

Fairly Disciplined

Shanghai Airlines reports positive results after launching China's first conditional nonpunitive FOQA program.

BY WAYNE ROSENKRANS

Airlines, pilots and civil aviation authorities worldwide have struggled for decades to reconcile their conflicting interests to obtain maximum benefits from flight operational quality assurance (FOQA) programs, also known as flight data monitoring. They all want to be successful in detecting accident precursors and unsafe trends in routine flight data. They also want to foster a work environment in which flight crews readily report deviations from standard operating

procedures (SOPs) and cooperate in analysis of flight parameter exceedances.

Airlines in China, as in most countries, this year will redouble efforts to integrate existing FOQA programs into their implementation of safety management systems (SMSs), according to a presentation and ASW interviews during the Joint Meeting of the Flight Safety Foundation 61st annual International Air Safety Seminar, International Federation of Airworthiness 38th International Conference and International Air

Transport Association in Honolulu. Some could replicate the approach of Shanghai Airlines, which decided that nonpunitive FOQA policies stand a greater chance of success than punitive policies of the past. Because of culturally ingrained beliefs about individual accountability for complying with safety rules, however, some aspects of Shanghai Airlines' policies have caught off-guard aviation safety professionals in North America and Europe.

Unlike the 20 U.S. airlines — out of 68¹ — that voluntarily analyze



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Fan

parameters of daily airplane operations captured by quick access recorders (QARs), all airlines in China for about 12 years have been required to install QARs on their airplanes, except those that are technically incompatible, and to conduct a FOQA program.

Encouraging China’s airlines to also adopt a nonpunitive FOQA policy has become a strategic priority of the Civil Aviation Administration of China (CAAC). “Right now, there

is a 90 percent-plus QAR installation rate for all Chinese airlines,” says Fang Jun, coordinator for international safety programs at CAAC headquarters. “FOQA is not so new for Chinese airlines, but SMS is. Since we are advocating and pushing the implementation of SMS, the FOQA programs are essential.”

Early Adoption of QARs

In 1997, CAAC issued an airworthiness directive requiring all Chinese airlines to equip their aircraft with QARs or equivalent equipment. Policy details for routine flight data monitoring and analysis, however, were left to each airline.

Data collection with QARs was seen as a way for CAAC and airlines to reduce delays in obtaining recorded parameters to conduct aircraft incident investigations, recalls Fan Hai-xiang (Steven), deputy general manager, flight technical, and director, Flight Training Center, at Shanghai Airlines. Removing

the digital flight data recorder, which primarily is designed for crash investigations, and leaving it at a laboratory for several days of data readout and analysis had proved too cumbersome. “Today, if the airline doesn’t have the QAR or equivalent equipment on a technically compatible airplane, the airplane is not airworthy,” Fan said.

His airline’s effort to introduce FOQA, and overhaul initial assumptions and policy, has been singled out by CAAC as a benchmark for all Chinese airlines. “Shortly after issuing the airworthiness directive, CAAC realized that having QARs on airplanes was not enough,” Fan said.

An unintended consequence of sparse QAR and FOQA requirements was free rein for airlines to discipline pilots for any exceedances of aircraft parameters deemed to indicate non-adherence to SOPs (Table 1). This soon caused resentment and resistance among flight crews rather than

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Consequences of Hard Landings for Flight Crews in China						
Normal Operations	Airline FOQA Program Monitors QAR Data and Interacts With Crews				CAAC Investigates Landing Event	
Hard Landing Severity						
<+1.1 g Normal landing	+1.4 g or less Minor exceedance	+1.6 g Moderate exceedance	+1.8 g Severe exceedance	+2.0 g Severe hard landing	>+2.0 g or incident (damage)	Accident
No monitoring/ actions	Typical FOQA Program in China Crew counseled				Discipline for these FOQA exceedances, at discretion of airline mid-management, may include fine, suspension and crew identification in notice to fleet	
No monitoring/ actions	Conditional Nonpunitive FOQA Program at Shanghai Airlines Only trend monitoring if event reported within 48 hours, validated by data and not repeated in 12 months				Crews counseled but not identified to mid-management unless they failed to report event within 48 hours	
			Crew disciplined but any notice to fleet will not identify them unless event recurs or they fail to report it within 48 hours	Crew suspended, possibly fined, retrained and identified in notice to fleet regardless of event report	Consequences determined outside of FOQA program	

FOQA = flight operational quality assurance; CAAC = Civil Aviation Administration of China; g = 1.0 times acceleration of gravity; QAR = quick access recorder

Source: Shanghai Airlines

Table 1

cooperation in the analysis of events flagged by analytical software.

“The CAAC began to realize there was something not quite right,” Fan said. “Airline managers would talk to the crew and ask them what happened, then the pilots would be punished. This was something that should not happen, and CAAC in 2003 called on the airlines to start creating nonpunitive FOQA programs.” The regulator also invited airlines, pilots, airframe manufacturers and FOQA-related vendors to take part in annual FOQA seminars in different regions of China.

