MoJet Tunnel Ventilation
【MoJet 隧道通风】

Motivation【动机】

- To deliver aerodynamic thrust in a tunnel【隧道中符合空气动力学的通风】
  - Significantly more than that delivered by a conventional jet fan 【性能明显超过传统喷气式风扇】
  - With the same or less than the power consumption of a conventional jet fan【耗电量小于或等于传统喷气风扇】
  - Within the same headroom as a conventional jet fan【与传统喷射风扇在同一空间限制之内】

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- Principles of the MoJet 【MoJet的原理】
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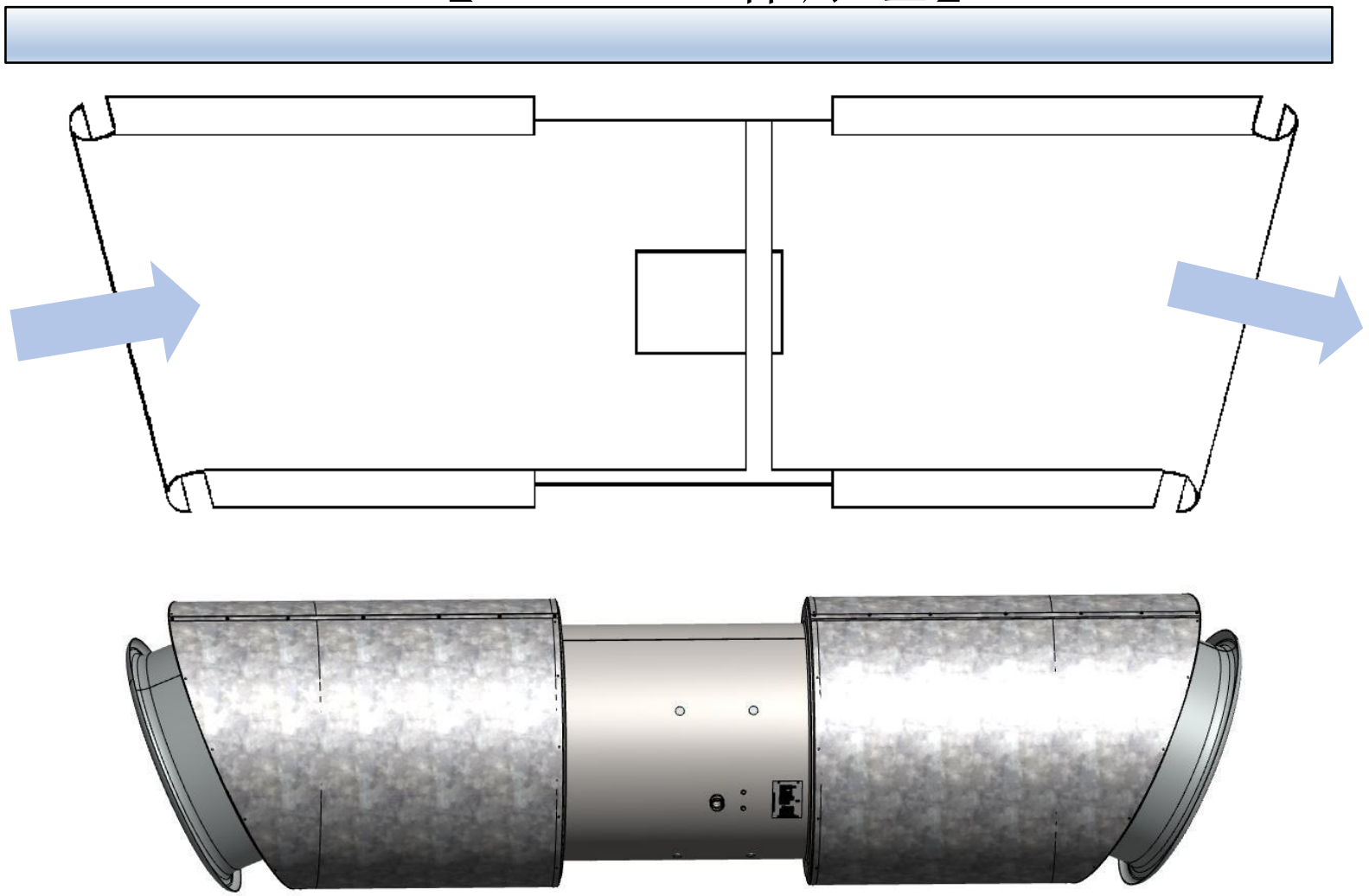
Principle of the MoJet
【MoJet 工作原理】



