

论文

矿用大型圆弧板叶型对旋式局部通风机的研制

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摘要:

为满足煤矿对大风量、长距离局部通风的需求, 研制了FBD-No7.5/2×55 (叶轮直径 0.75 m, 额定转速2 970 r/min, 2级, 单级功率55 kW) 矿用大型防爆对旋轴流局部通风机, 该机的叶片采用圆弧板叶型, 用普通热轧钢板模压成形, 加工简易, 材料成本低, 无静电, 不老化。研究采用理论分析和试验相结合的方法。通过有限元分析, 采用局部加大叶片根部厚度的办法, 解决了高速、大机号通风机圆弧板叶片易断裂的问题。经测试, 该通风机的风量为15.83~10.66 m<sup>3</sup>/s, 全压为 1 331~ 7 454 Pa, 全压效率达到82.64%, 比A声级噪声13.92 L SA (dB), 其气动性能优于行业标准。现场应用表明: 该通风机运行安全可靠, 功能满足用户需求。

关键词: 对旋轴流式; 局部通风机; 圆弧板叶型; 气动性能; 有限元

Development of large-scale contra-rotating axial fan for mine auxiliary ventilator with circular plate blade profile

Abstract:

Large-scale contra-rotating axial fan for mine auxiliary ventilation FBD-No7.5/2×55(impeller diameter; 0.75 m, rated speed; 2 970 r/min, 2 stages, single stage power; 55 kW) were developed to meet the mine demand of large air flow and long distance.The blade die-formed with common hot-rolled sheet steel is in circular plate profile, which has simple process with low cost, no static and non-aging.This study combines theory analyses with experiments, solving the problem of easy blade fracture of high-speed and large-scale fans by enlarging auxiliary thickness of the blade root through finite element method analyses.After testing, the air flow of this fan is up to 15.83-10.66 m<sup>3</sup>/s, total pressure, 1 331-7 454 Pa, efficiency of total pressure, 82.64%, A-weight specific sound level, 13.92 LSA (dB), and its aero-dynamic performance effect is better than that of industry standards.Filed testing shows that the fan runs safe and reliable, and that the function can meet needs of users.

Keywords: ontra-rotating axial; auxiliary ventilator; circular plate blade; aero-dynamic performance; finite element method

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