-Corrosion protection for Fixings

Geomet Finish for Steel Fixings:

A water based Zinc & Aluminium flake coating for fixings and fastenings. The coating is silver grey in appearance and provides a 4-way protection system:

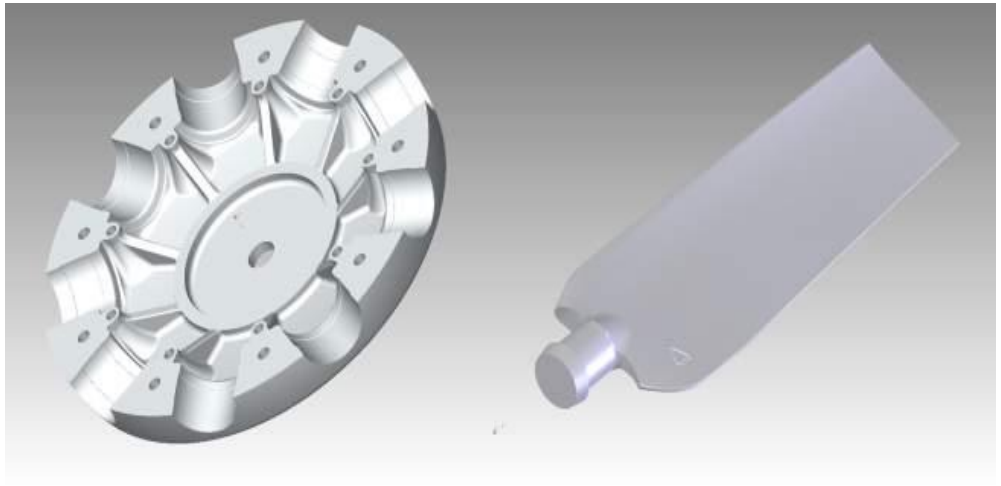
- **Barrier Protection**: Overlapping Zinc & Aluminium flakes provide an excellent barrier between Steel and any corrosive materials
- **Galvanic Protection**: Sacrificial corrosion of the Zinc component, protects the Steel (up to C4 protection)
- **Passivation**: Metal Oxides slow down the corrosion reaction of Zinc and Steel which provides 3 times greater protection than pure Zinc
- **Self Repairing**: Zinc Oxides actively repair the coating and restores protection



Impeller Assembly Design & Construction

Our impeller assembly design is unique to the JM Aerofoil

- Refined aerodynamic design
- Economic manufacturability
- Efficient solution

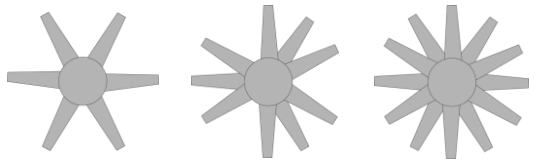
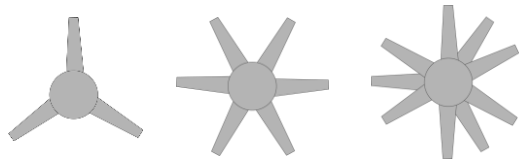
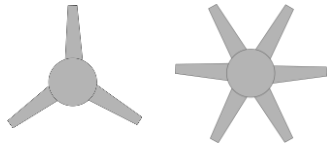
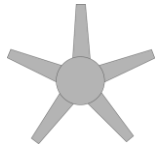


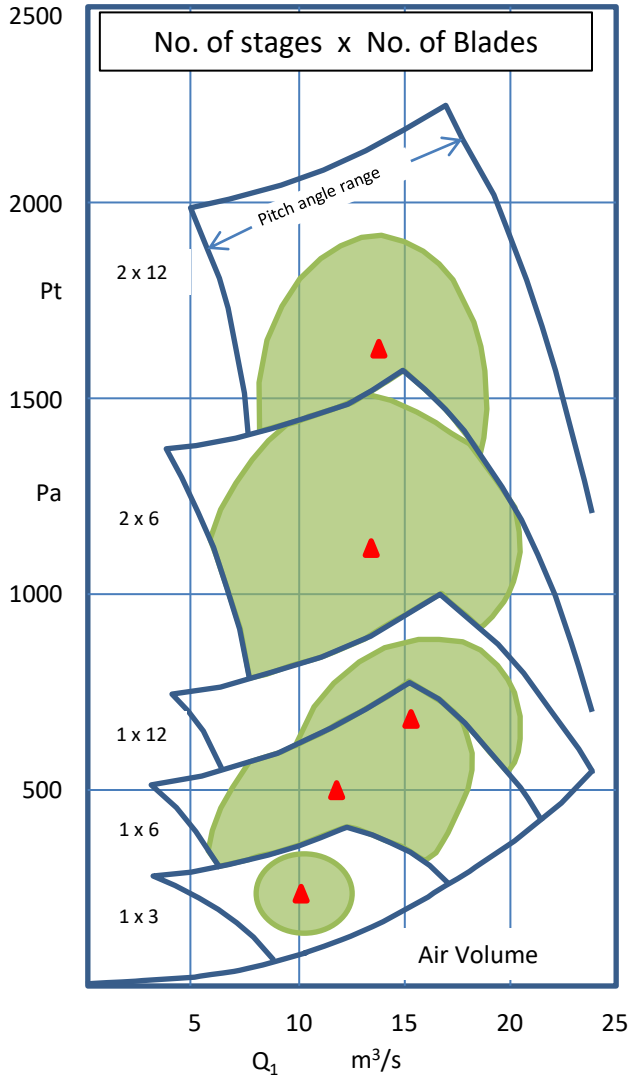
- **Aluminium alloy LM6** – has a high silicon content – ideal **corrosion resistance**. It is also ductile, so has high stress capability.
- **Alternative alloy (LM13)** is used to offer impellers with **higher temperature capabilities**.
- All rotating aluminium alloy parts, blade, hub, clamp plate, are **100% X Ray examined to provide reliability assurance**.
- **Blade tip gap is manufactured to 0.25% of diameter** to give highest peak pressure / lowest noise solution.
- **Pitch angle is adjustable to customer duty** – to achieve optimum performance.
- **Balanced to G6.3**. Hub designed to accommodate balance weights

Impact of Blade Solidity on Performance

Impeller Solidity

Different number of Blades for wider range of selections – more efficient, cost saving

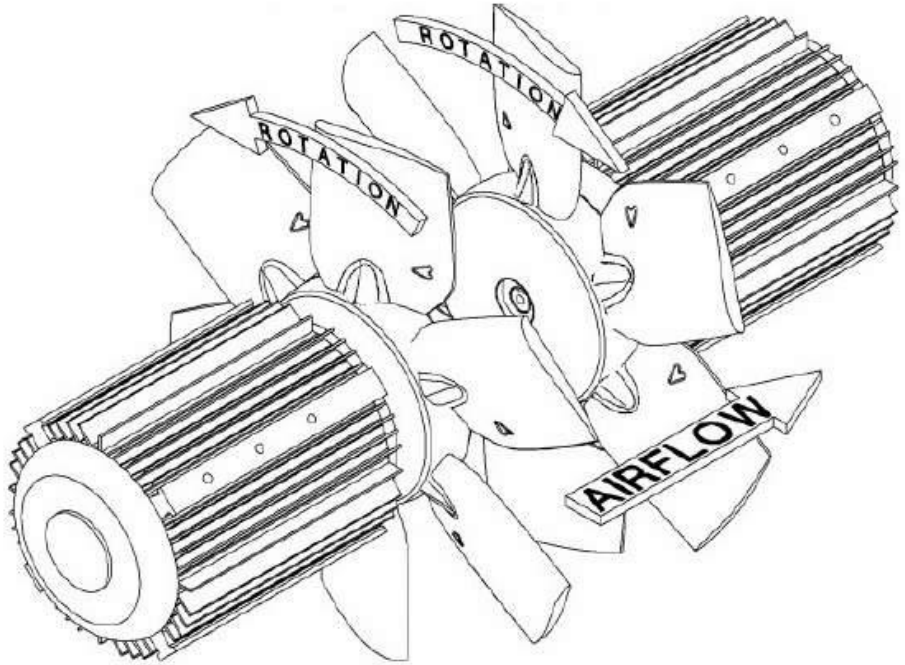
500mm Hubs 6, 9 or 12 Blades	
250mm – 400mm Hubs 3, 6 or 9 Blades	
200mm Hubs 3 or 6 Blades	
160mm Hubs 5 Blades	



Multi-Stage Fans: Increased Pressure Development

JM multistage

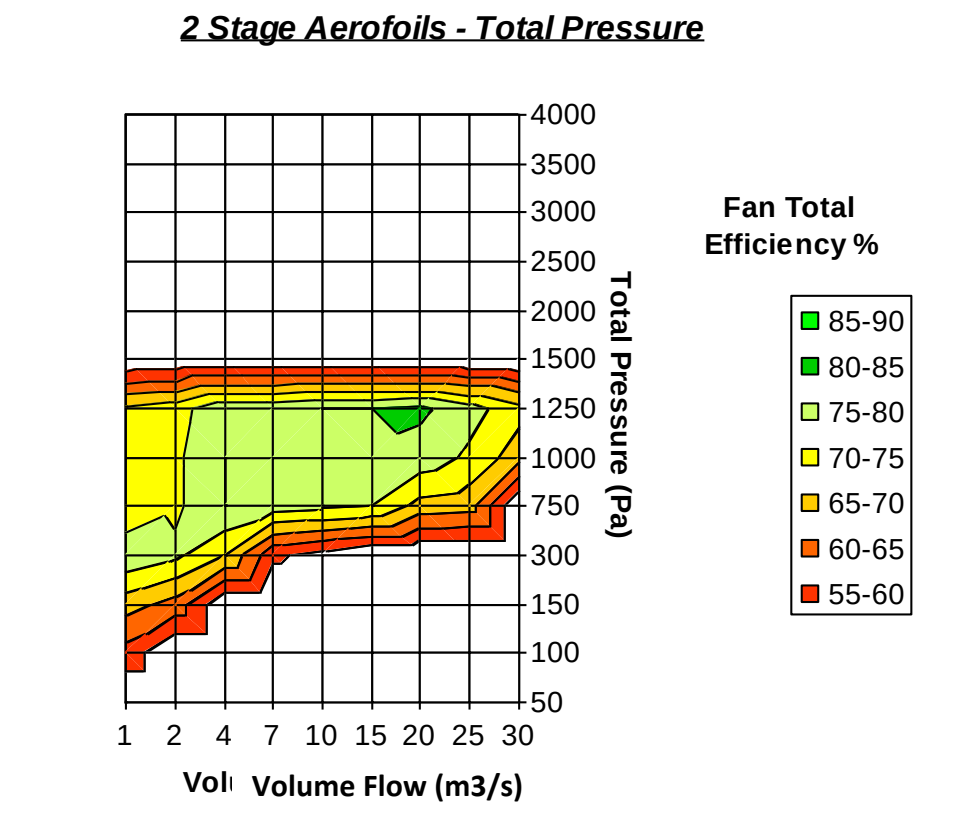
- Contra-rotating design
  - 2 stages give 2.7 times pressure development of single stage fan.



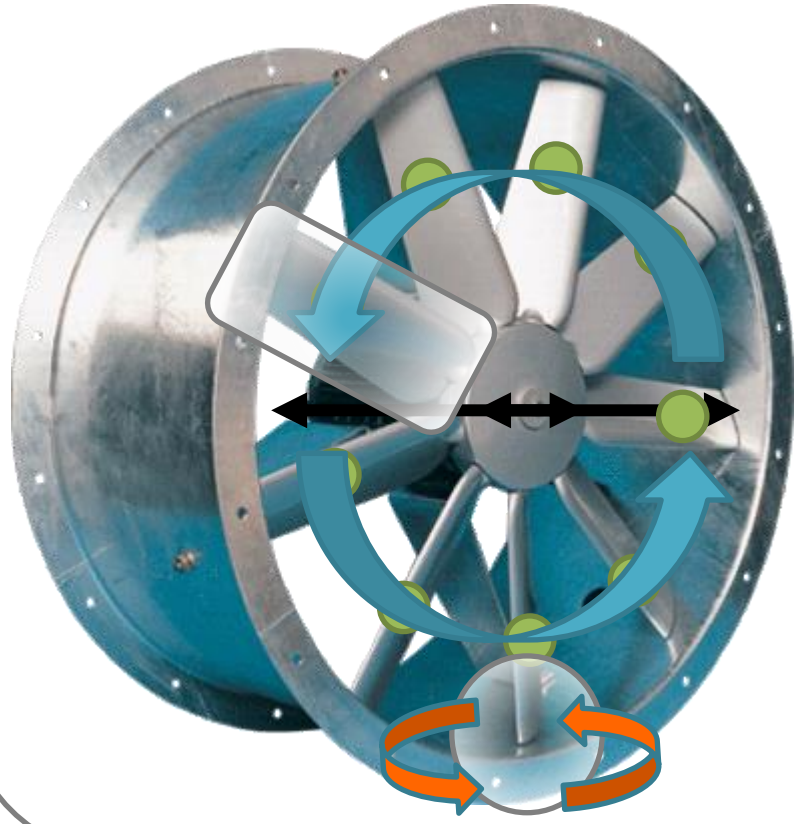
A standard JM Two Stage comprises a Form A right hand fan followed by a Form B left hand fan.

Multi-Stage Fans: Benefits of Multi-Stage Fans

- High Efficiency above 500Pa
- Easy to install - in-line
- Flexibility. Add new stages as pressure increases
- Duty / Standby arrangement gives some performance even with one Fan stopped



JM Axial – Product Model Code Nomenclature



Fan Code Structure:

125JM / 40 / 4 / 9 / 26°

125 – Fan diameter (cm)

JM – Impeller designation

40 – Hub diameter (cm)

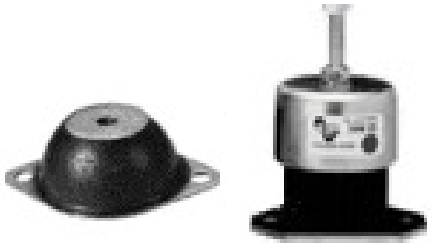
4 – Motor Pole Speed

9 – Number of Impeller Blades

26°– Pitch angle of Blades

JM Axial – Accessories

Mounting Feet



A/V Mounts

Flexible Connector and clips

Safety Guard

Bellmouth inlet

Silencer

Damper (AOD)

Matching Flange

Axial Fan Evolution: Introducing the JMv(G)

Innovative

VCC VORTEX CREATION CONTROL by FLÄKT WOODS

Compliant

ErP Compliant 2015

High Efficiency

Running cost savings of up to

44.5%

INTRODUCING…

JMv by FLÄKT WOODS

Range: 315mm up to 1400mm

Woods AIR MOVEMENT

JMv(G) AXIAL FLOW FAN - TOPICS

- JMv Range Benefits
- How JMv(G) delivers Energy Savings: *Performance Benchmarking*
- Carbon Footprint Reduction: *Environmentally Friendly Design*
- Engineering Design technology
- JMv “VCC” – Vortex Creation Control: *delivering enhanced efficiency*

JMv Range Benefits

WHAT ARE THE BENEFITS OF OUR JM AND JMv AXIAL RANGE?

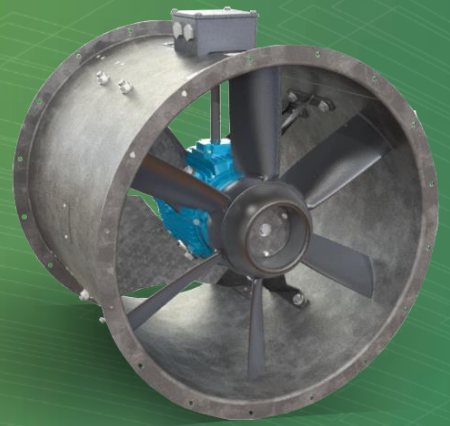
- Suitable for both **Air Comfort** and **Fire Safety** Applications
- Innovative design **delivers more performance**
- **Robust construction** for a longevity – “Fit and Forget”
- **Flexible solutions** designed to suit your needs
- **Low running costs – End User**
- **Lower Fan Costs – Contractor**
- **Higher Efficiency – Consultant**

ErP Regulation Compliance » Same Motor - Better Results

2013 – 2014
JM Aerofoil

- **70% Fan Efficiency**
- **82 % Motor Efficiency (IE2)**
- **FMEG = 70% x 82% = 57**