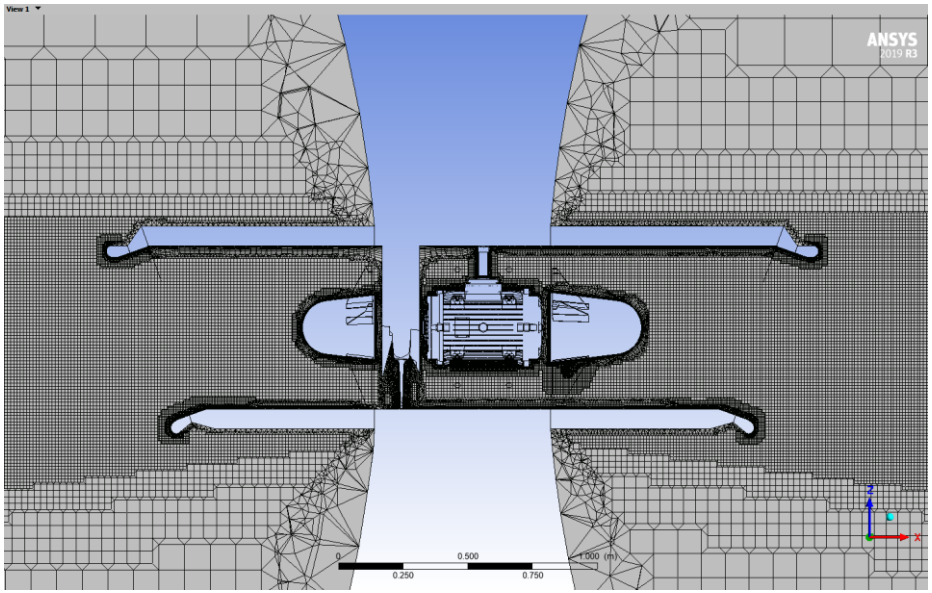
How the MoJet Works
【MoJet 怎样工作】

- The reversible MoJet tunnel ventilation system can increase the in-tunnel aerodynamic thrust by up to 100%, with reduced power consumption. 【可逆向通风的MoJet 隧道通风系统可将隧道内空气动力推力提高多至100%，因而降低了功耗.】
- The MoJet uses shaped nozzles which turn the airstream away from the tunnel soffit and walls. This reduces surface friction, minimising the Coanda Effect. 【MoJet 使用特殊型状喷嘴，使气流离开隧道的拱腹和墙壁. 这样减少与表面的摩擦，减小柯恩达效应 （Coanda Effect）。】

Computational Fluid Dynamics (CFD)
【计算流体动力学（CFD）】

- 3D CFD calculations have been used extensively in the design of the MoJet。【在MoJet的设计中深入地使用3维计算流体动力学分析。】

- They have confirmed the advantages of the MoJet both in bench thrust tests (in the factory) and also within tunnels. 【MoJet的优势在（在工厂中）的台架推力测试及隧道内测试被证实。】



Benefits of the MoJet
【选用MoJet 的益处】

- Reduced number of jet fans required, hence less procurement and maintenance costs 【减少所需的喷气风扇数量，因此减少了采购和维护成本】
- Reduced cabling requirements【减少布线要求】
- Less power consumption【减少耗电量】
- More energy-efficient, sustainable solution【更节能，可持续的解决方案】

Aerodynamic Effects【空气动力学效应】

- Reducing the Coanda effect (i.e. the flow is turned away from the tunnel soffit). 【减少柯恩达效应（既气流量导向离开隧道拱腹）。】
- Static pressure recovery downstream of the fan (due to an increase in silencer cross-sectional area). 【风扇下游的静压力恢复（由于消音器横截面积的增加）。】
- Increased mass flowrate through the fan (due to reduced inlet and outlet pressure drops). 【通过风扇的空气流量增加（由于入口和出口的压力损失降低）。】
- The confining effects of the tunnel soffit on the silencer inlet are reduced, because the silencer inlet area is directed away from the tunnel soffit.【因为消音器入口的方向指向离开隧道拱腹，所以减小了隧道拱腹对消音器入口的限制作用。】
- Reduced discharge velocity, leading to lower shear stress at the tunnel soffit.【降低气体排放速度，因而降低隧道拱腹处的剪应力。】

Factory Tests【工厂测试】

A full range of thrust and acoustic tests have been carried out for 1.25m and 0.8m internal diameter MoJets.

