

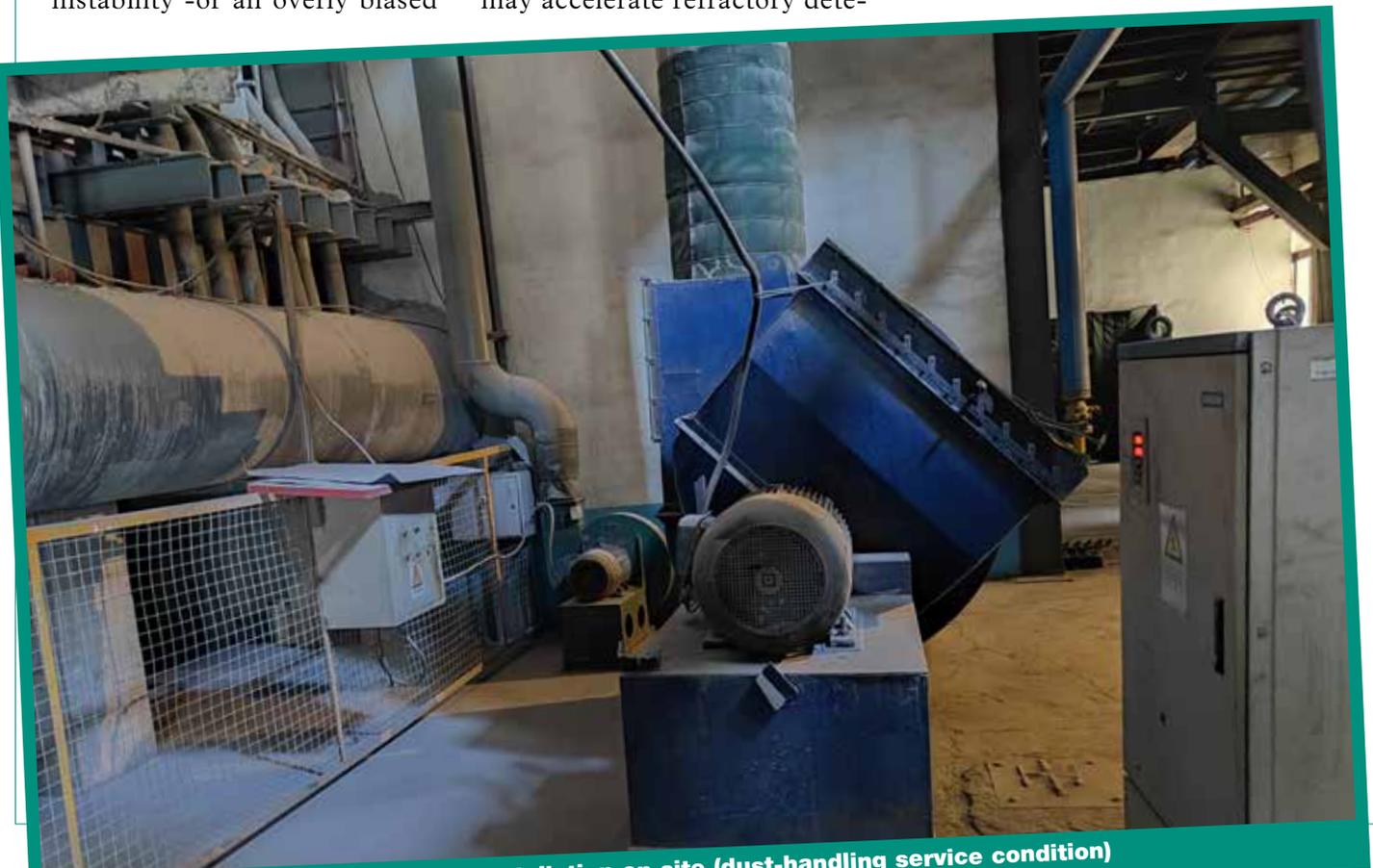
Airflow balance insights from ZIBO MINGCHEN ENVIRONMENTAL TECHNOLOGY

Stable furnace pressure is often treated as an auxiliary control target. In extensive field service on glass production lines, we have found that long-term pressure instability -or an overly biased

positive or negative pressure strategy- can act as a chronic load upon the furnace structure. The effects are rarely dramatic at the beginning, but they accumulate over time and may accelerate refractory dete-

rioration and trigger unplanned interventions.