2013 = N Grade 50



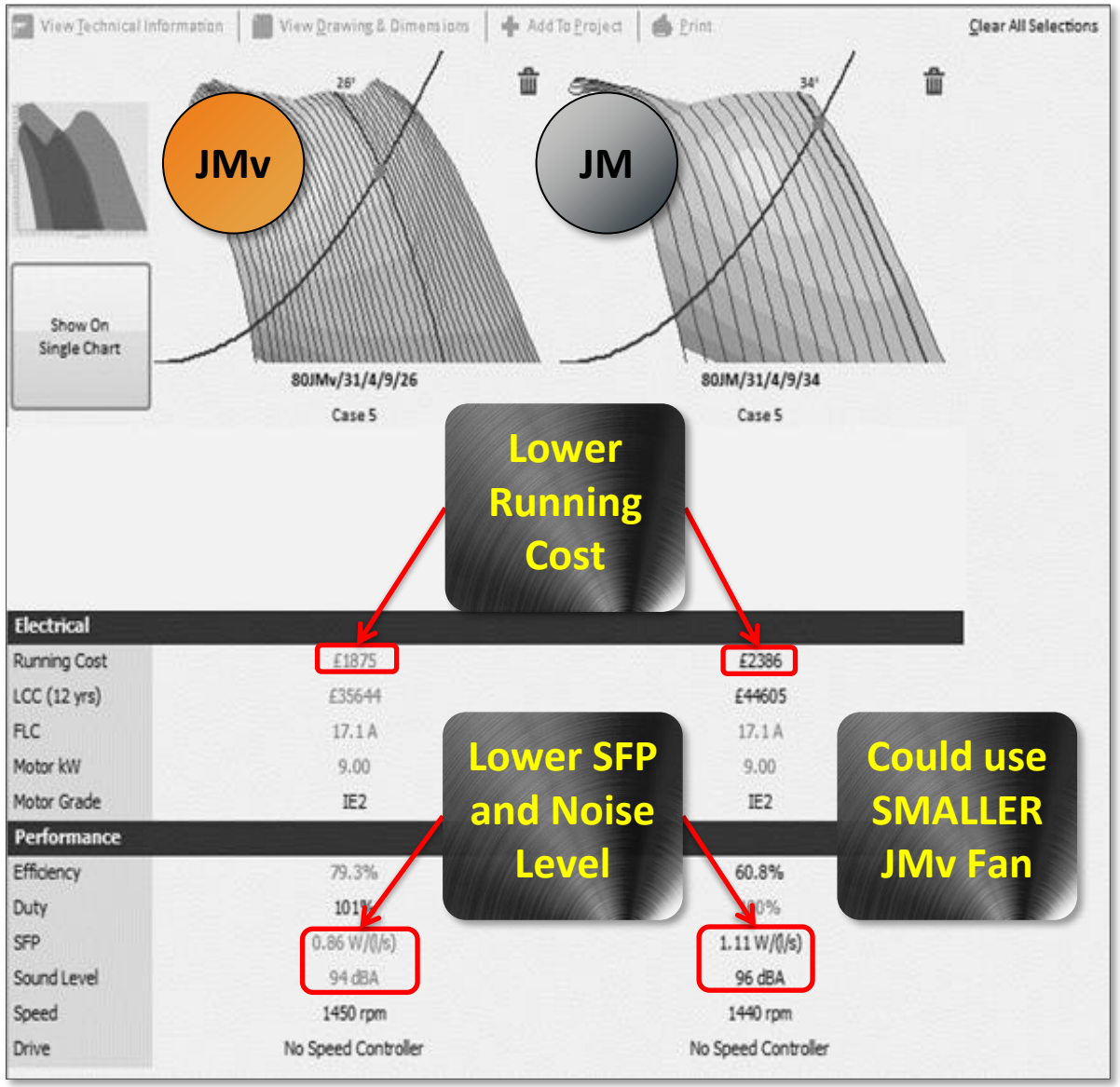
2015 – 2022
JMv Aerofoil

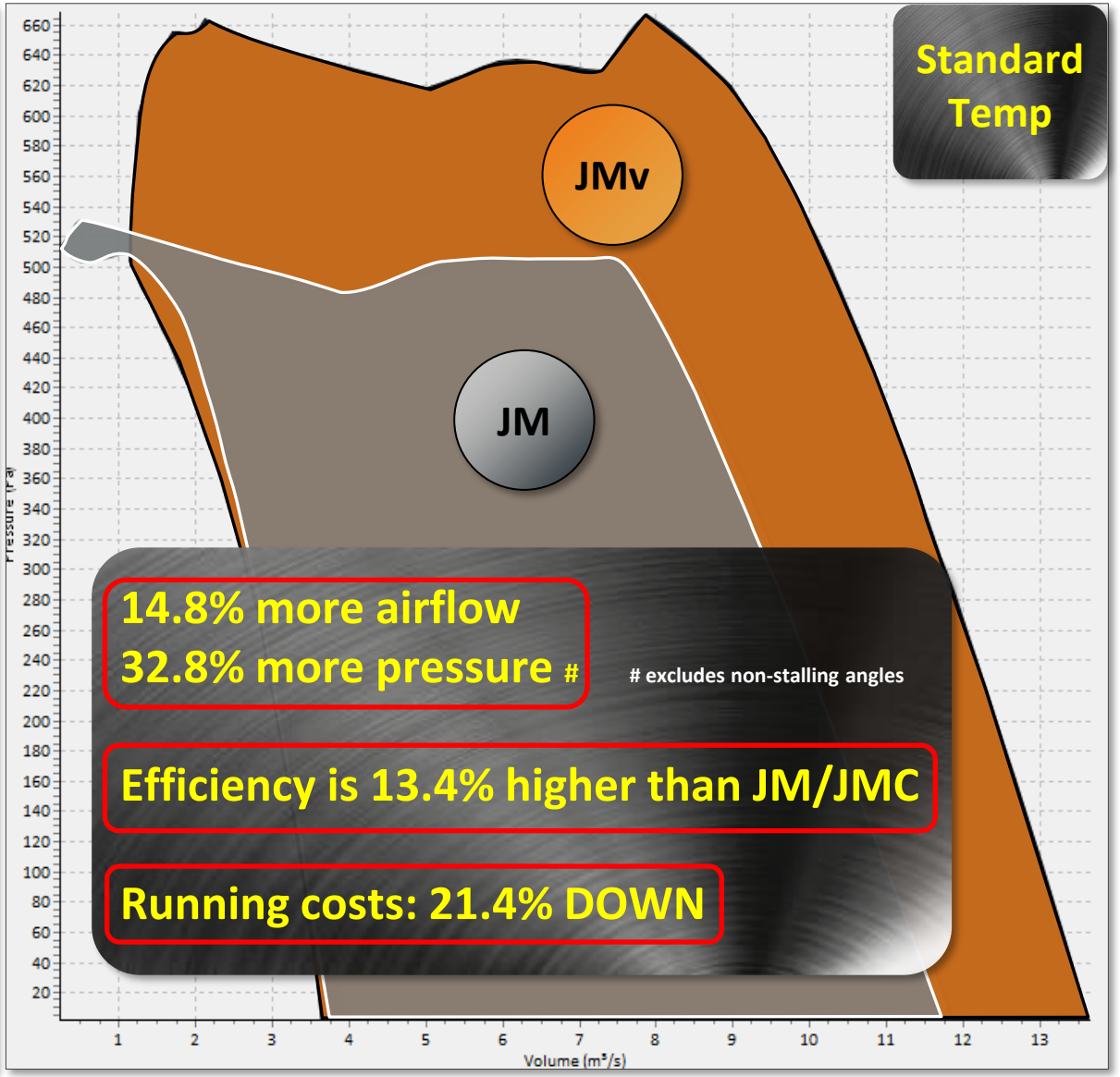
- **84% Fan Efficiency**
- **82 % Motor Efficiency (IE2)**
- **FMEG = 84% x 82% = 69**

2015 = N Grade 58

2022 = N Grade 64 "Draft"

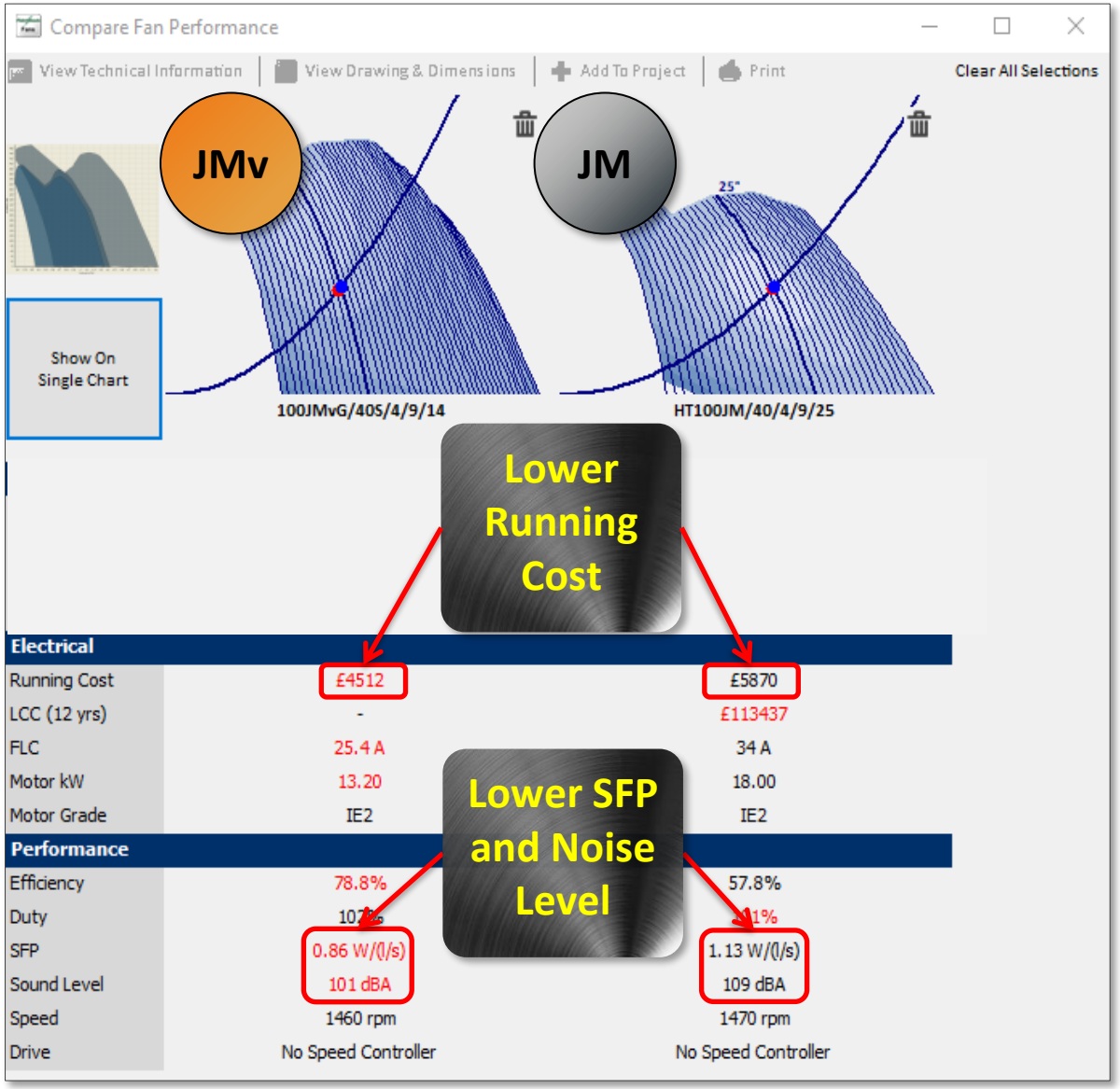
» Benchmarking 800mm JM v JMv (315mm hub) : **More Performance / Less Power**

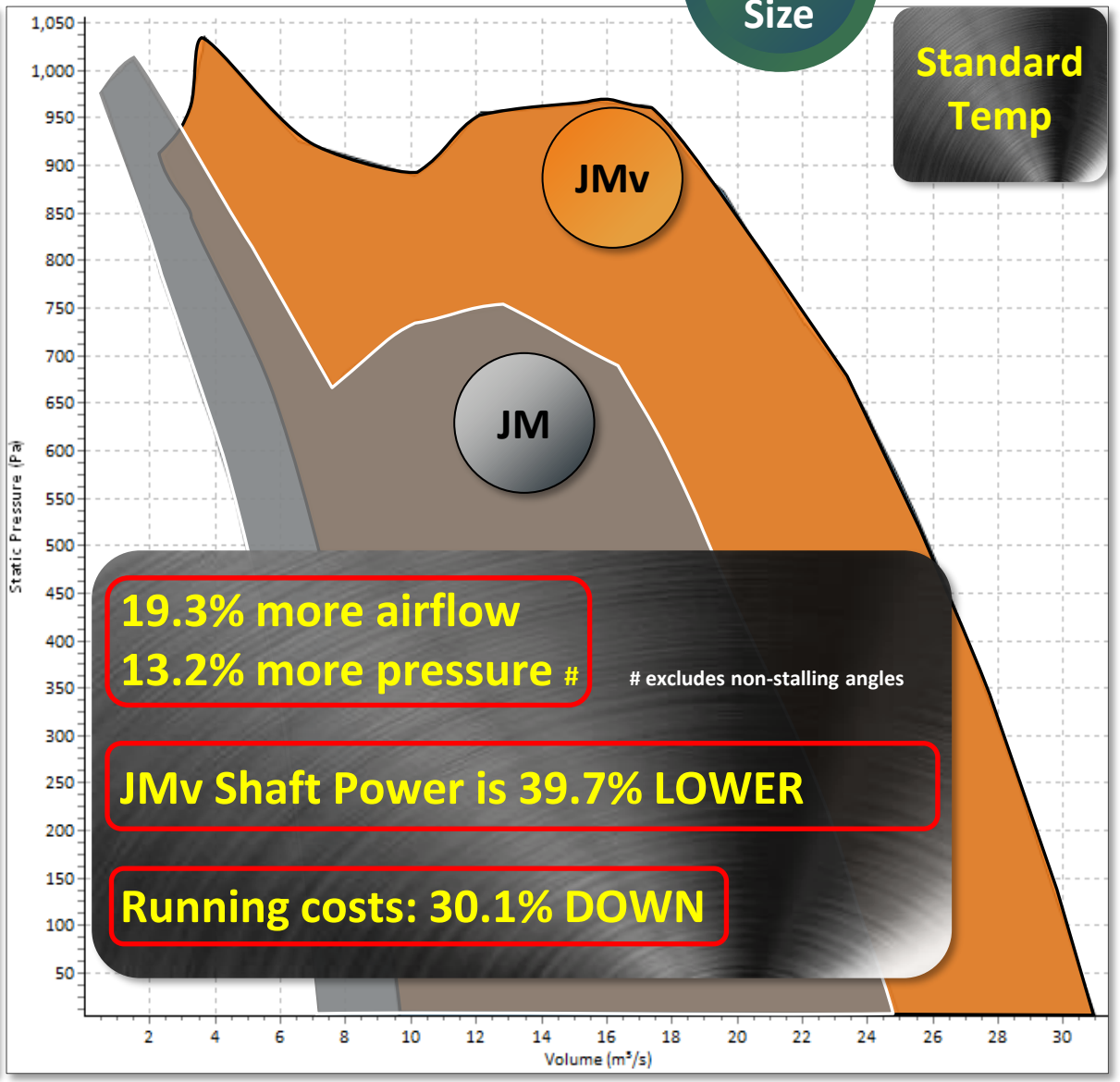




» Benchmarking 1000mm JM v JMv (400mm hub with Spinner) : **More Perfomance / 39.7% Less Power**