【对于内径为1.25m和0.8m的MoJet，已经进行了全面的推力和声学测试。】

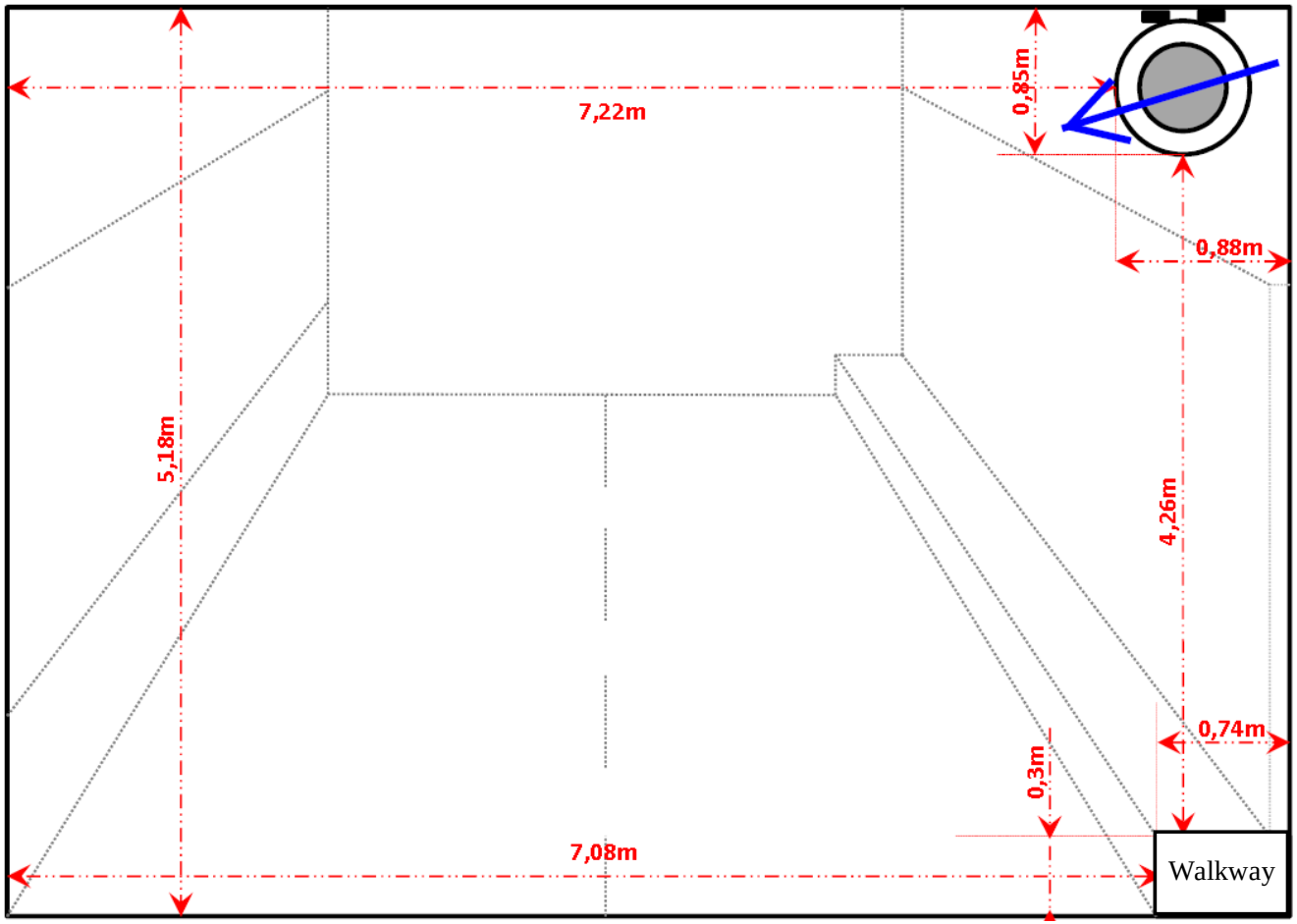
Full-Scale Tunnel Tests【隧道全面测试】

The MoJet has been successfully tested in the following tunnels:【MoJet 已在以下隧道中成功测试：】

