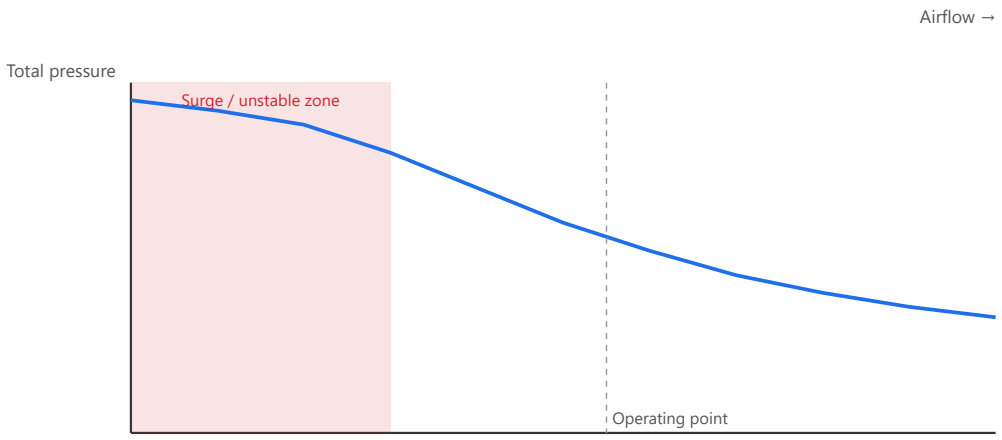
FM202 Improper Backward / Forward Impeller Selection → Efficiency or Pressure Mismatch

Chapter 2: Structural Features — Fault model & typical case

DOCUMENT	CHAPTER	RELATED Q&A	PUBLISHER
FM202	**Structural Features**	**2-32, 2-63**	**Kunshan Best Machinery Equipment Co., Ltd.**

Fault model + typical case. Mechanism, causes, symptoms, diagnosis, corrective actions and prevention are all anchored to the relevant entries of the Fan Engineering Q&A (see front matter for question references).



FM202: the impeller type sets where the duty sits on the curve. The left-hand region is the surge / unstable zone; a wrong choice gives either insufficient head or excessive energy use and noise.

Failure Mechanism

A forward-curved impeller has a large pressure coefficient but low efficiency and high noise, while a backward-curved impeller has high efficiency but limited pressure head per stage (2-32, 2-63). Choosing the wrong type leaves the system either short of pressure head or with excessive energy consumption and noise.

Common Causes

- Forward-curved type wrongly chosen where pressure is the priority
- Forward-curved type wrongly chosen where high efficiency is required
- Mismatch of the specific-speed range

Failure Symptoms

- High energy consumption / high noise, or insufficient pressure head

Diagnosis & Evaluation

- Check the pressure coefficient and the efficiency curve
- Verify the specific speed

Corrective Actions

- Select the impeller type according to the duty

Preventive Measures

- Define the weighting between efficiency and pressure at the selection stage

Typical Failure Case (Summary)

(A representative real case of the same fault mode) The G9—2×36No17F double-inlet double-supported centrifugal primary-air fan at a power plant used strongly forward-curved blades (20 blades per side, wide blades, 1495 r/min). Because the forward-curved impeller suffers flow separation and high blade working stress at high speed, and the unit ran for a long time in the low-flow region with small damper opening, a crack about 210 mm long appeared after 28 months of service in the heat-affected zone of the inlet-side blade-to-disc weld, and this triggered shaft wandering. This case shows that selecting a forward / strongly forward-curved impeller for a high-pressure-head, high-speed duty readily induces stress and noise problems; switching to a backward-curved impeller according to the duty significantly reduces the blade stress and the energy consumption.

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