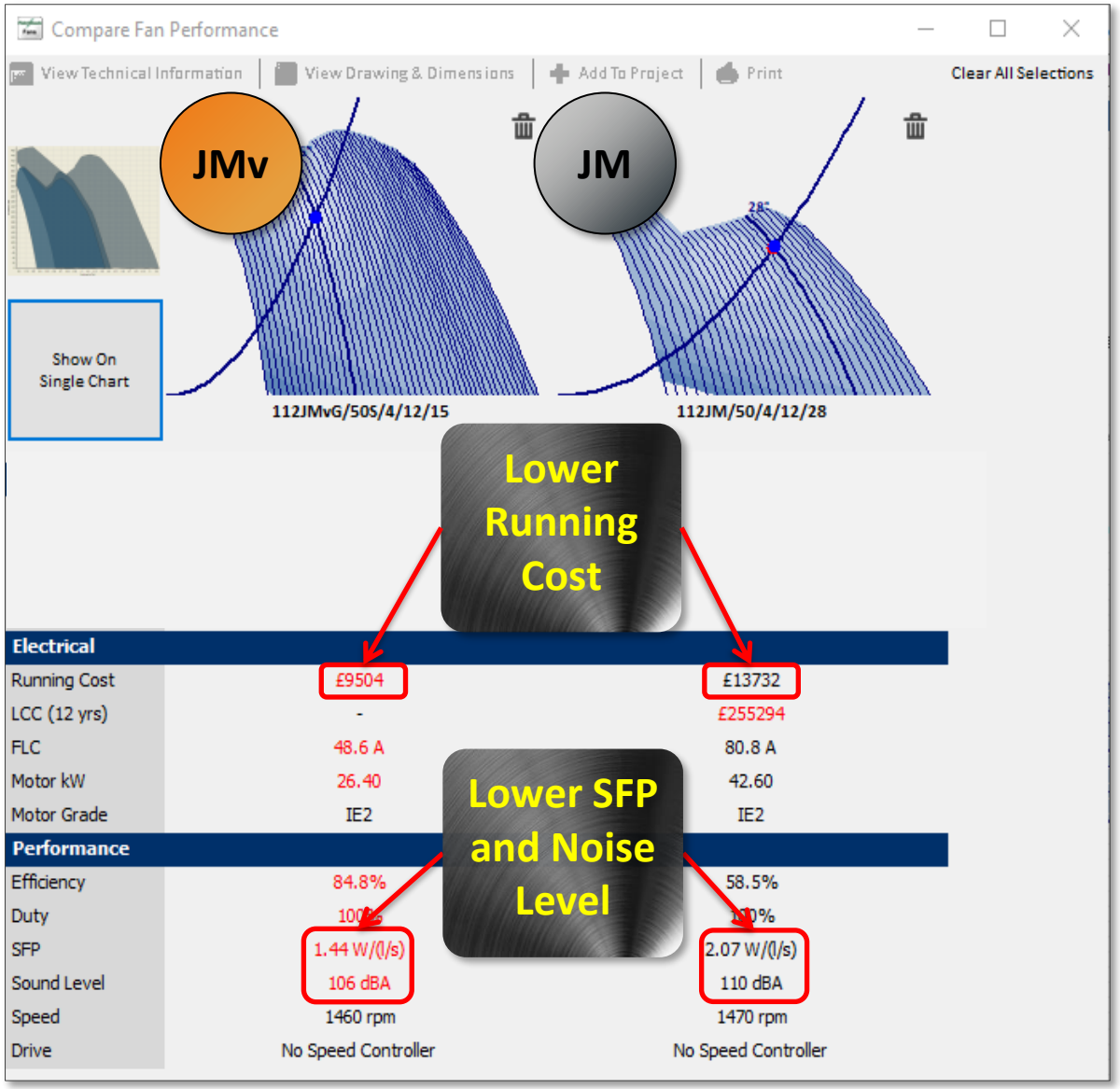
NEW Size

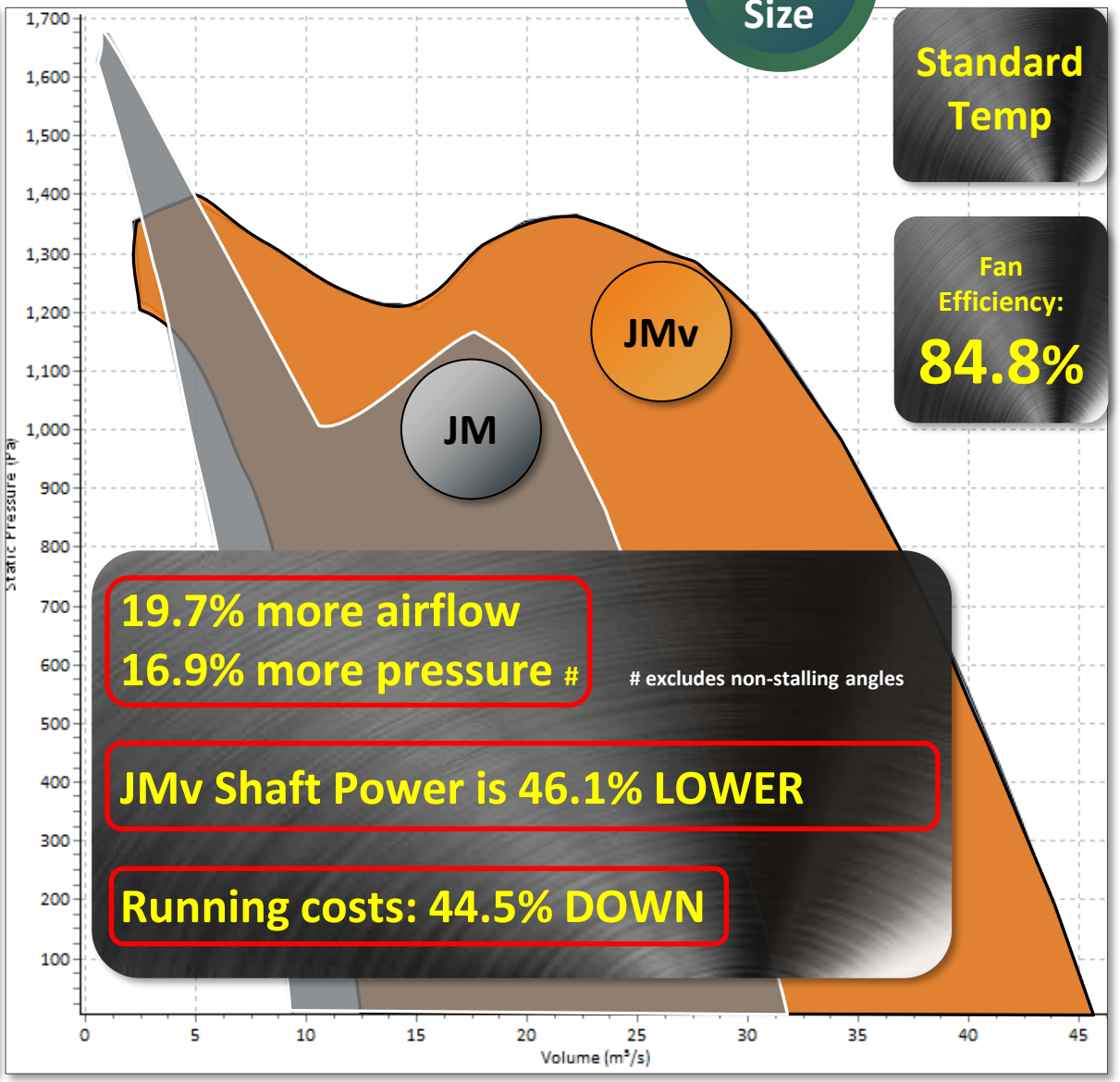




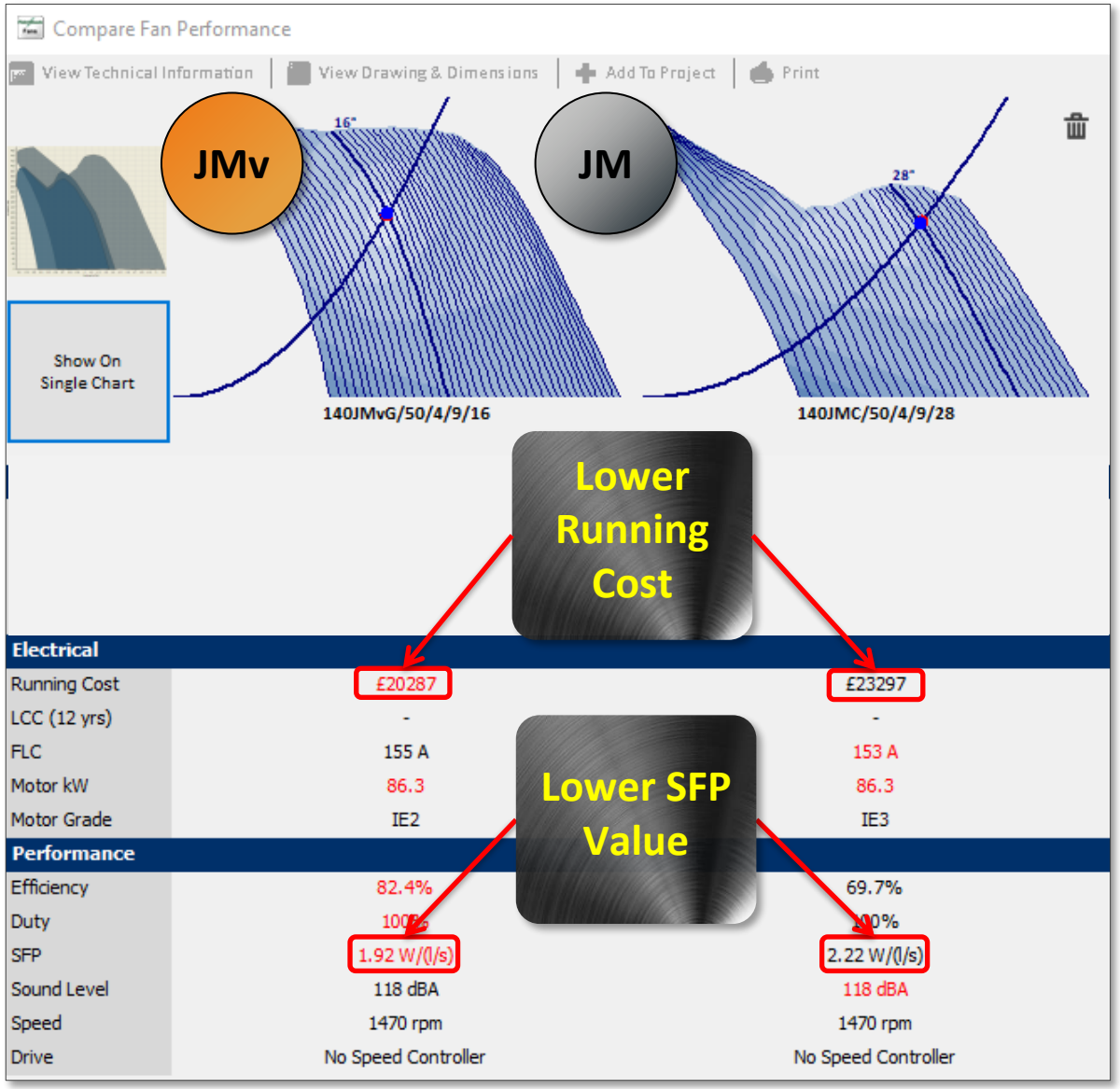
» Benchmarking 1120mm JM v JMv (500mm hub with Spinner) : 46.1% Less Power / Highest Efficiency

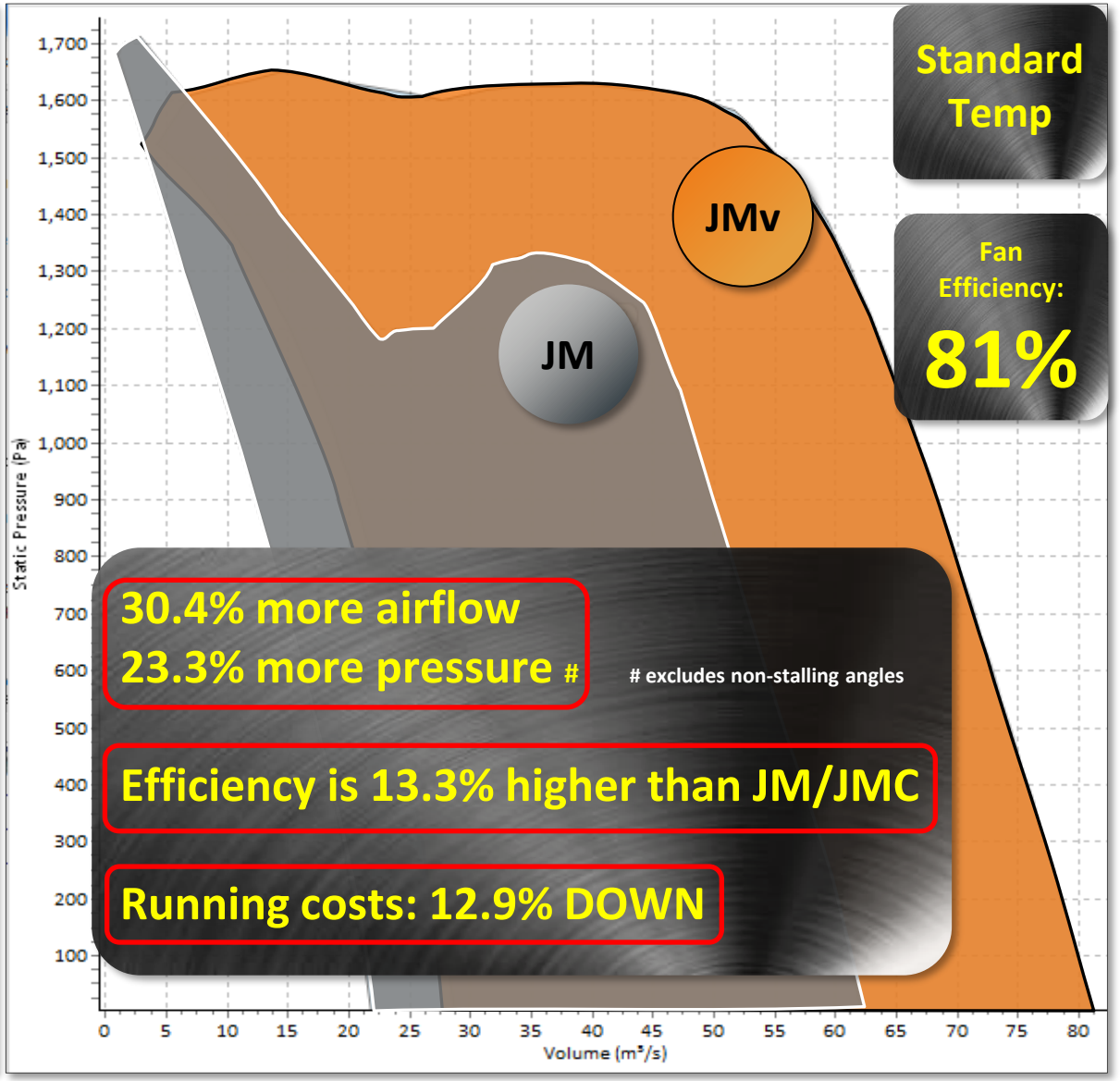
NEW Size





» Benchmarking 1400mm JM v JMv (500mm hub) : **13.3% Less Power, 12.9% lower Running Cost**





JMv » 1120mm JMvG vs JM Example (1 fan)

OPERATIONAL SAVINGS #1

1,231 mWh

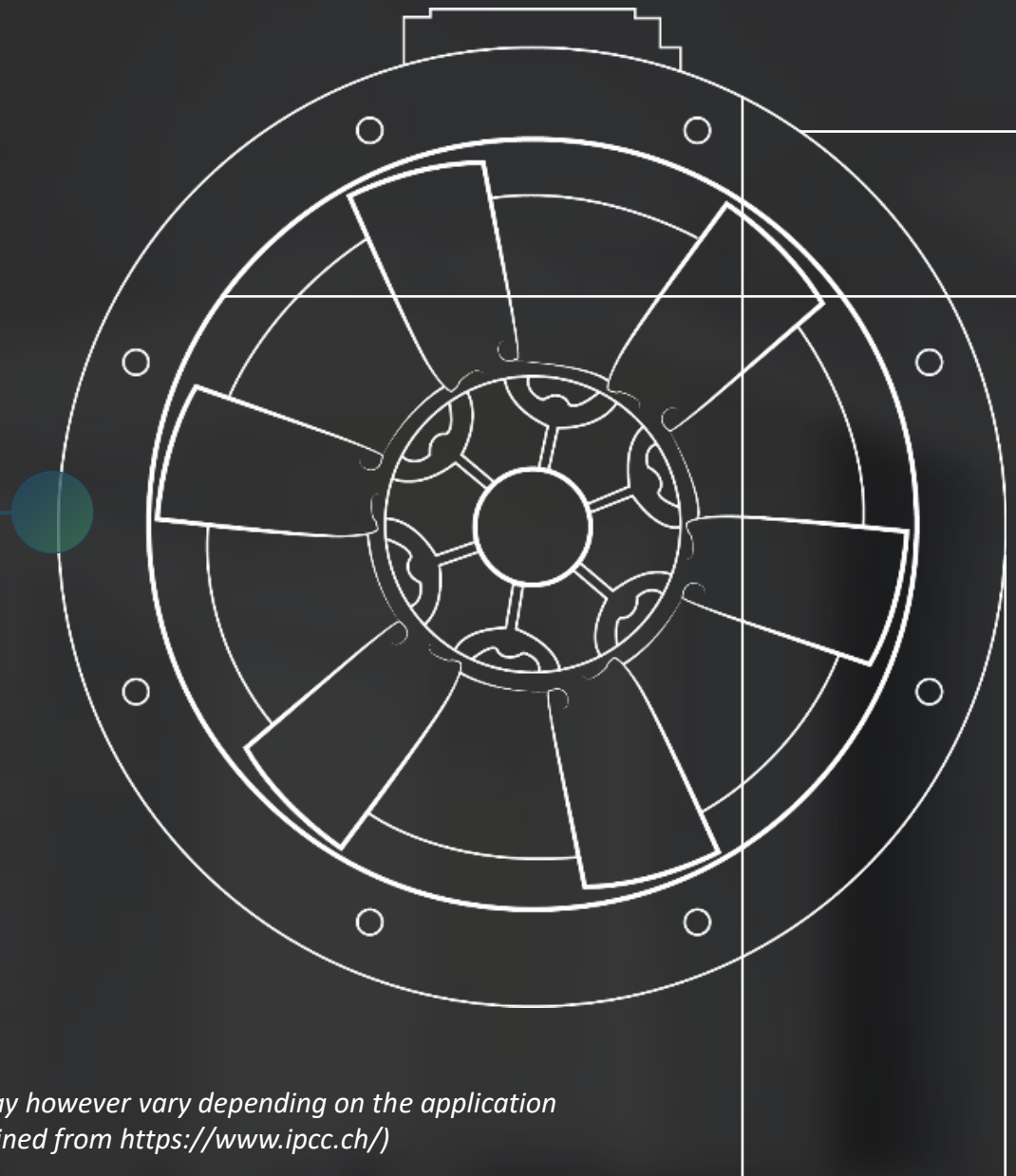
Energy Use Reduction: **102,587** kWh per year
Compared to our existing JM Axial Fan
(running time per year is 8736 hours)

£ 110,790

Typical Running Cost Saving (based on UK data: 9p/kWh)

624 Tonnes

Maximum CO_2 Carbon Saving
Per year Compared to our existing JM Axial Fan
(running time per year is 8736 hours) #2



#1 Savings calculated for the typical minimum product lifetime of 12 years. Actual lifetimes may however vary depending on the application
#2 Conversion factors from kWh to tonnes of CO_2 based on IPPC data (reference material obtained from https://www.ipcc.ch/)

Running Cost

315mm to 1400mm Diameter Range

- 44.5% Max

Maximum operating costs savings when compared with a reference JM Axial Fan

AS WE HAVE SOLD
11,622 JMv FANS, SINCE 2015

DURING THEIR OPERATIONAL LIFE THESE FANS WILL **SAVE**

397,485 TONNES

OF CARBON DIOXIDE ENOUGH TO….

…DRIVE OVER
37,000 TIMES AOUND THE WORLD BY CAR…

OR…

… FLY NEARLY
6,700 TIMES AROUND THE WORLD BY AEROPLANE

ALTERNATIVELY….

….TO SAVE THE SAME AMOUNT OF CO_2 WE WOULD NEED TO PLANT OVER **331,000 TREES**…

…WHICH IS EQUIVALENT TO A FOREST AREA OF **136 HECTARES OR 334 ACRES**

* Fans sold: 23/04/15 to 17/06/21

Based on 8736 hrs running per year

IN ADDITION, THE JMv PRODUCT HAS **SAVED NEARLY 13 TONNES OF ALUMINIUM***

WHICH IS ENOUGH TO MAKE OVER **858,000 DRINK CANS…**

…CONTAINING OVER 283,000 LITRES OF REFRESHMENT…

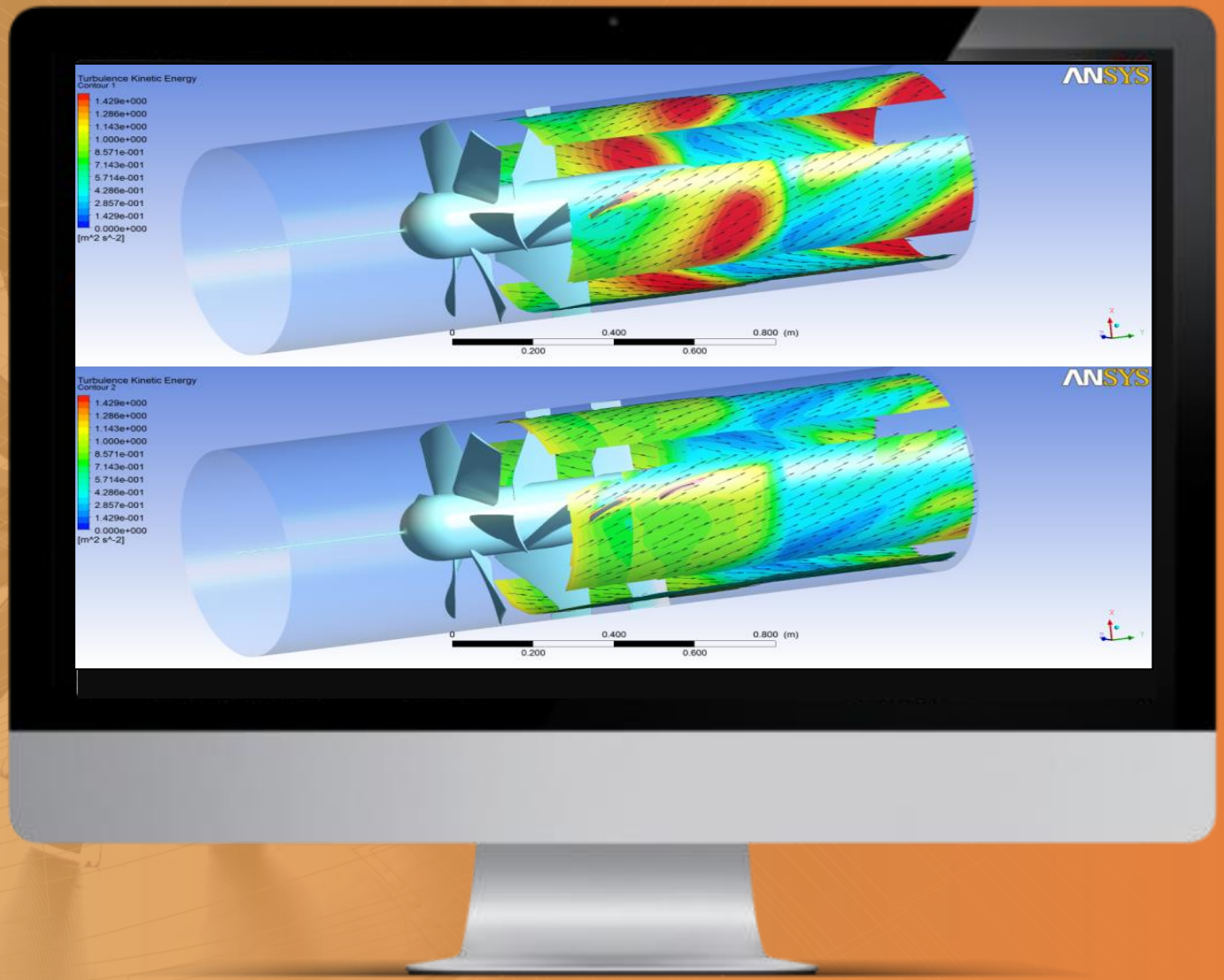
* Fans sold: 23/04/15 to 17/06/21

ADVANCED RESEARCH & TESTING FACILITIES

Woods Air Movement has some of the most advanced ventilation development laboratories in the world.