- Montgomery Tunnel, Brussels, Belgium (100% increase in thrust compared to conventional jet fans)【比利时布鲁塞尔的Montgomery隧道（与传统的喷气风扇相比，推力增加了100％）】
- Queensway Tunnel, Liverpool, England【英国利物浦的Queensway隧道（与传统的喷气风扇相比，推力增加了30％）】

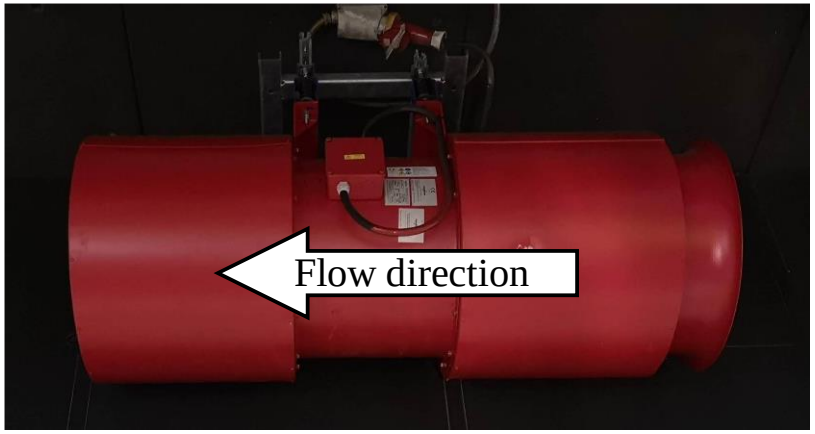
Montgomery Tunnel, Brussels
【布鲁塞尔Montgomery隧道】

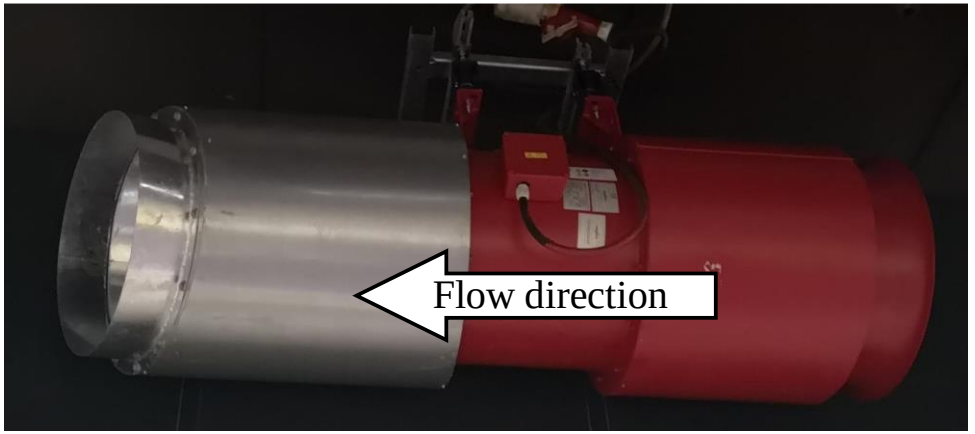
Montgomery Tunnel Cross-Section
【Montgomery 隧道截面】



*注：图中Walkway是指“走道”

Montgomery Tunnel, Brussels
【布鲁塞尔 Montgomery 隧道】





Experimental comparison between unidirectional jet fans (3 conventional jet fans and 3 MoJets) undertaken; 100% additional thrust with MoJet measured by ULB University. 【进行了单向射流风机（3个常规射流风机和3个 MoJets风机）之间的实验比较； ULB大学测出的 MoJet 的推力增加100％。】