The following three representative field cases illustrate typical 'hidden' damage pathways caused by draft imbalance.



Centrifugal fan installation on site (dust-handling service condition)

Presenting practical observations and operator-focused guidance for safer, longer furnace service thanks to field observations from his frontline engineering practice, Haochen Hu, Senior Engineer and Technical Director of ZIBO MINGCHEN ENVIRONMENTAL TECHNOLOGY, explains how dynamic airflow imbalance undermines furnace pressure stability whilst accelerating refractory degradation and eroding control margins.



Fan unit and duct connection (field installation view)

CASE 1 - POSITIVE PRESSURE IS NOT ONLY A FLAME-ESCAPE RISK: HOT GAS MAY FIND 'INVISIBLE ROUTES'

During operational transitions such as load changes, pulling changes, or resistance fluctuations, delayed induced-draft response can lead to repeated positive-pressure episodes. Over time, plants may observe localised shell hot

spots, early thermal-fatigue indications on steelwork, or traces around joints. Cold-repair reviews often show that hot flue gas has penetrated through gaps and weak interfaces, followed by internal deposition and condensation of corrosive species. This mechanism drives degradation from the inside outward and is difficult to detect at an early stage.

CASE 2 - NEGATIVE PRESSURE IS NOT 'THE MORE, THE SAFER': COLD-AIR INGRESS AMPLIFIES THERMAL CYCLING

Some production lines maintain a deeply negative draft to reduce flame-out risk. Field experience shows that sustained negative pressure increases the driving force for cold-air ingress at doors, ports, and imperfect seals, creating cold spots and steep tempera-



Typical centrifugal fan casing and drive-end arrangement (site condition)

ture gradients. Repeated hot-cold cycling promotes micro-cracks and spalling. Once cracks form, gas and dust ingress can further accelerate deterioration, increasing the likelihood of non-planned repairs.

CASE 3 - CONTROL MARGIN CAN BE SLOWLY CONSUMED: FAN OPERATING-POINT DRIFT MAKES PRESSURE HARDER TO HOLD

With accumulated runtime, fouling in regenerators and ductwork, together with damper wear, gradually changes system resistance and shifts the fan operating point. Because this drift is slow, the line adapts until pressure becomes increasingly difficult to stabilise. Symptoms include larger swings during transitions, slower response, and aggressive corrections that can trigger secondary oscillations. In many cases, the root cause is not tuning quality, but reduced operating margin.

PRACTICAL NOTES FOR OPERATORS (NO OVER-ENGINEERING)

- Manage pressure as a trend, not a single number. During shift handover, note whether draft is stable or prone to drift, and under which operating modes.
- During transitions, stabilise airflow first-then combustion. Avoid chase-control that amplifies oscillations.
- Treat sealing and resistance changes as daily checks, including doors, ports, joints, duct deposits and damper wear. If hot spots or leakage traces appear, begin troubleshooting from airflow and sealing.

CONCLUSION

Airflow stability is not only an energy topic; it is a foundational condition for safe, controllable, long-term furnace operation. Many seemingly 'random' structural issues become explainable when

viewed through the lens of sustained variability, biased draft, and gradual loss of control margin. ■



MC FANS

MING CHEN INDUSTRIAL FANS & ENVIRONMENTAL TECH

**ZIBO MINGCHEN
ENVIRONMENTAL
PROTECTION
TECHNOLOGY
CO. LTD.**

Room 010201, 2nd Floor, Unit 1, Building 2
Financial Office Center, Phase II
Fangda E-commerce Industrial Park
Nanjiao Town, Zhoucun District
Zibo City, Shandong Province
CHINA

**DECEMBER 01-03,
2026**

**UZ EXPO CENTRE
TASHKENT, UZBEKISTAN**

**The Only Dedicated
Glass Industry Exhibition
in Central Asia**

BOOK YOUR SPACE



INFORMATION



**Expected
Exhibitors 150+**



**Expected
visitors 2500+**

follow us@ **UzGlassExpo**



Our Contact:

info@uzglass.com

www.uzglass.com