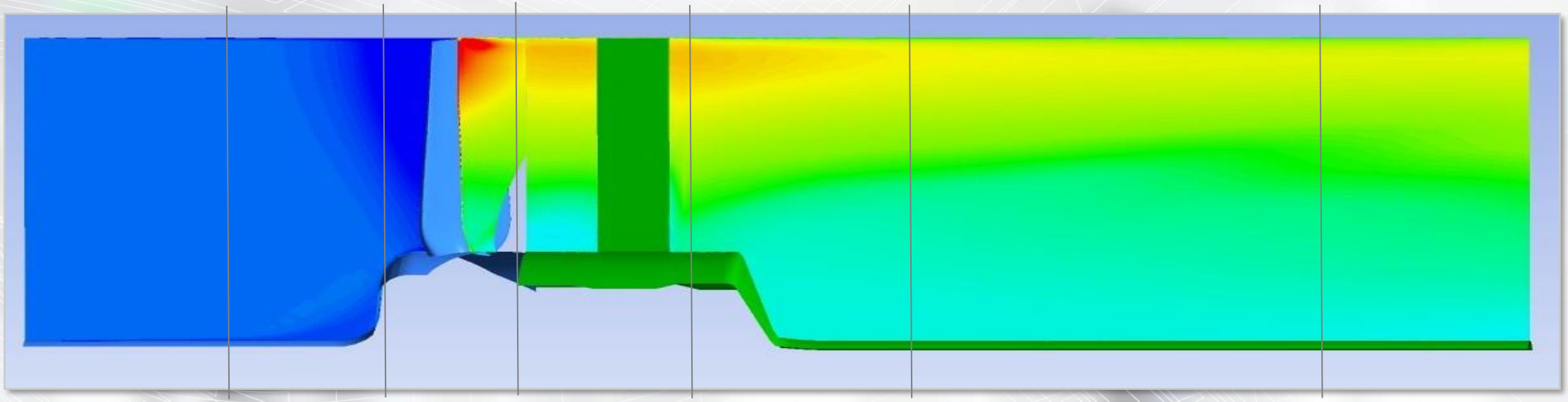
During development of our JMv(G) product, our Engineering team used CFD simulations extensively, which allowed us to achieve a highly optimised solution with enhanced levels of aerodynamic efficiency.

CFD Analysis : Results for Turbulent Kinetic Energy (Losses)



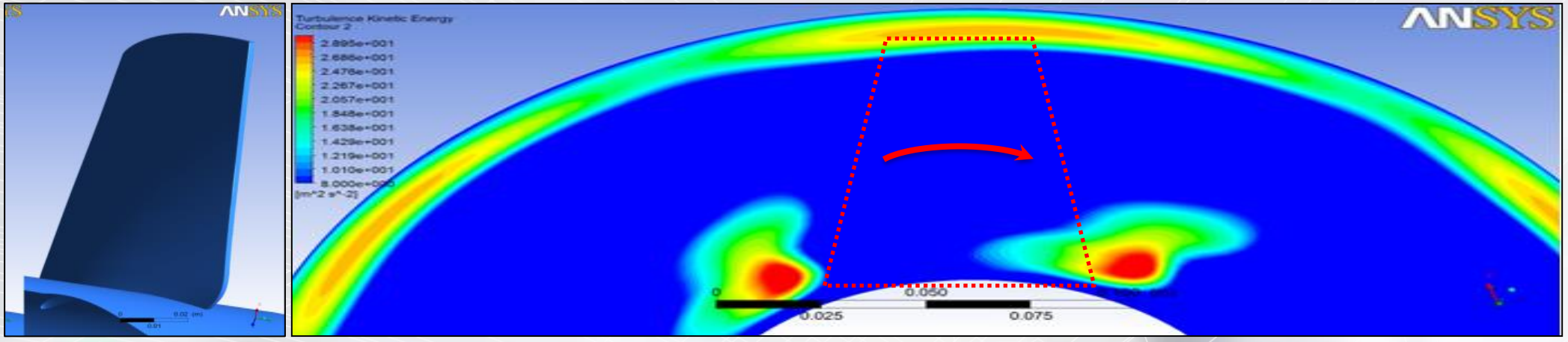
CFD Analysis has been used to **minimise aerodynamic losses**

	Inlet	Blade row	Supports	Expansion	Outlet	Total Loss
JM	~ 2%	~ 12%	~ 5%	~ 6%	~ 5%	~ 30%
JMv	**~ 1.5%**	**~ 8.5%**	**~ 3%**	**~ 5%**	**~ 4%**	**~ 22%**



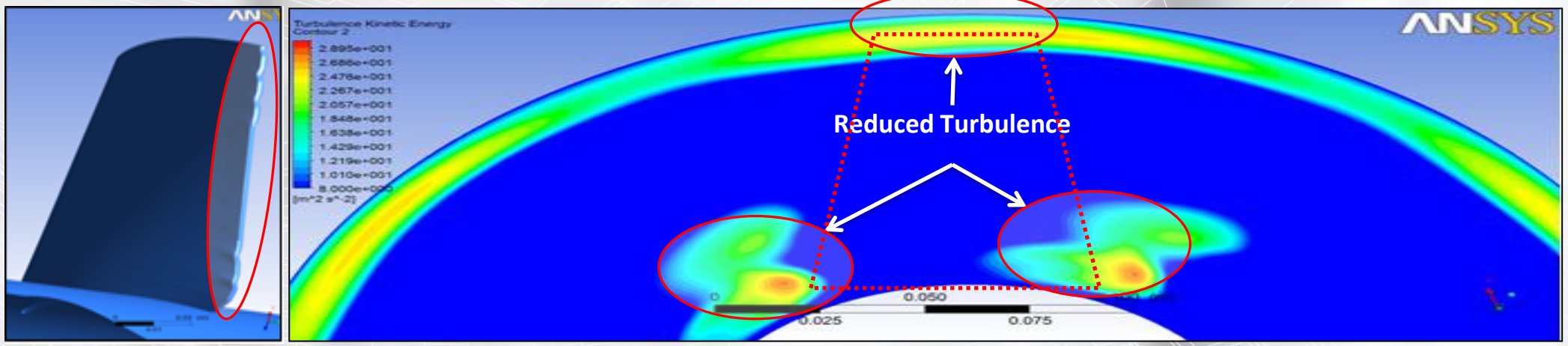
CFD Analysis – Turbulence at Blade Trailing Edge (TE)

Blade Geometry ***without*** Vortex Generators



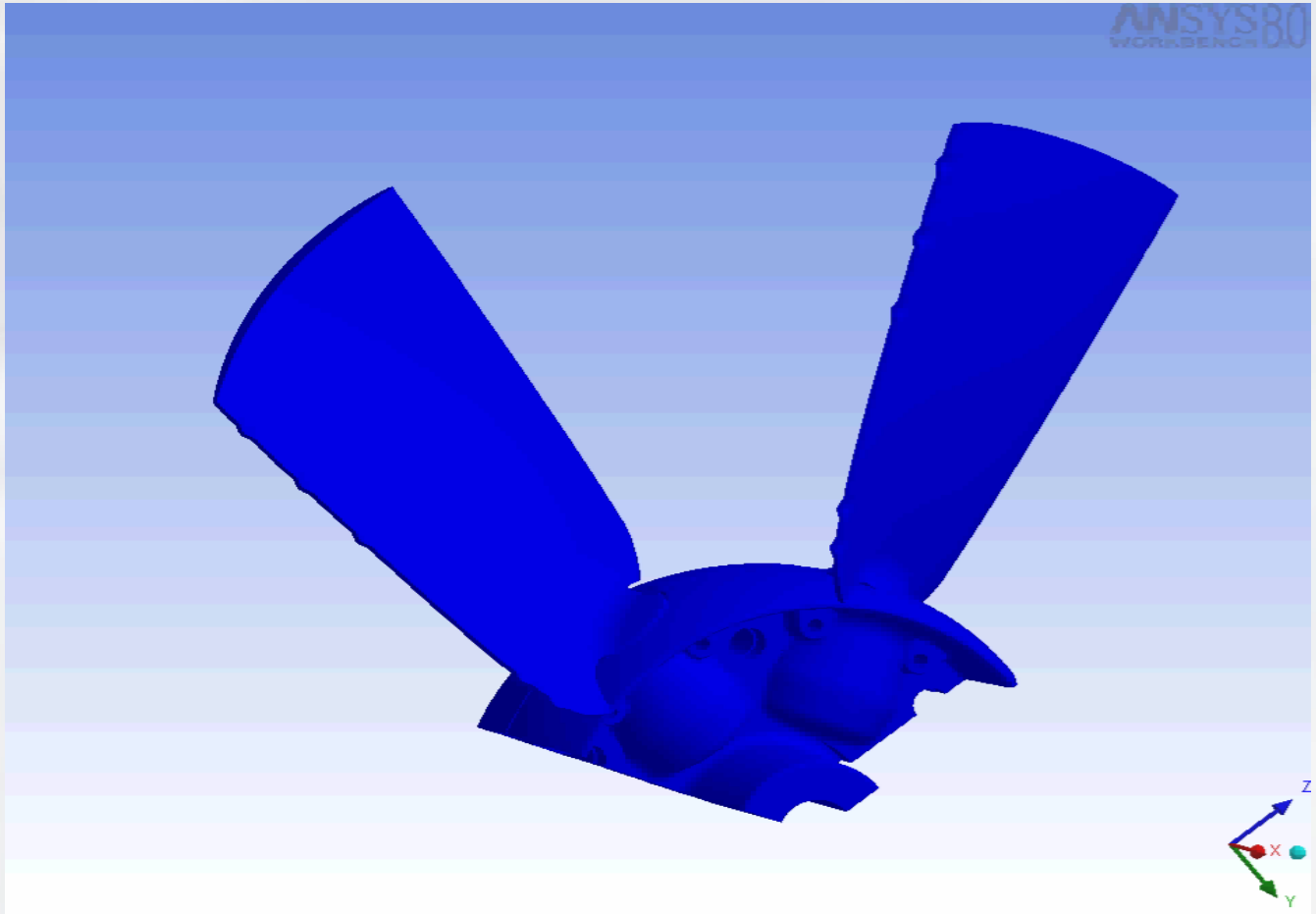
JMv Blade Geometry ***with*** Vortex Generators

Looking in direction of Air Flow at a single impeller blade

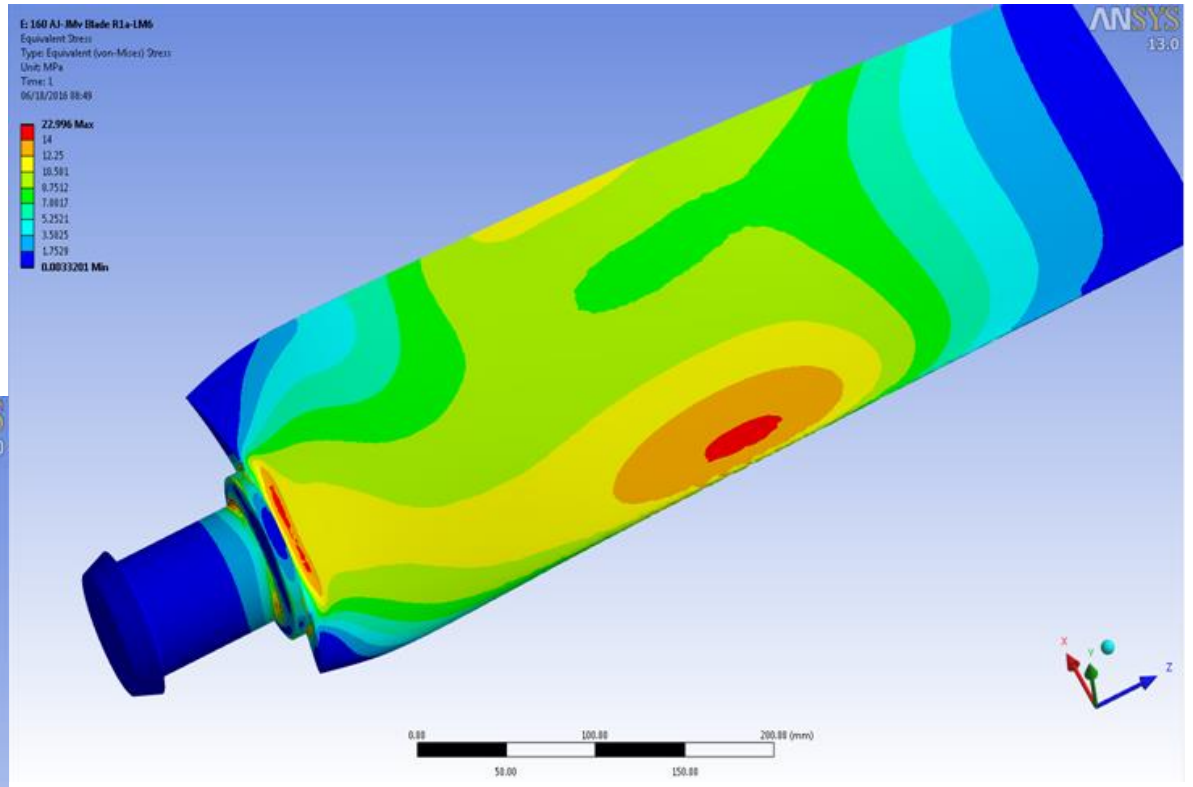


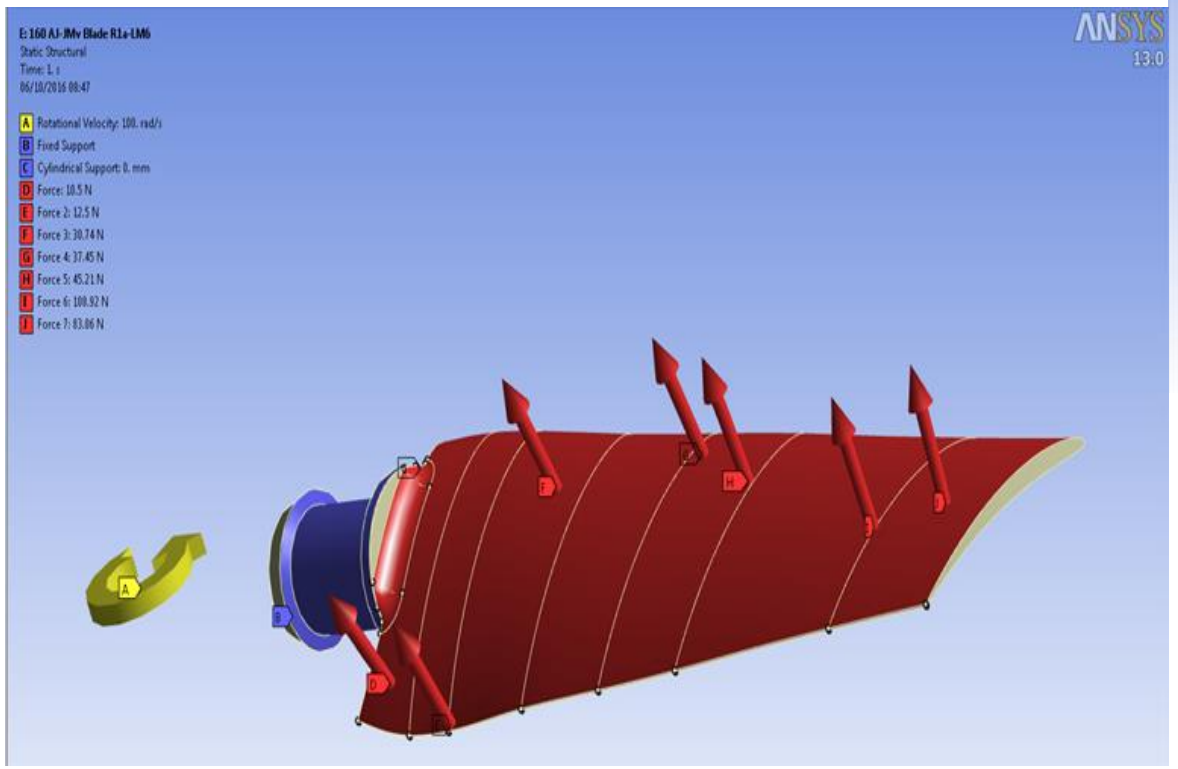
Our Engineering team uses advanced **FEA** or **F**inite **E**lement **A**nalysis computer modelling software to review stress, strength and load locations within key fan components.

We have shown a typical animated output example, which illustrates how we visualise these variables within the design software



Finite **E**lement **A**nalysis computer modelling software is a powerful design tool that allows us to refine our design before we even make a “physical” component.





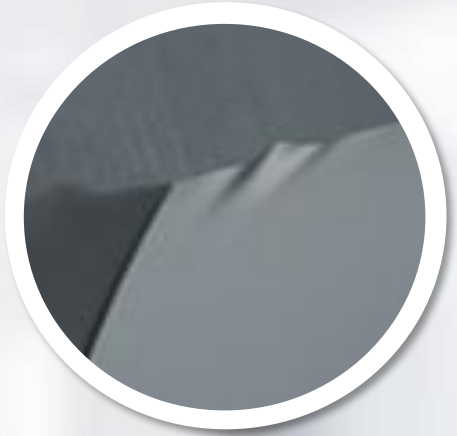
Forces and Stresses can be modelled using alternative designs and materials

DISCOVER OUR INNOVATIVE “VCC” TECHNOLOGY

The VCC Logo denotes that the JMv fan is authentic

More efficient even at low blade angles

Highly efficient aerodynamic hub design (Includes Spinner on larger sizes)

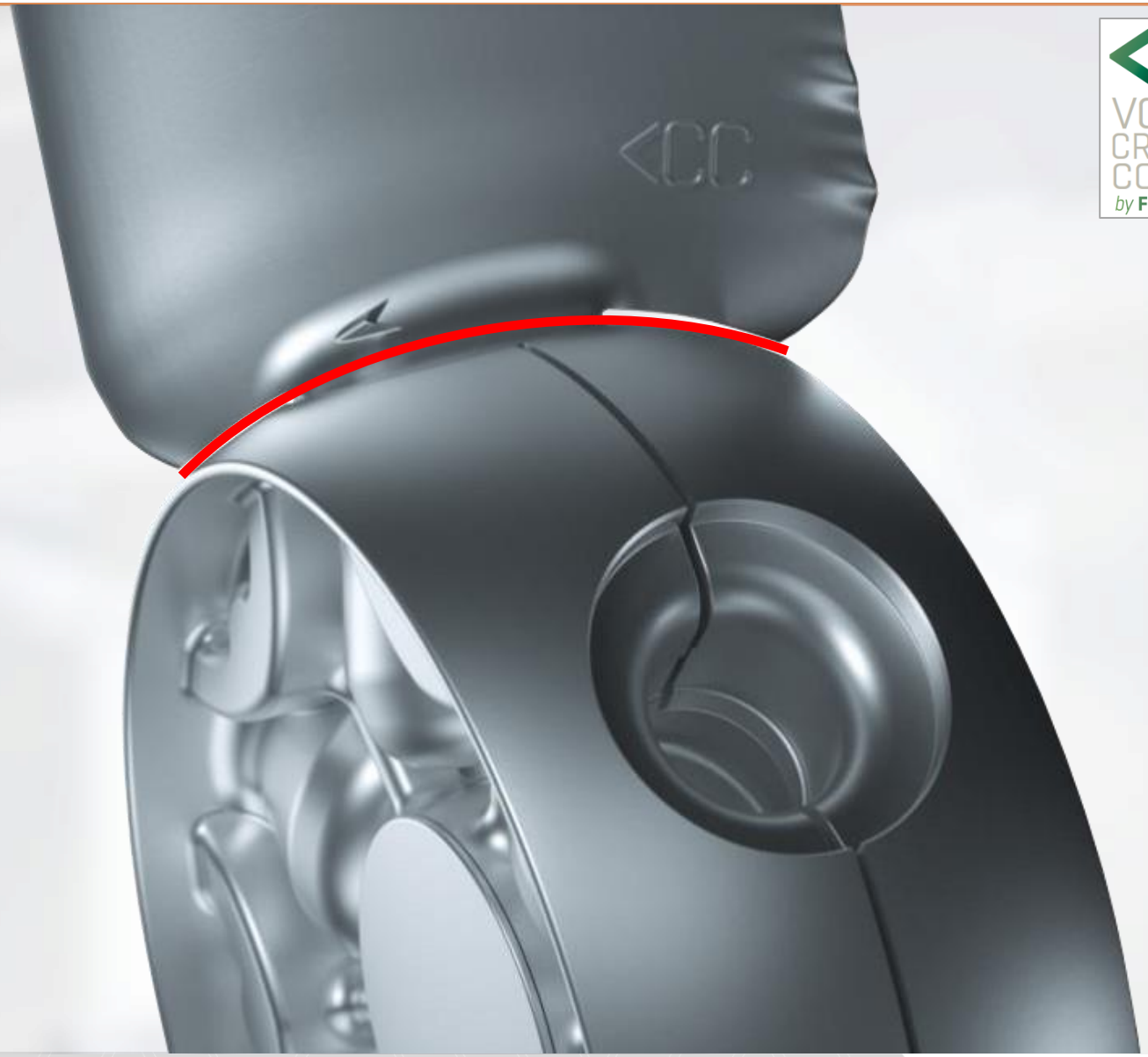


New impeller design enables a closer fit between impeller components to reduce air turbulence