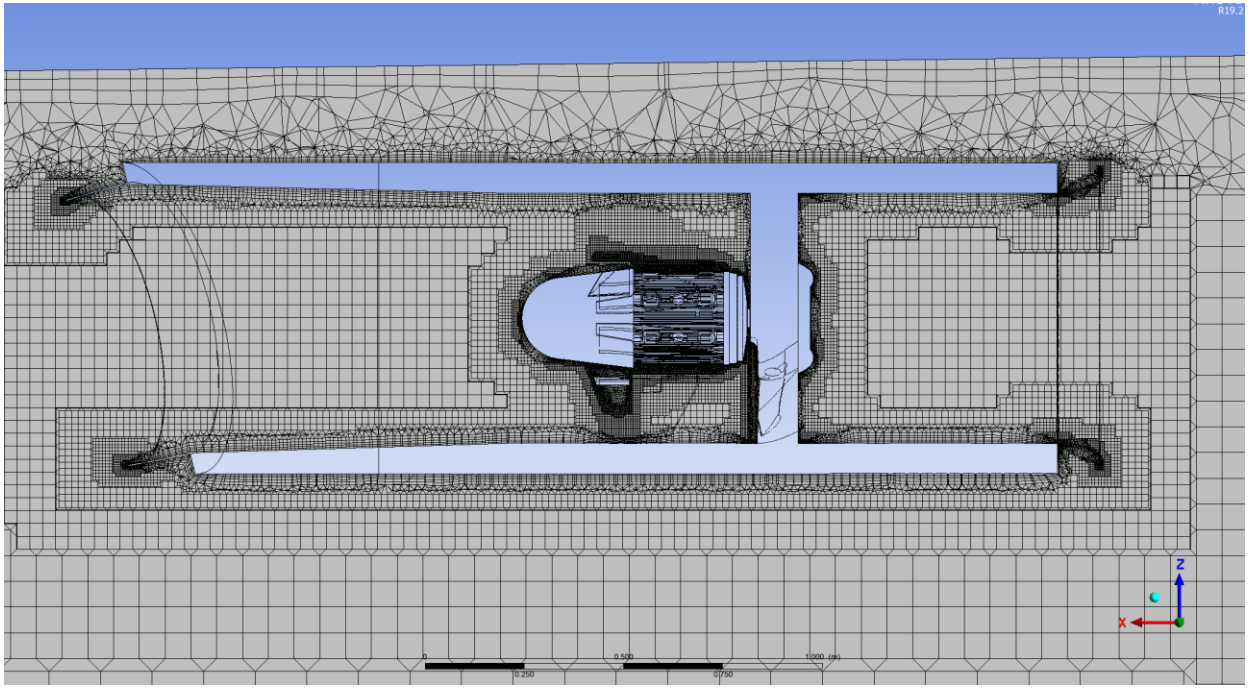
*注：上图中的“**Flow direction**” 指“气流方向”.

Measurement Grid at North Portal
【北门的测量网格】

5 x 5 = 25 points on cross-section measured near the north portal, in accordance with BS EN ISO 5802: 2008+A1:2015

【根据欧共体标准 BS EN ISO 5802：2008 + A1：2015，在北门（north portal）附近隧道截面测量，测试点为 5 x 5 共 25个点】

CFD Calculations【CFD 计算】



100% increase in thrust was confirmed by 3D CFD calculations. 【通过3D CFD计算确认推力增加了100％】

Mersey Queensway Tunnel – Rendel Street Branch
【Mersey Queensway 隧道 – Rendel 街】

Rendel Street Branch Tunnel 【Rendel 街隧道】

(600 m long x 7 m wide approximately【长600 m x宽约7 m】)

