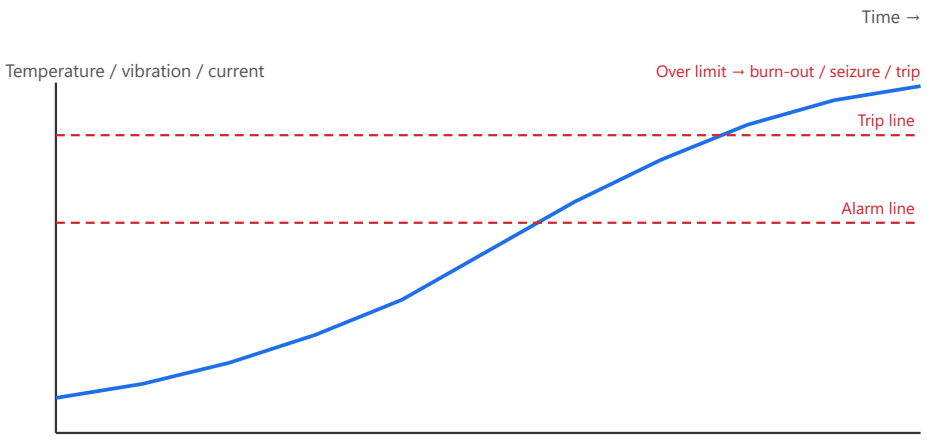
FM301 Selection Off Actual Duty → Long-Term Low Efficiency / Overload

Chapter 3: Selection & Use — Fault model & typical case

DOCUMENT	CHAPTER	RELATED Q&A	PUBLISHER
FM301	**Selection & Use**	**3-01, 3-18**	**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).



FM301 Selection off actual duty: temperature / vibration (or current) keeps rising; cross the alarm line and stop at once. Running over the limit causes burn-out, seizure or trip.

Failure Mechanism

The fan was not selected according to the actual duct network and service fluid (3-01 principles, 3-18 boiler fan selection), so the normal operating point falls into the low-efficiency or overload region, giving high energy consumption over the long term and a high failure rate.

Common Causes

- Inaccurate duty survey
- Excessive or insufficient margin

Failure Symptoms

- Long-term low efficiency / overload
- Motor temperature rise

Diagnosis & Evaluation

- Plot the actual operating point and compare it with the catalogue curve

Corrective Actions

- Re-select the fan or carry out a VFD retrofit

Preventive Measures

- Complete a duty survey before selection

Typical Failure Case (Summary)

Case 1 (Real Case)

- Source unit / industry, time, duty: a chemical plant in Shandong (sulphuric acid production), 350kW / 2-pole forced-draft fan, originally operated at line frequency with the airflow regulated by duct dampers; at commissioning the fan had been selected too large, so a "large motor driving a small load" persisted over the long term.
- Failure symptoms: average operating current at line frequency was 530~590A (take 550A), with a large amount of electrical energy wasted across the damper; the fan efficiency was low; the autotransformer reduced-voltage starting current was high, and rotor cage bar breakage occurred frequently.
- Root cause: the fan was selected too large and regulated by damper throttling, so the actual operating point stayed away from the high-efficiency region for a long period — a typical case of selection off the actual duty causing long-term low efficiency / overload.
- Corrective actions and result: a high-voltage VFD was added, replacing damper regulation with variable-frequency control and soft starting; after the retrofit the average current fell to 280~320A (take 300A), the power factor was 0.93, the saving was about 110kW·h per hour and about 434,000 CNY per year, the investment payback was only half a year, and the cage-bar breakage accidents were eliminated.

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