Two stage Guide vanes increase efficiency further, whilst also being used to support the drive motor

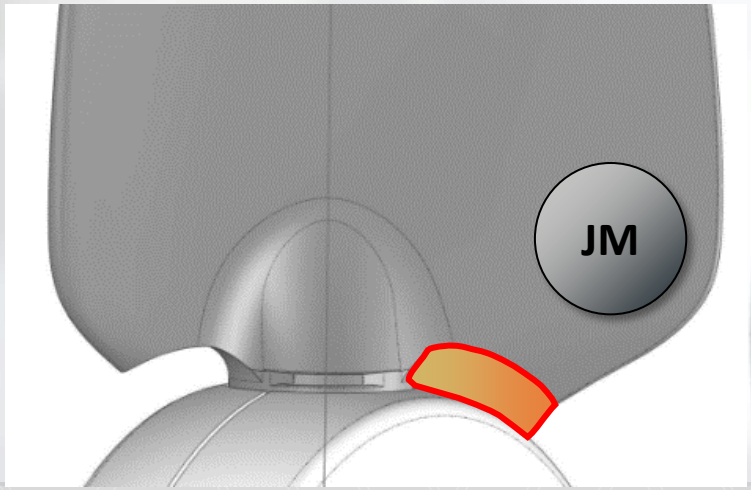
THE JMv HUB / BLADE FIT HAS BEEN RADICALLY IMPROVED…

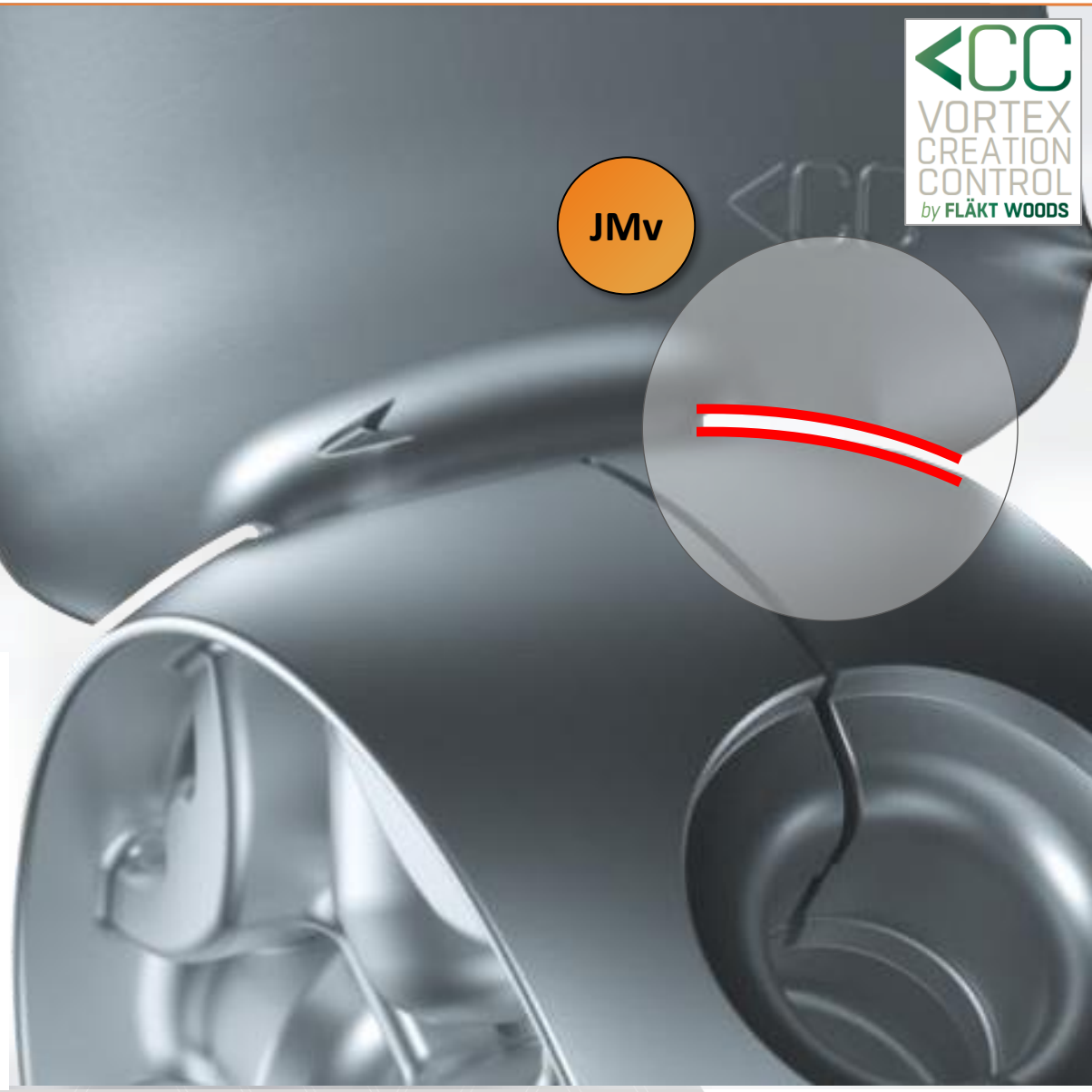
…OUR NEW HUB HAS A CURVED PROFILE SO THAT IT IS FAR MORE AERODYNAMIC, WHICH ENABLES US TO USE CLOSER FITTING IMPELLER COMPONENTS.



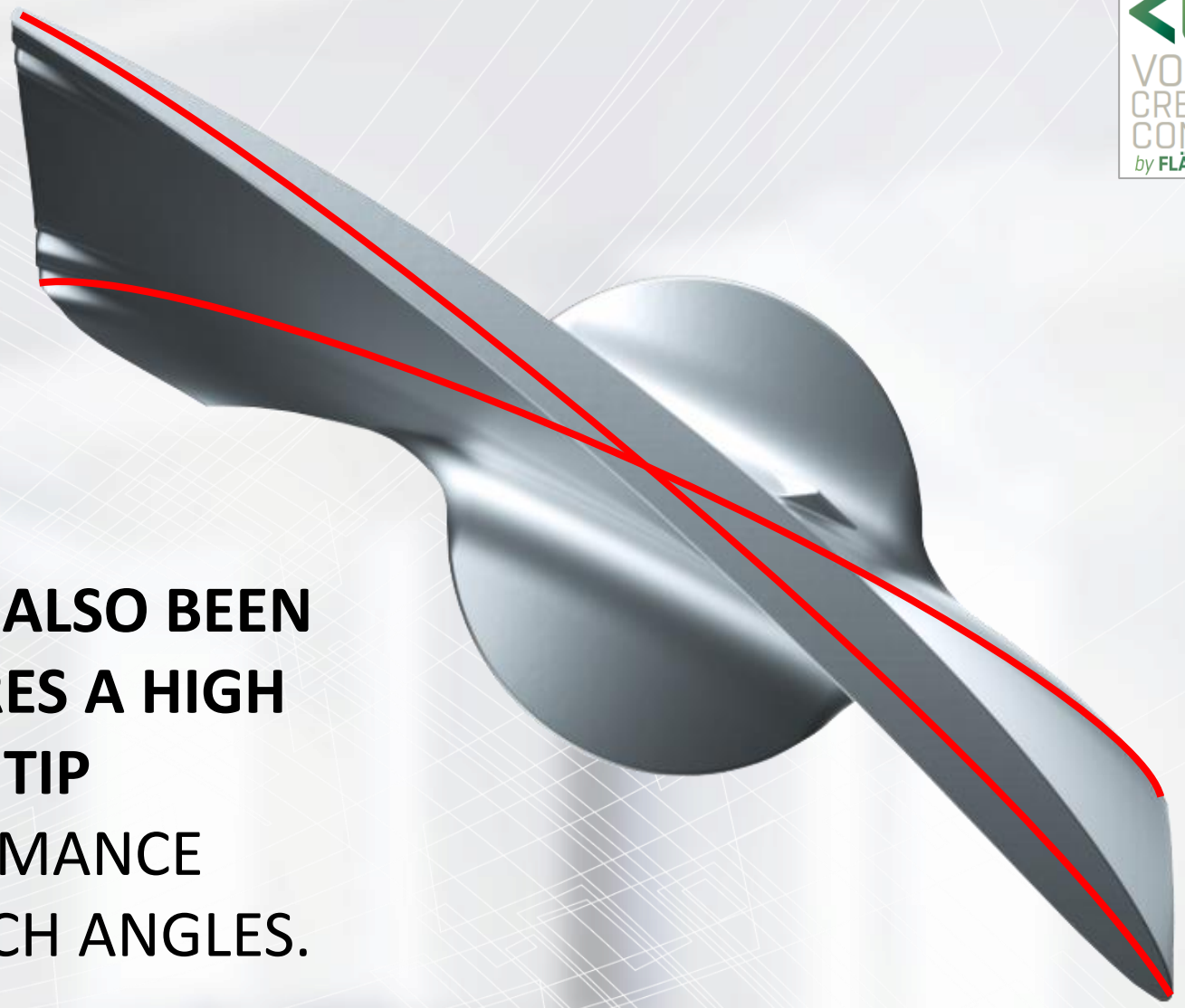
LESS TURBULANCE, LOWER LOSSES AND IMPROVED EFFICIENCY….

…ACHIEVED BY REDUCED CLEARANCES BETWEEN THE **JMv** IMPELLER BLADE, THE HUB, IMPELLER TIP AND THE FAN CASING.





High Twist Angle



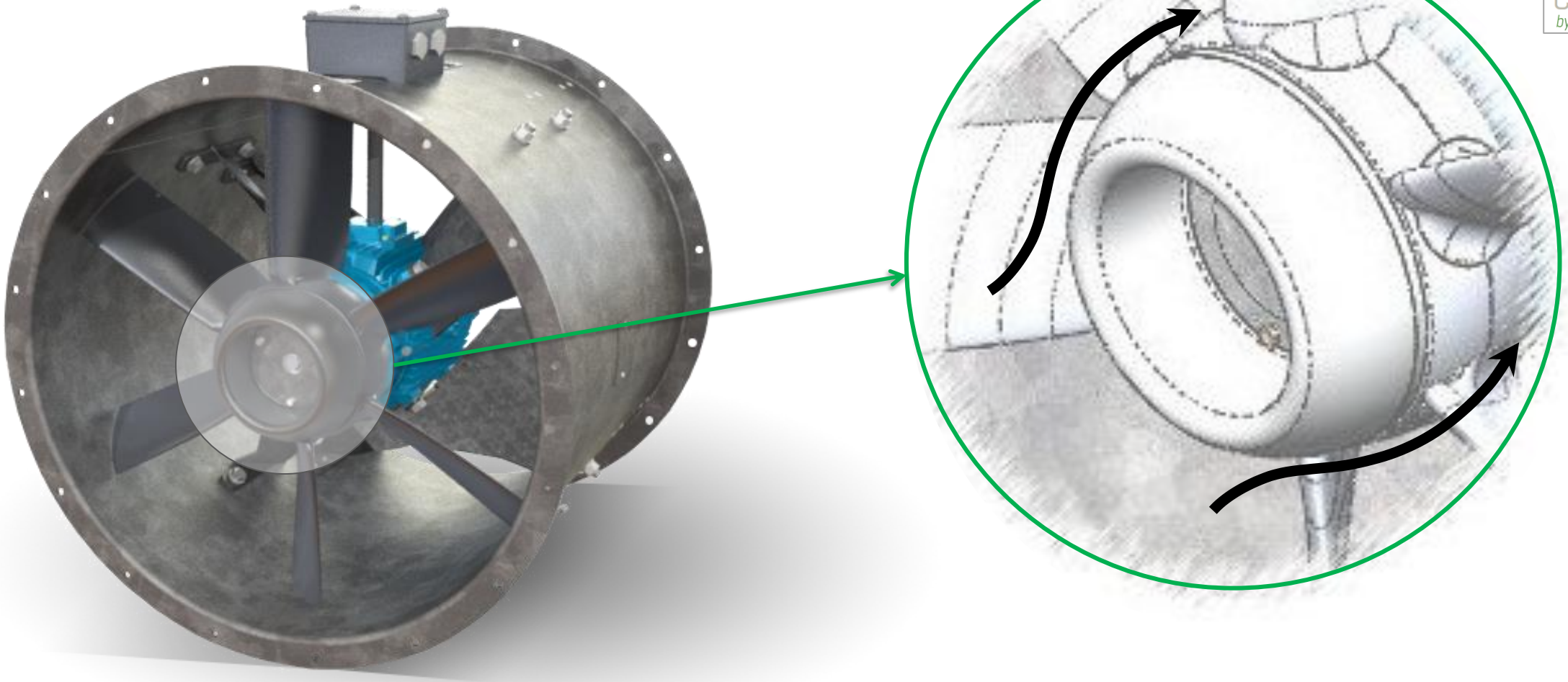
IMPELLER BLADE DESIGN HAS ALSO BEEN IMPROVED AND NOW FEATURES A HIGH TWIST FROM ROOT TO BLADE TIP
ENSURING EXCELLENT PERFORMANCE EVEN AT LOWER IMPELLER PITCH ANGLES.

VCC
VORTEX
CREATION
CONTROL
by FLÄKT WOODS

TRAILING EDGE BLADE FEATURES EFFICIENTLY CONTROL AIR TURBULENCE AFTER THE IMPELLER... TO MINIMIZE LOSSES

Woods
AIR MOVEMENT

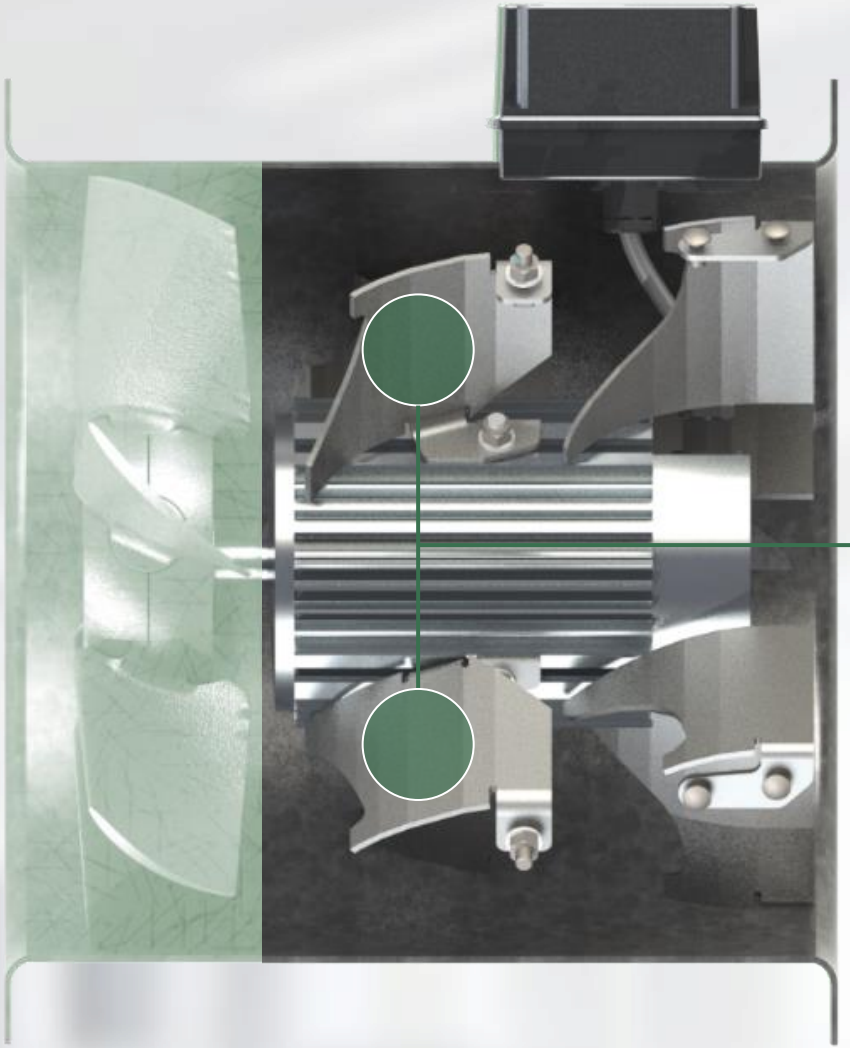
IMPELLER “SPINNER” INCREASES EFFICIENCY FURTHER



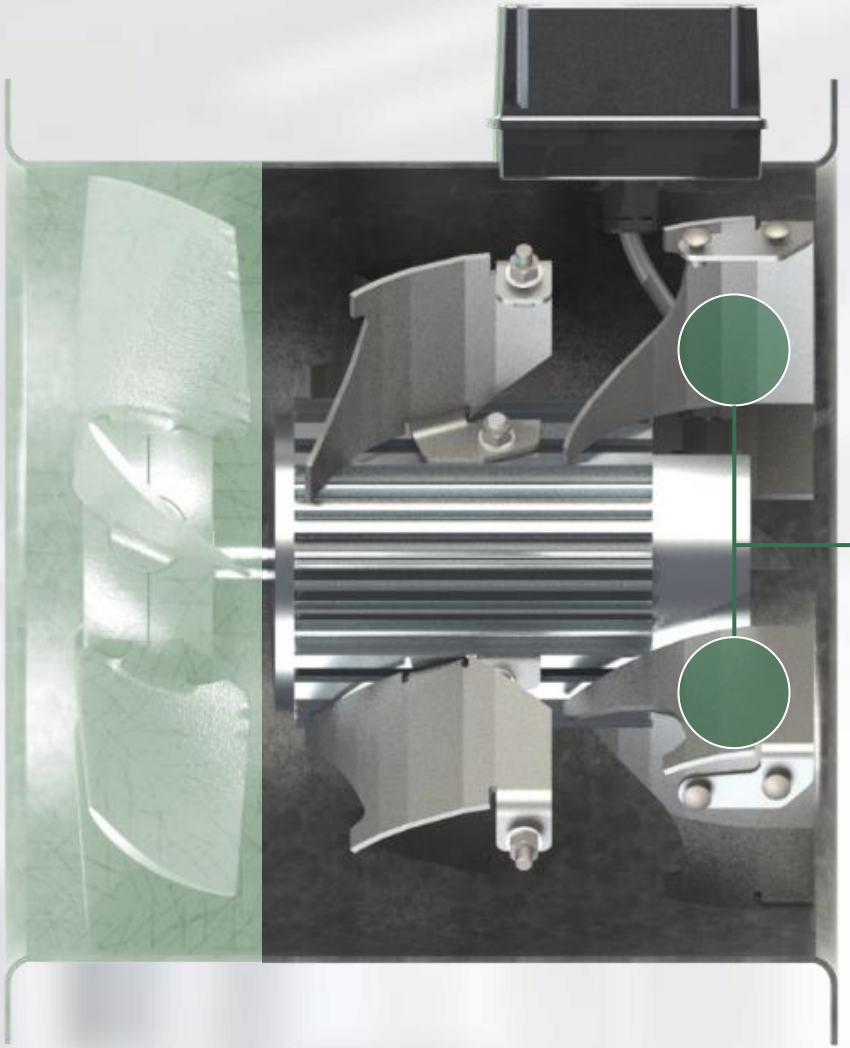
JMv » VCC Technology

OUR GUIDE VANE TECHNOLOGY IS DESIGNED TO BOOST OVERALL EFFICIENCY

THE PRIMARY GUIDE VANES SUPPORT THE MOTOR, WHILST THE SECONDARY GUIDE VANES BOOST EFFICIENCY FURTHER



First set of guide vanes are positioned just after the impeller and are designed to reduce air turbulence. In addition, they also act as drive motor supports.