Airflow Measurements【气流测量】

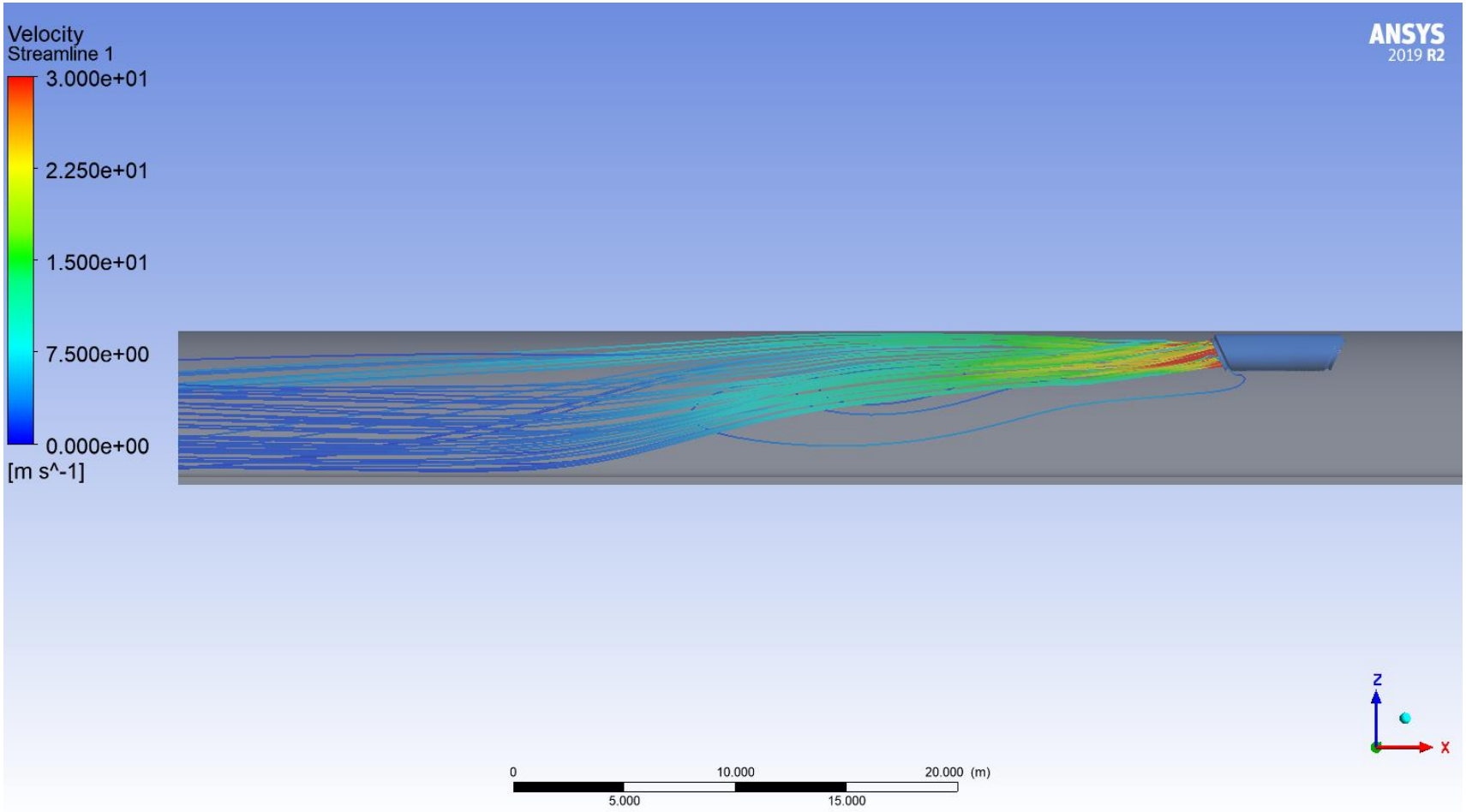
6 x 6 = 36 points on cross-section measured 140 m away from jet fan, in accordance with BS EN ISO 5802: 2008+A1:2015

【根据欧共体标准 BS EN ISO 5802：2008 + A1：2015, 在距喷气风扇140 m 的横截面设 6 x 6 共36个测量点】

MoJet Installation【MoJet 安装】

与传统的喷气风扇相比，推力增加了30％，而功耗没有增加。

3D CFD Calculations
【3D 计算流体力学分析】



Licensing【执照】

- The MoJet is protected by trademarks, patents and pending patents worldwide.【MoJet受全球商标，专利和正在申请中的专利的保护。】
- We are seeking licensees for our technology.【我们正在为我们的技术寻求合作厂商。】
- Please visit our website: www.mojet.global【请访问我们的网站：www.mojet.global】
- Please contact us at info@mojet.global【请通过邮件info@mosen.global与我们联系】