A second set of guide vanes (used for smaller diameters of 1000mm or less) boost fan efficiency further by creating a more even (laminar) airflow discharge.

JMv(G) AEROFOIL STANDARD TEMPERATURE

Our Standard temperature JMv variant is designed for normal ventilation applications where every day running costs and performance are important. It combines reliability, quality and energy efficiency into one optimised package.

JMv(G) AEROFOIL HT (SMOKE EXTRACT)

Our HT JMv variant is not only designed for normal ventilation applications, but can also be used for “one-off” emergency smoke extraction. Even though it is specifically designed to handle smoke extract temperatures of up to 400°C for 2 hours, it still offers an energy efficient solution.

Other Axial Fan Derivatives: Larger Fans for Infrastructure & Specialist Applications

JM Aerofoil (1.6m+) T/S

Diameters	1600 mm to 3550 mm
Volumes	Up to 360 m3/s (1,296,000 m3/h)
Pressures	Up to 3300 Pa (Static)
Impeller	Adjustable Pitch T/S
Case Style	Ducted, Long case
Case Coating	Hot dip galvanized
Installation	Horizontal or Vertical
Location	Internal or External
IP rating	IP55
Temperature	-40°C to +50°C
Emergency	200°C/2 to 400°C/2 (Optional)
Standards	EN12101-3-2015 available

Smoke Venting	Inverter Control	Speed Control	2 Speed	Motor Grades
✓	✓	✓	✓	IE1 IE2

JM Aerofoil (1.6m+) U/D

Diameters	1600 mm to 3550 mm
Volumes	Up to 400 m3/s (1,440,000 m3/h)
Pressures	Up to 4000 Pa (Static)
Impeller	Adjustable Pitch U/D
Case Style	Ducted, Long case
Case Coating	Hot dip galvanized
Installation	Horizontal or Vertical
Location	Internal or External
IP rating	IP55
Temperature	-40°C to +50°C
Emergency	200°C/2 to 400°C/2 (Optional)
Standards	EN12101-3-2015 available

Smoke Venting	Inverter Control	Speed Control	2 Speed	Motor Grades
✓	✓	✓	✓	IE1 IE2

KMG Aerofoil

Diameters	315 mm to 1600 mm
Volumes	Up to 62 m3/s (223,200 m3/h)
Pressures	Up to 2200 Pa (Static)
Impeller	Adjustable Pitch
Case Style	Ducted, Integral Guide Vane
Case Coating	Hot dip galvanized
Installation	Horizontal or Vertical
Location	Internal or External
IP rating	IP55
Temperature	-40°C to +50°C
Emergency	200°C/2 to 400°C/2 (Optional)
Standards	-

Smoke Venting	Inverter Control	Speed Control	2 Speed	Motor Grades
✓	✓	✓	✓	IE1 IE2

JM Aerofoil with Guide vanes

Diameters	315 mm to 1600 mm
Volumes	Up to 65 m3/s (234,000 m3/h)
Pressures	Up to 2000 Pa (Static)
Impeller	Adjustable Pitch
Case Style	Ducted, Bolt on Guide vane
Case Coating	Hot dip galvanized
Installation	Horizontal or Vertical
Location	Internal or External
IP rating	IP55
Temperature	-40°C to +50°C
Emergency	200°C/2 to 400°C/2 (Optional)
Standards	-

Smoke Venting	Inverter Control	Speed Control	2 Speed	Motor Grades
✓	✓	✓	✓	IE1 IE2

JMST Stainless Steel (316)

Diameters	500 mm to 1000 mm
Volumes	Up to 65 m3/s (234,000 m3/h)
Pressures	Up to 2000 Pa (Static)
Impeller	Adjustable Pitch
Case Style	Ducted, Long or Short
Case Coating	EN1.4401 (316) Stanless Steel
Installation	Horizontal or Vertical
Location	Internal or External
IP rating	IP55
Temperature	-40°C to +50°C
Emergency	200°C/2 to 400°C/2 (Optional)
Standards	ATEX Available

Smoke Venting	Inverter Control	Speed Control	2 Speed	Motor Grades
✓	✓	✓	✓	IE1 IE2

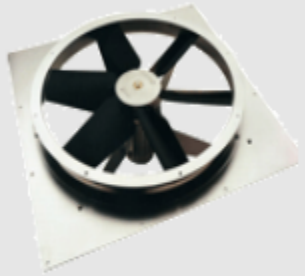
Other Axial Fan Derivatives: OEM Applications

Power S

Diameters	450 mm to 1250 mm
Volumes	Up to 39.5 m3/s (142,200 m3/h)
Pressures	Up to 1465 Pa (Static)
Impeller	Adjustable Pitch
Case Style	Short
Case Coating	Hot dip galvanized
Installation	Horizontal or Vertical
Location	Internal or External
IP rating	IP55
Temperature	-20°C to +40°C
Emergency	Standard Ambient Only
Standards	ISO 5801 Aerodynamic BS848 Pt 2 Acoustic

Smoke Venting	Inverter Control	Speed Control	2 Speed	Motor Grades
-	✓	✓	-	IE3

Climafan Platemounted Type A



Diameters	500 mm to 1000 mm
Volumes	Up to 13.5 m3/s (48,500 m3/h)
Pressures	Up to 850 Pa (Static)
Impeller	Adjustable Pitch, Polypropylene
Case Style	Plate
Case Coating	Hot dip galvanized
Installation	Horizontal or Vertical
Location	Internal or External
IP rating	IP55
Temperature	-40°C to + 65°C
Emergency	-
Standards	-

Smoke Venting	Inverter Control	Speed Control	2 Speed	Motor Grades
-	✓	✓	✓	IE1 IE2

Climafan Shortcased Type A (OEM)

Diameters	500 mm to 1000 mm
Volumes	Up to 13.5 m3/s (48,500 m3/h)
Pressures	Up to 850 Pa (Static)
Impeller	Adjustable Pitch, Polypropylene
Case Style	Unducted, Short
Case Coating	Hot dip galvanized
Installation	Horizontal or Vertical
Location	Internal or External
IP rating	IP55
Temperature	-40°C to + 65°C
Emergency	-
Standards	-

Smoke Venting	Inverter Control	Speed Control	2 Speed	Motor Grades
-	✓	✓	✓	IE1 IE2

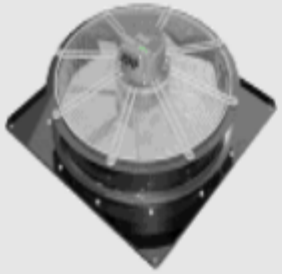
Climafan Long Cased Type D

Diameters	500 mm to 1000 mm
Volumes	Up to 13.5 m3/s (48,500 m3/h)
Pressures	Up to 850 Pa (Static)
Impeller	Adjustable Pitch, Polypropylene
Case Style	Ducted, Long or Short
Case Coating	Hot dip galvanized
Installation	Horizontal or Vertical
Location	Internal or External
IP rating	IP55
Temperature	-40°C to + 65°C
Emergency	-
Standards	-

Smoke Venting	Inverter Control	Speed Control	2 Speed	Motor Grades
-	✓	✓	✓	IE1 IE2 IE3

Other Axial Fan Derivatives: OEM Applications

EC Climafan Platemounted



Diameters	710 - 900 mm
Volumes	Up to 8.35 m3/s (30,060 m3/h)
Pressures	Up to 235 Pa (Static)
Impeller	Fixed Pitch, Polypropylene
Case Style	Plate
Case Coating	Powder Coated pre-galvanised Steel
Installation	Horizontal or Vertical
Location	Internal or External
IP rating	IP65
Temperature	-40°C to +80°C
Emergency	-
Standards	-

Smoke Venting	Inverter Control	Speed Control	2 Speed	Motor Grades
-	-	✓	-	IE4

EC Climafan Without Plate

Diameters	710 - 900 mm
Volumes	Up to 8.35 m3/s (30,060 m3/h)
Pressures	Up to 235 Pa (Static)
Impeller	Fixed Pitch, Polypropylene
Case Style	-
Case Coating	Powder Coated pre-galvanised Steel
Installation	Horizontal or Vertical
Location	Internal or External
IP rating	IP65
Temperature	-40°C to +80°C
Emergency	-
Standards	-

Smoke Venting	Inverter Control	Speed Control	2 Speed	Motor Grades
-	-	✓	-	IE4

JM Metric Impeller

Diameters	315 mm to 1600 mm
Volumes	Up to 65 m3/s (234,000 m3/h)
Pressures	Up to 2000 Pa (Static)
Impeller	Adjustable Pitch
Case Style	-
Case Coating	-
Installation	Horizontal or Vertical
Location	Internal or External
IP rating	-
Temperature	-40°C to +50°C
Emergency	
Standards	-

Smoke Venting	Inverter Control	Speed Control	2 Speed	Motor Grades
-	-	-	-	-

JM Metric Impeller (1.6m+) U/D

Diameters	1600 mm to 3550 mm
Volumes	Up to 400 m3/s (1,440,000 m3/h)
Pressures	Up to 4000 Pa (Static)
Impeller	Adjustable Pitch U/D
Case Style	-
Case Coating	-
Installation	Horizontal or Vertical
Location	Internal or External
IP rating	-
Temperature	-40°C to +50°C
Emergency	-
Standards	-

Smoke Venting	Inverter Control	Speed Control	2 Speed	Motor Grades
-	-	-	-	-

Other Axial Fan Derivatives: High Temperature Bifurcated fans

JM Bifurcated 200 °C

Diameters	400 mm to 1000 mm
Volumes	Up to 19 m3/s (68,400 m3/h)
Pressures	Up to 950 Pa (Static)
Impeller	Adjustable Pitch
Case Style	Ducted, Long case
Case Coating	Hot dip galvanized
Installation	Horizontal or Vertical
Location	Internal or External
IP rating	IP55
Temperature	Up to 200°C Continuous
Emergency	-
Standards	-

Smoke Venting	Inverter Control	Speed Control	2 Speed	Motor Grades
-	✓	✓	-	IE2

Series 33 200 °C

Diameters	152 mm to 305 mm
Volumes	Up to 0.95 m3/s (3,420 m3/h)
Pressures	Up to 380 Pa (Static)
Impeller	Aluminium silicon alloy, Fixed pitch
Case Style	Ducted, Long case
Case Coating	Hot dip galvanized
Installation	Horizontal or Vertical
Location	Internal or External
IP rating	IP55
Temperature	Up to 200°C Continuous
Emergency	-
Standards	-

Smoke Venting	Inverter Control	Speed Control	2 Speed	Motor Grades
-	-	✓	-	IE2

JM Bifurcated 600 °C

Diameters	400 mm to 1250 mm
Volumes	Up to 33 m3/s (118,800 m3/h)
Pressures	Up to 1000 Pa (Static)
Impeller	Adjustable Pitch
Case Style	Ducted, Long case
Case Coating	Hot dip galvanized
Installation	Horizontal or Vertical
Location	Internal or External
IP rating	IP55
Temperature	Up to 600°C/2 hours
Emergency	-
Standards	-

Smoke Venting	Inverter Control	Speed Control	2 Speed	Motor Grades
✓	-	-	-	IE3

Other Axial Fan Derivatives: Car Park Jet Thrust Fans

THANK YOU FOR YOUR ATTENTION

Contact details: andy.cardy@flaktgroup.com

Woods
AIR MOVEMENT

Appendix – Supporting Information

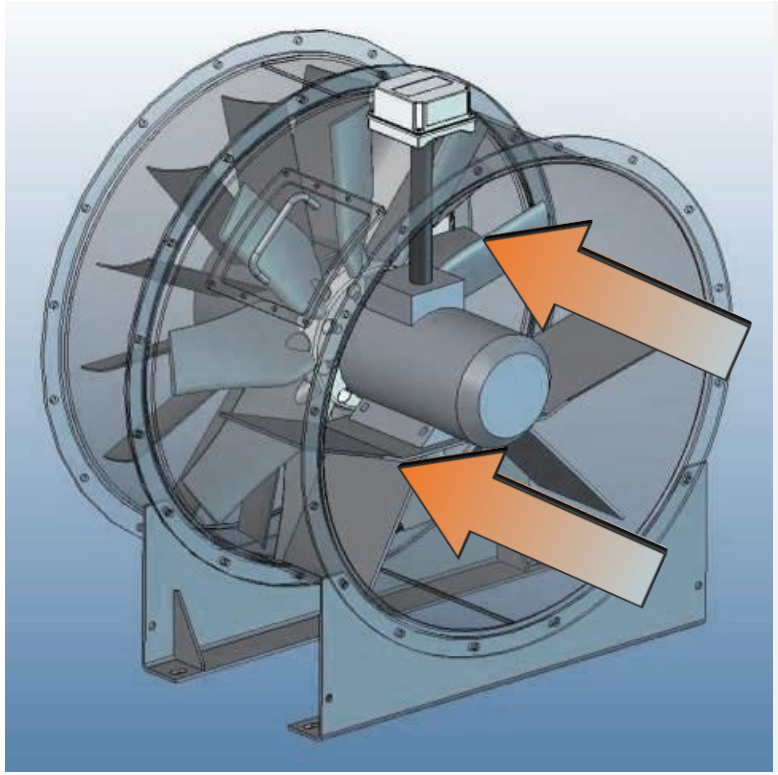
TOPICS

- JM fan Guide Vane Principles
- JMv Performance range data
- JMv Value Propositions
- Axial fan Application Examples

JM Axial Fans
Concepts & Variants

Supporting Information

JM Axial – Product Variants: Guide Vanes



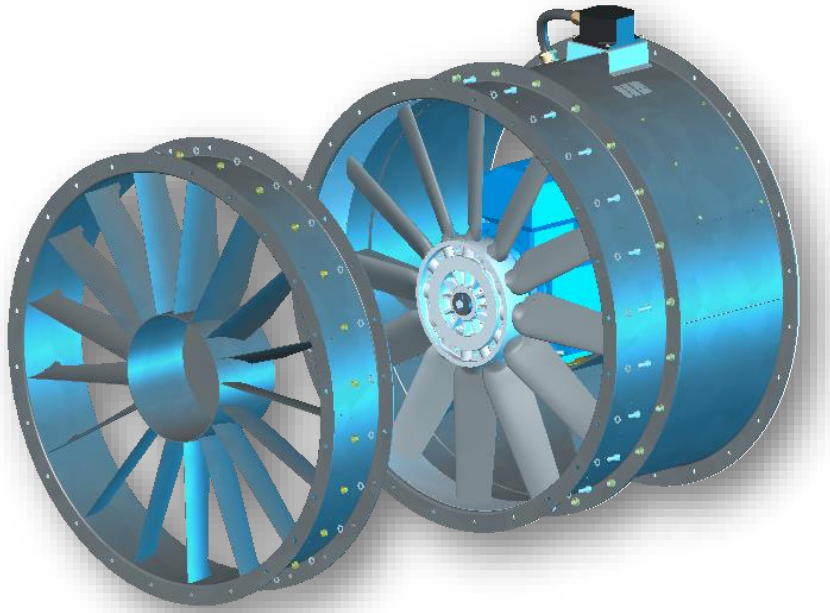
Guide Vane Principles

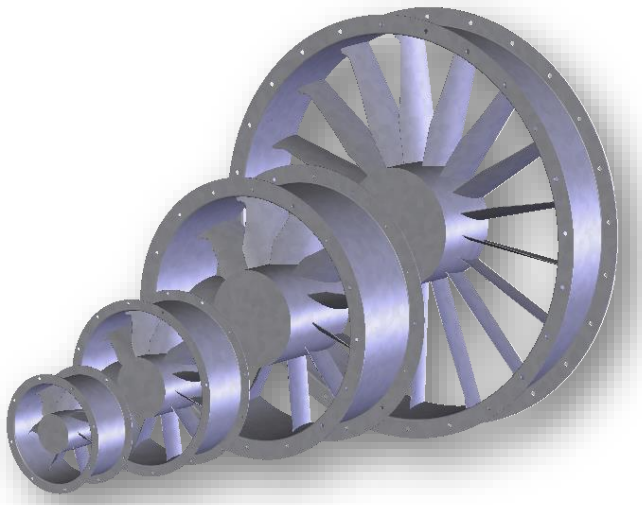
Guide Vanes mounted downstream within a **Form A Fan** gives extra pressure for **no extra power**

1. Right hand impeller blade imparts **extra swirl into the airstream**

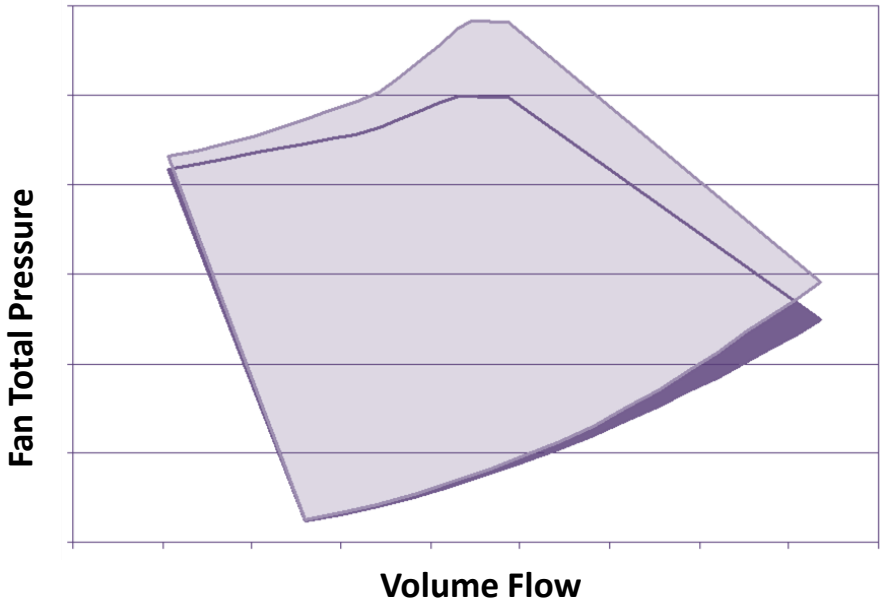
2. **Swirl is removed by Guide Vanes**, which in turn **creates additional static pressure**

JM Axial – Product Variants: Guide Vane Fan Product





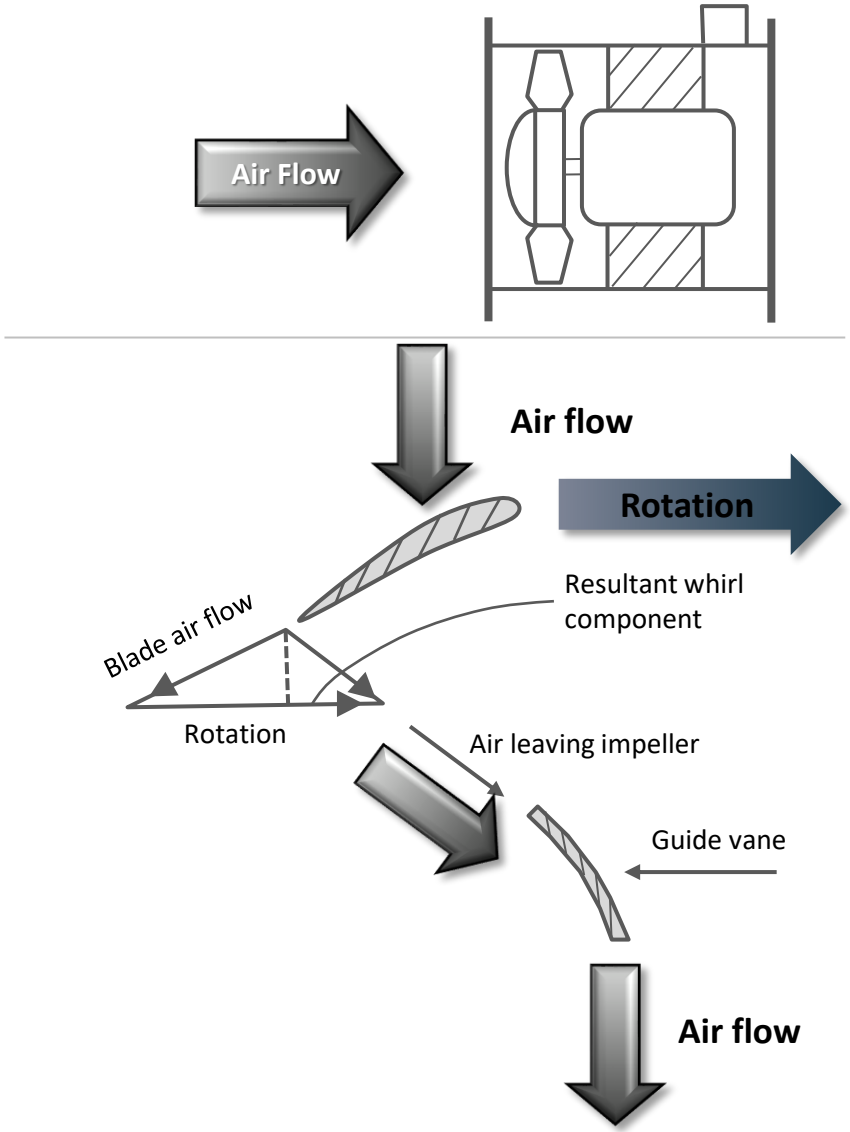
- Design derived from JM Marine Fan product development
- Downstream Bolt on Guide Vane offers a simple method of increasing pressure development without having to change the motor



JM Axial – Product Variants: Guide Vanes: Downstream

JM Guide Vane – Downstream

- Increased Efficiency
  - No increase in power
  - Slightly higher pressure development
- 26°Non-Linear Twist (Free Vortex)
- Aluminium Impellers:
  - High Pressure Die Cast (up to 1000 mm)
  - Gravity Cast (up to 1600 mm)



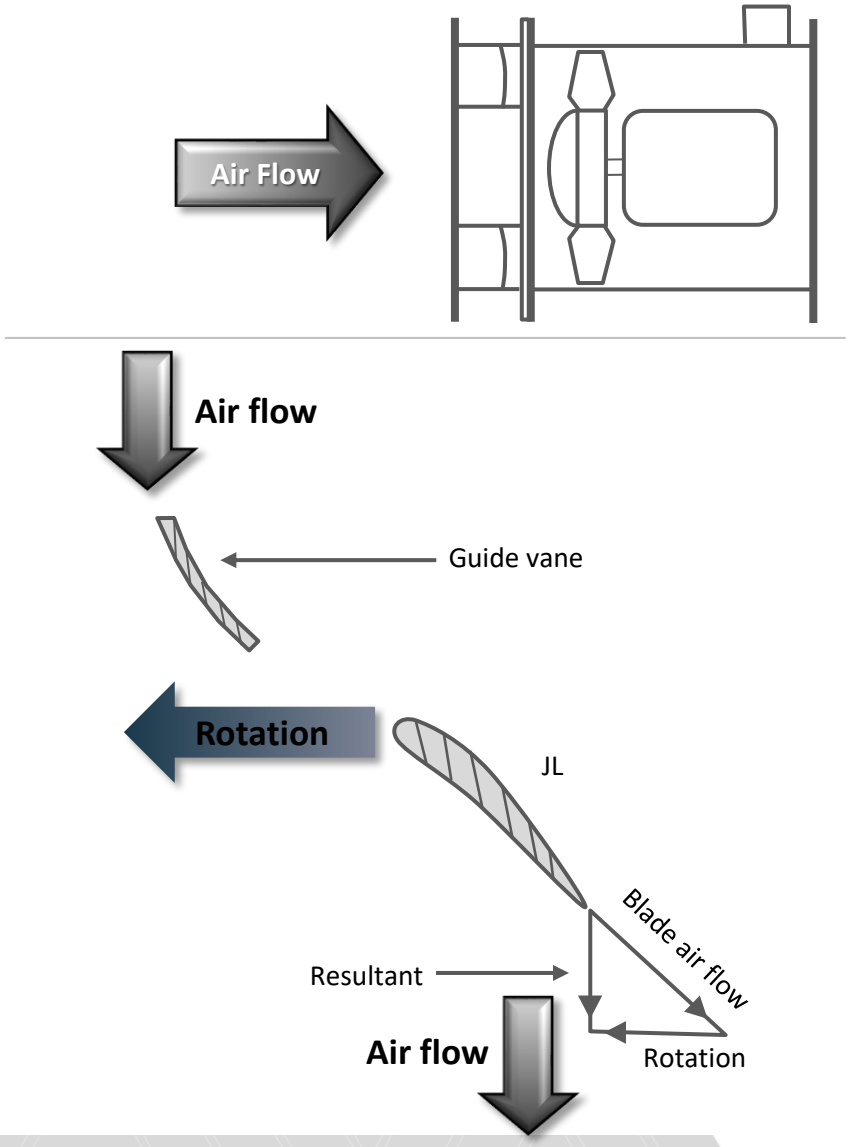
JM Axial – Product Variants: Guide Vanes: Upstream

JM Guide Vane – Upstream

- Can be offered as a separate Accessory which can be retro-fitted
- **Up to 30% more pressure development**

BUT

- **Power consumption increases (by 30%)**
- Same Efficiency as Standard Fan
- Motor rating may not be sufficient, so a motor change may also be needed



THE JMv(G) VENTILATION FAN

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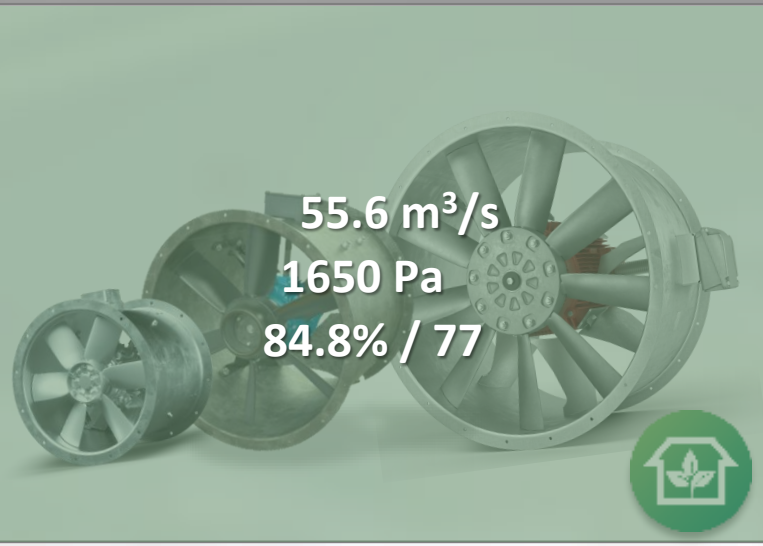
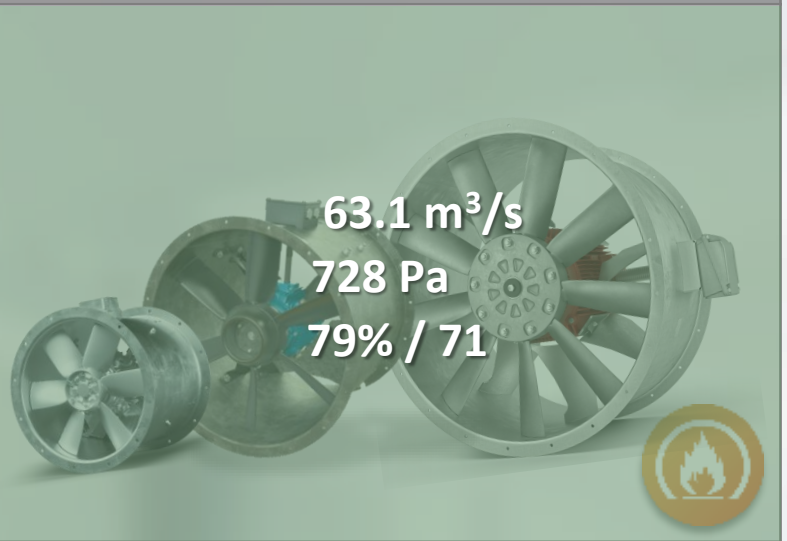
Supporting Information

Product Name >	JMv(G) Aerofoil (Std Ambient)	JMv(G) Aerofoil HT
Maximum Airflow » Maximum Pressure » Max Efficiency / FMEG »	 55.6 m^3/s 1650 Pa 84.8% / 77	 63.1 m^3/s 728 Pa 79% / 71
Casing Style	Long Cased with integral Guide Vanes	Long Cased with integral Guide Vanes
Available Sizes	14 Sizes available: 315 to 1400mm	14 Sizes available: 315 to 1400mm
Impeller hub diameters (mm)	140, 160, 200, 250, 315,400 & 500mm	140, 160, 200, 250, 315, 400 & 500mm
Impeller blades (number)	6, 9 or 12 Blades (hub dependent)	6, 9 or 12 Blades (hub dependent)
Motor Speed Options	2, 4, 6 or 8 pole #	4, 6 or 8 pole #
Operating Temperature range	-40°C to +50°C	200°C, 300°C or 400°C (For 2 Hours)
Electrical Supply	1Ph / 50 or 60Hz and 3Ph / 50 or 60Hz	3Ph / 50Hz and 60Hz (400°C Max.*)

 # diameter / hub size dependent *** diameter / speed dependent**

PROPERTY OWNER

- **Operating Cost Savings**: up to **44.5%**
- Available as a **standard fan or high temperature** fan up to HT 400°C / 2 hours (EN12101-3 certified)
- **Innovative "VCC technology"** using 2-stage integrated guide vanes & impeller spinner for larger diameter fans (630mm, with 250mm hub and above) delivers **high efficiency solution**

CONSULTANT

- **Impeller efficiency increased up to 84.8%** (increased by up to **19.3%**).
- Innovative new fan design (integrated guide vanes) increases overall fan efficiency
- **High efficiency performance** supports the design of "green buildings“
- **JMv(G) offers a single stage, high pressure, high efficiency solution to replace the need for 2 stage fans**

CONTRACTOR

- Long casing fans offer easy and affordable installation - saves time
- Large range and fast availability **– Offers smaller motor or Fan diameter solutions**
- **JMv(G) offers a single stage, high pressure, high efficiency solution to replace the need for 2 stage fans**
- Meets ErP 2015 regulations (Regulation 327/2011) – peace of mind
- Operating costs are calculated automatically by Fan Selector software

JMv(G): Achieve More With Less

High Efficiency, High Pressure Alternative to Steel impeller @ 2 pole speed

ENVIRONMENT

- Offers **Environmental** protection by **reducing carbon dioxide emissions by up to 624 tonnes** (over operational life)
- Less material than alternative 2 stage & bolt on guide vane solutions
- Able to achieve higher performance at lower speed (2 pole Vs 4 pole) therefore significantly quieter

ECONOMICAL

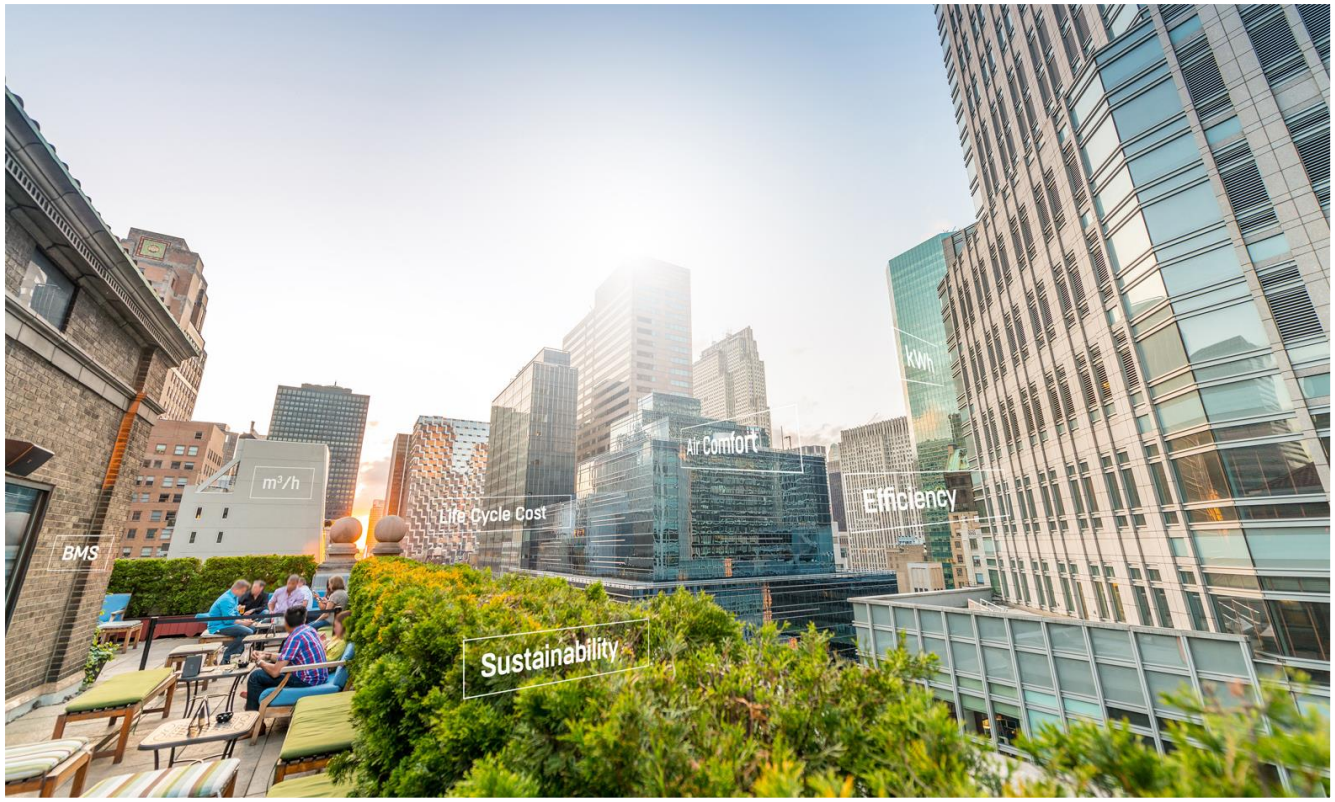
- **Reduced running costs by up to 44.5%** (when compared with our JM fan product), even with IE2 motors
- **ErP 2015 (Tier 2) compliant:** Reduced power needs translates into a more economical solution for installers
- IE3 efficiency grade motors can also be fitted to provide even greater energy savings

EXPERTISE

- **Uses our Vortex Creation Control technology** developed using advanced Engineering software tools (Computational Fluid Dynamics and Finite Element Analysis)

Aluminium Impeller → Light Weight → Smaller Motor → Lower Speeds → Lower Noise Levels → Higher Efficiency → Less Power Required → Lower Capitol & Running Cost

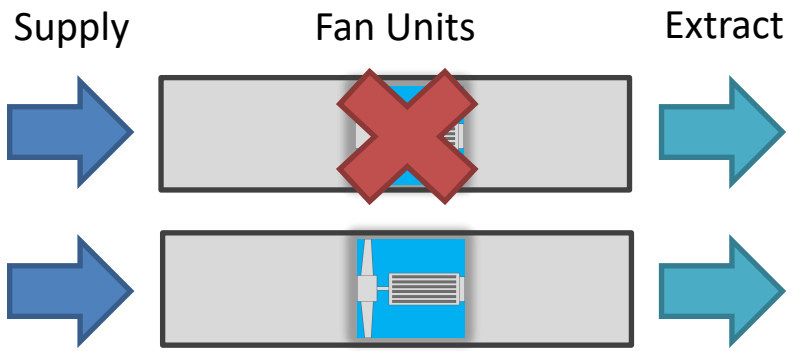
Axial Fans: Typical Applications Reference Material

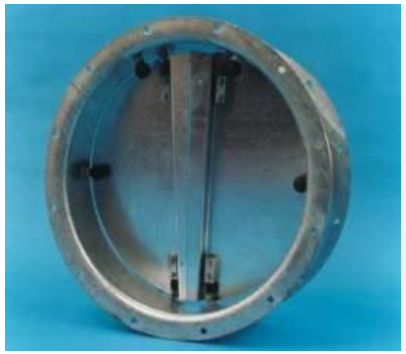


JM Axial – Fans in Parallel

Two or more Fans in parallel increases volume at the same pressure…

- Space saving (duct run length)
- Run & Standby
- Variable volume (2 Different Systems)
- Often standard requirement for emergency smoke removal





Note: Requires care in selection at higher pitch angles to avoid possible “stall”

Fit Dampers to prevent back-draught/re-circulation

JM Axial – Fans in Parallel

Typical application:
Car Park Emergency Extract Fans

JM Axial – High Temperature Smoke Extract Fans

Certification: High Temperature Emergency Smoke Extract Fans

- Tested to EN12101-3: 2015
- CE-Marked / UKCA Marked

Temperature/time categories:

- 200˚C / 2 hours
- 300˚C / 2 hours
- 400˚C / 2 hours
- **600˚C / 2 hours** (JMF.Bif)

HT JM Axial

F600+

HT JMF.Bif Axial

JM Bifurcated Fans) F600 (600°C/1 & 600°C/2 Hour) Dedicated Fire Mode Use

Quick Facts

- **400mm to 1250mm Diameter**
- **Volume flows up to 29 m3/s**
- **Static Pressures up to 1180 Pa**
- **Suitable for temperatures up to 600°C for 1 hour (F600)**
- **Additionally, the fan is suitable for 600°C/2 and 400°C/2**
- Casings are hot dipped galvanised
- Duct mounted terminal box fitted as standard
- Steel impellers are of the single piece, welded design
- Motor is mounted out of airstream
- Motor protection is IP55. Insulation is Class H (Class F rise)

Sizes

7 sizes : 400mm, 500mm, 630mm, 800mm, 1000mm, 1120mm and 1250mm, available in 2, 4 or 6 pole speed options (dependant on diameter).

Temperature Range

Fans are designed for Emergency Smoke Venting up to 600°C for 1 hour duration (F600), plus 600°C/2 and 400°C/2.

Fan Performance

Based on using the above fan diameters, speed options and a range of impeller blade pitch angles, our Steel impellers, mounted inside a Bifurcated fan casing deliver exact performance requirements with a non-overloading fan characteristic, so reliability is ensured.

Impellers

Impellers are fabricated from robust steel hubs and formed steel blades to produce a single piece, fixed pitch impeller which delivers the required performance whilst operating at 600°C. To ensure structural integrity and reliability, impeller assemblies are inspected during manufacture using non-destructive test methods.

Motors

All motors are is IP55 rated, totally enclosed f an cooled. Insulation is class H as standard. All motors are supplied with sealed for life bearings or extended lubricators.

Electrical Supply

380 – 420V / 50Hz / 3ph

Accessories

Mounting feet, Anti-Vibration isolators, Matching flanges, Flexible connectors, Guards and Bell mouth inlets. Optional Silencers can be provided for the downstream (pressure) side.

JM Axial – High Temperature Smoke Extract Fans (Elefsina-Tsakona Motorway, Greece)

5 Road Tunnels: Total length 365.4 km

- 2 off 2.8m HT Axial fans each fitted with a 710 kW motor
- 10 off 1m Jet Fans (rated for HT400/2)
- 60 off 1.0m Jet fans (rated for HT300/2)
- 26 off 1.25m Jet fans (rated for HT300/2)

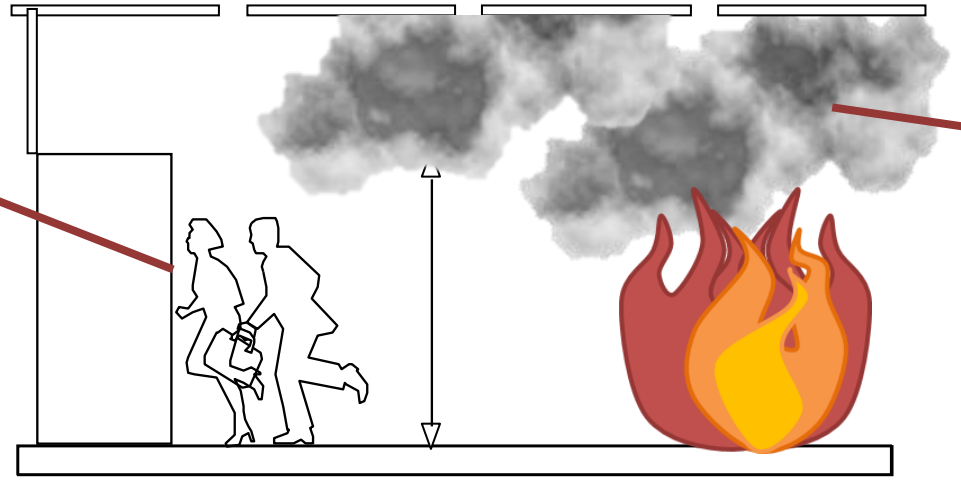
JM Axial – High Temperature Smoke Extract Fans

High Temperature Emergency Smoke Extract Fans

Emergency smoke extraction
from occupied space

To assist Firefighters

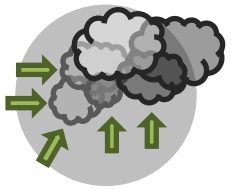
To allow escape of occupants



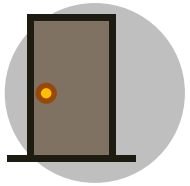
Removal of hot or cold smoke up to specificed temperature and time

JM Axial – Stairwell Pressurisation Systems: Functions

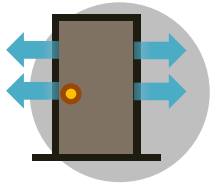
Protection of emergency escape routes



- Create positive pressure to resist smoke entry to escape route
- Provide positive smoke control in the protected escape routes

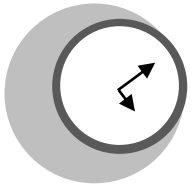


Use of pressure relief to atmosphere to balance pressures to allow doors to be opened

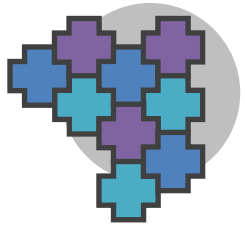


Provide sufficient airflow through door openings and gaps to resist smoke flow

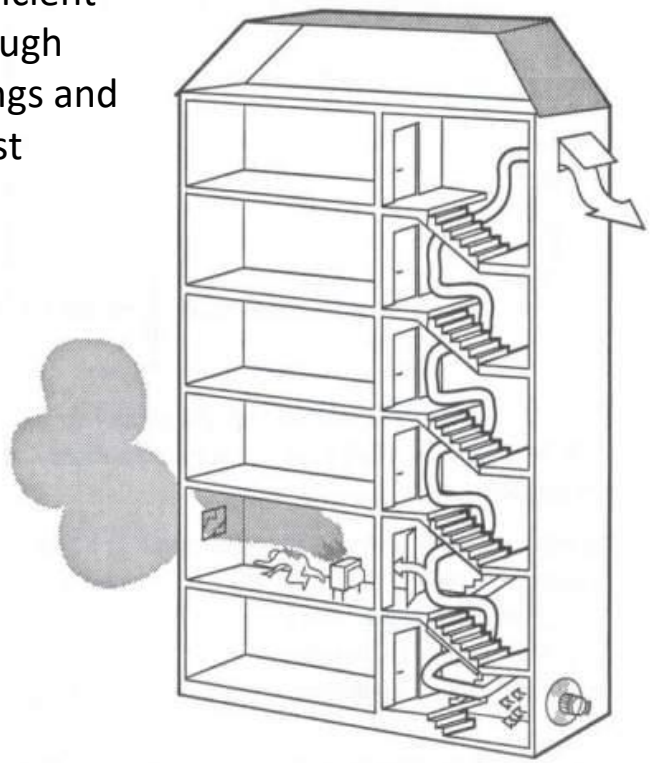
Be readily available when fire / smoke detected



Be reliable and capable of functioning for period required

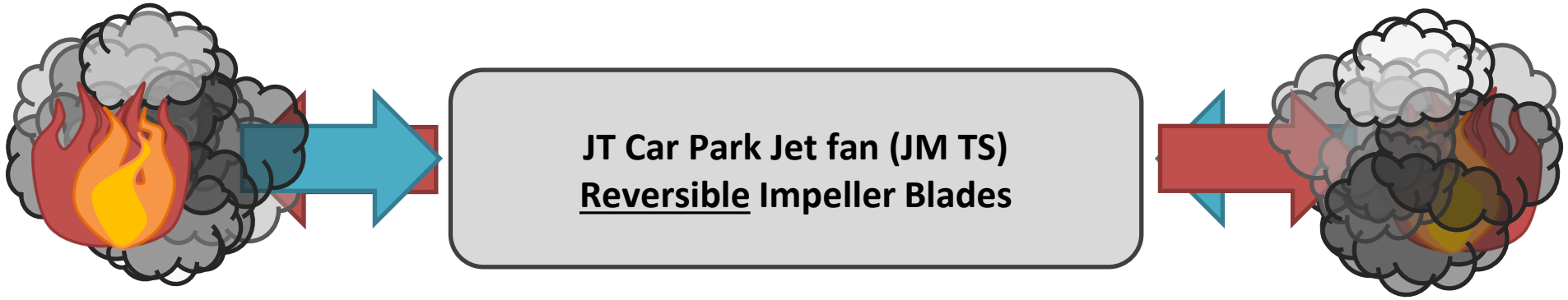


Be simple, economic and installed to avoid malfunction



JM Axial – JT Car Park Smoke Extract Systems

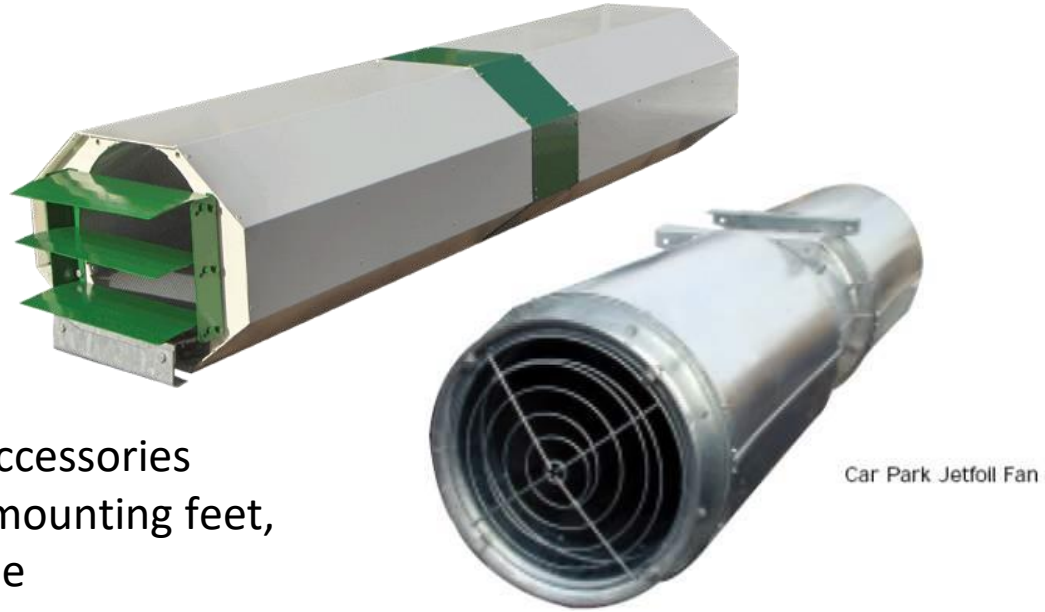
JM Axial – JTS Car Park Smoke Extract Systems (Thrust Fans)



31, 35 and 40 cm Fan Impeller diameter

Emergency smoke extract: up to 400°C for 2 hours temperature

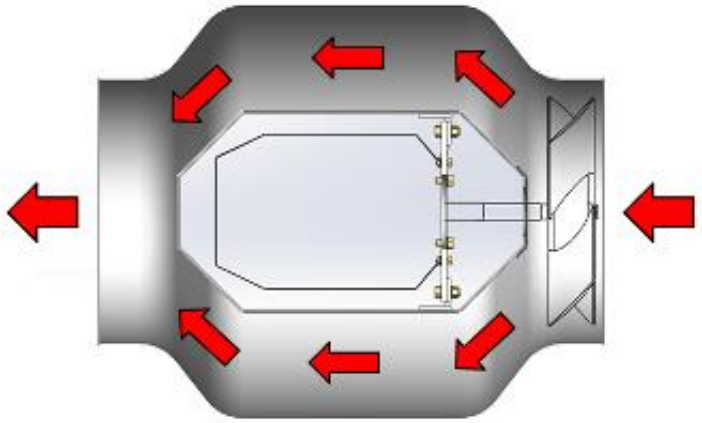
Integral silencers plus other accessories including electrical isolators, mounting feet, guards and deflectors available



Car Park Jetfoll Fan

JM Axial – JTv Car Park Smoke Extract Systems (Thrust Fans)

JM Axial – High Temperature (Continuous use)



JM Bifurcated Fan

- 315 – 1000 mm diameter
- 2, 4 & 6 Pole Speeds
- Continuous temperature rating: 200˚C
- Aluminium Impellers:

  - High Pressure Die Cast

Applications:

- for high temperature air,
- fume extract or
- contaminated air

JM Axial – Bifurcated High Temperature (Continuous use)

Typical application: Kitchen Hood Extract

JM Axial – Hazardous Area Fans (ATEX)

- Modifications to Standard Fans
- Performance & Build changes
- EU Legislation from 1st July 2003
- Designated construction file
- ATEX approved components
- Design approval Third Party
- Duty of specifier to define the zone
- Duty of the manufacturer to meet the requirement
- Only manufacturers with design capability will meet the standards

JM Axial – Hazardous Area Fans (ATEX)

JM Axial for Hazardous area use

Standard fan specification

ATEX: Ex II 2 G c IIB T4

- 500 – 1000 mm diameter fans
- EExd Motors as standard – other motors available
- Anti-spark impeller track
- Special terminal box, cable and connectors

JM Axial – Hazardous Area Fans (ATEX)

Typical application:
Oil Refinery

JM Axial – Product Variants: JM Plate Mounted Fan

JM Plate Mounted Fan

'Through the Wall' Ventilation'

- 315 – 630 mm diameter
- 4 & 6 Pole Speed options

Applications:

- Wall mounted
- Low pressure/High volume applications

JM Axial – Product Variants: Clima Fans AC

Clima fan

- Variant of JM with Polymer Blades
- 500 – 1000 mm diameter
  - Up to 2 Pole – 500 mm
  - Up to 4 Pole – 800 mm
  - Up to 6 Pole – 1000 mm
- Adjustable Pitch Impellers
- Short Case & Plate Mounted
- Maximum continuous temperature rating is up to 60°C
- Used for OEM applications - Heat transfer solutions

JM Axial – Product Variants: Clima Fans EC

- **IE4+ Efficiency**
  - Operating efficiencies above current legislative targets, reducing energy consumption
- **Modbus or 0-10v control with infinitely variable speed from 0% to 100%**
  - Allowing full control and BMS integration with full motor control software
- **Fully EMC compliant & CE marked**
  - Have confidence in the safety of the product
- **Patented aerodynamically optimised impeller design**
  - Featuring crenellated blade and tip feature; reducing noise related to air movement
- **Standard & bespoke plate sizes & finishes**
  - Tailored to fit customer requirements

JM Axial – Product Variants: Stainless Steel (Food Industry)

JM Stainless Steel

- Stainless Steel Case and Arms
- JM Aluminium Alloy Impeller
- Standard pre-designed range 500 - 1000 mm diameter
- Pad Mounted Motor
- Used for hygiene, food industry, wood drying applications

JM Axial – Product Variants: Marine Fans

JM Marine: Sizes 40 – 160 with Standard Motors,

Sizes 50, 63 – 160 with Hazardous Area Motors

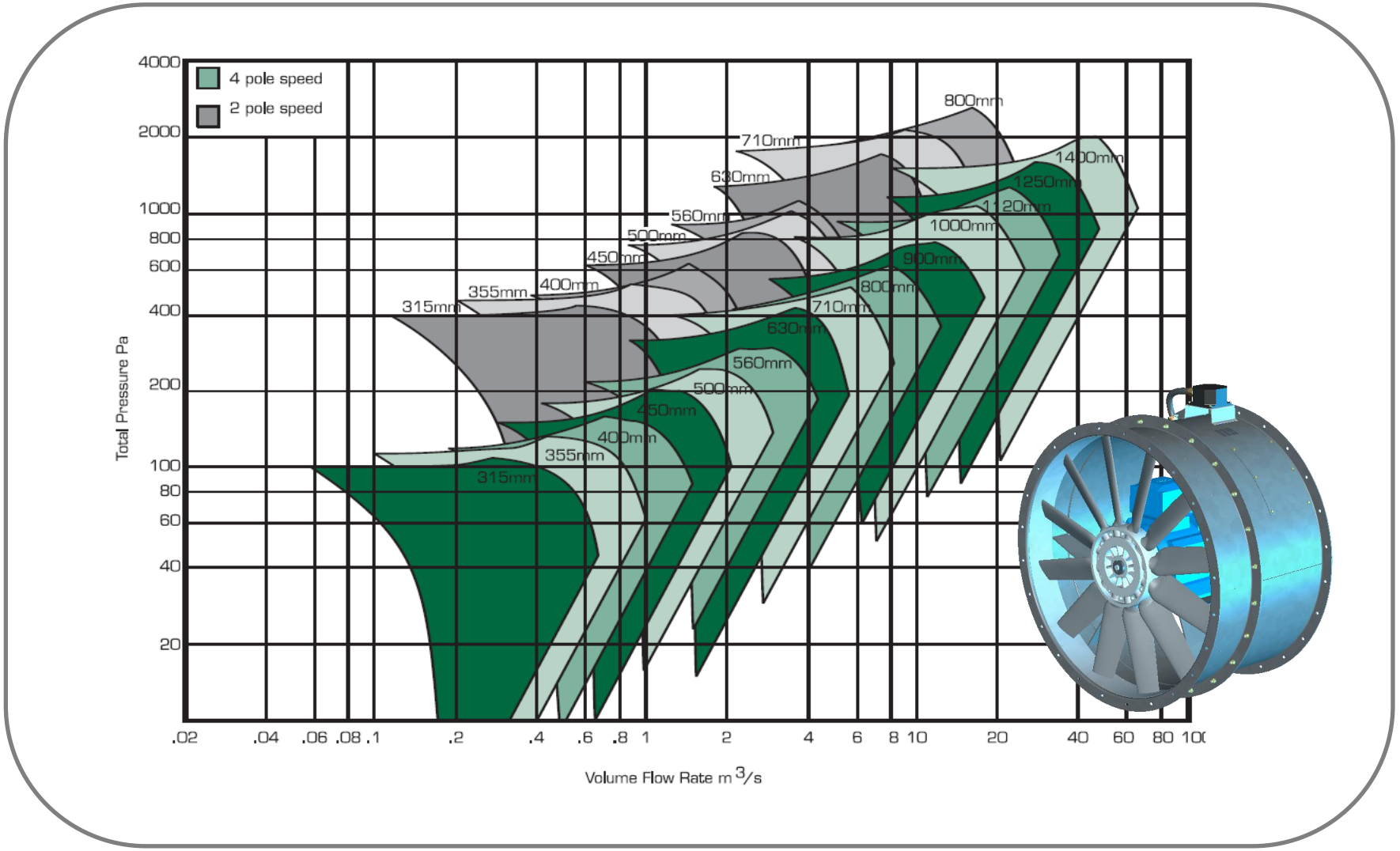
JM Marine hazardous areas range includes:

- 10 diameters - 500, 630 to 1600 mm
- 6 mm thick Casing
- Inspection Doors
- 50 Hz or 60 Hz supply
- Marine EExd Foot Mounted ABB or Marelli Motors
- EExe T/Box & approved Conduits & Glands
- Additional Impeller locking feature
- Anti-Spark Track
- Increased Tip Gap*
- 2 Fan speeds per diameter (achieved by 2 Motor Pole variations)
- Vertical & Horizontal Mounting

Options:

- Epoxy paint on top of galvanised finish
- Bolt-on Guide Vane
- Ancillaries

JM Axial – Product Variants: Marine Fan Performance



JM Axial – Product Variants: Tunnel Fans

Tunnel Jet Fans

- 400 – 1600 mm Fans
- 2, 4 & 6 Pole Speed
- Uni-directional & Truly Reversible
- Up to 400°C for 2 hours options
- Tested at BSRIA UK to EN12101-3
- Integral Silencers with length options
- Stainless Steel variants available