“Some cultures have approached FOQA programs by using data obtained from flight data recorders to punish the pilots for even minor exceedances of parameters,” said Frank M. Hankins, a training captain in China for The Boeing Co. and Fan’s co-author of the IASS presentation. “Such is the case in most of mainland China and some other countries in Asia. The pressure on flight crews to fly by the book — knowing that the ‘QAR police’ are looking over their shoulders — has a very debilitating effect on ... their judgments, which jeopardizes the safety of flight.”

Shanghai Airlines had chosen hardware and software vendors in 1998, but implemented its

FOQA program in 2000, somewhat later than other large airlines in China. Because of the extended implementation time, the company was less vested in the industry’s prevailing orientation toward punitive FOQA programs.

“From 2000 to 2004, we did parameter development with emphasis on hard landings; sink rate warnings and high speed at low altitudes; landing long; and unstabilized approaches,” Fan said. “The event reports were very few, not enough, so we fine-tuned the parameters and the trigger conditions. We analyzed the event and interviewed the crew. The pilots also got called in by their mid-manager and got punished ... we then issued notices to the fleet with pilot identifications. A lot of pilots felt hurt; they did not want to be identified. When we tried to talk to the crews, they would try to keep quiet, saying as little as possible so they would not make trouble for themselves or colleagues. When we could get information, it probably was two or three weeks old ... or not enough. Another negative aspect was that the captains started to fly the airplane more; they would not let the first officers fly because if the first officer made a mistake, the captain also got punished. I felt that this was not conducive to

effective crew resource management and diminished safety.”

Seeds of a major change were sown when Fan approached the airline’s senior management about trying something different, drawing from his own safety literature review and visits to nonpunitive FOQA programs in several Western countries. The airline’s original FOQA program had failed to live up to expectations, and Fan and his staff were anxious to devise a new nonpunitive reporting policy.

In his pitch to senior management, Fan argued that unjustifiably disclosing flight crew names in notices to the fleet undercut corporate values of fairness and objectivity. “You usually must deidentify them in order to have a fair solution,” he said.

One factor in his favor was peer scrutiny of his initial ideas outside China — including at a 2004 regional safety seminar organized by the International Civil Aviation Organization. The audience questioned his reasoning when they heard him propose limited disciplinary measures within Chinese FOQA programs.

Some people who heard him speak, for example, asked him to categorize his proposal as either punitive or nonpunitive. Fan answered, “Our system will be less punitive.” Similarly, they asked why airlines ever should disclose the names of flight crews to mid-managers and/or all the fleet pilots. “I admitted that identifying the crew is a punishment,” he recalls. “I said, ‘Changing that is difficult, but we will try.’ Their input really inspired me toward turning my airline’s system in a nonpunitive direction.”

Shanghai Airlines began with an assumption that flight crews are tempted to conceal mistakes for fear of disciplinary action, lack of confidence that the

system would treat them fairly and/or embarrassment. Policy changes would have to address every concern.

“Throughout much of Asian culture, including in China, people believe that if you make a mistake, it is right to discipline and to administer some punishment,” Fan said. “It is acceptable, expected and part of who we are as a people. Even pilots who have made big mistakes tell us, ‘Punishment is OK, no problem. It’s right. I was wrong. I am sorry for that.’ But when pilots did not have good protection, or we punished them for minor exceedances, they would say, ‘No, this is not fair — why should I be disciplined?’ and then they would stay quiet.”

Early advocacy of nonpunitive FOQA could not budge senior management from one fixed position. For the most serious FOQA exceedances, a notice to the fleet about each event was considered warranted, including disclosure of the names of the pilots involved. Senior management was willing, however, to require all mid-managers to shift their focus from disciplining individuals to solving systemic problems.

“I told senior management that the situation was like having one window in a room,” Fan said. “If this window were open, mid-management only would look out, they would not look at things happening inside the room. But if we shut the window, then they would have to look in other directions for how to solve the problem. That’s why I got senior management support.”

The company in 2005 had a successful trial run of its revised policy, calling it a *conditional nonpunitive FOQA program*; the program was fully implemented in 2006. It includes objective validation with data of non-normal operational events in the interest of accuracy, consistency and fairness; elimination of disciplinary action — including crew identification — for

minor and moderate exceedances of FOQA parameters; and strong incentives/reduced discipline for crews to report non-normal operational events. A few exceptions made the nonpunitive policy “conditional,” and the concept still falls within the bounds of *just culture* used in international aviation, Fan believes.

“It’s conditional — that’s the magic word; our own way of designing a nonpunitive reporting system is probably not the same as that of others,” Fan said. *Conditional* means that there are prerequisites for deidentified, nonpunitive handling of a minor or moderate exceedance: The crew must report the event within 48 hours (Figure 1), the report has to be validated by corresponding QAR data, and the crew must not have had a related exceedance within the previous 12 months.

Even with high-level support, Fan and other safety professionals soon encountered opposition at the mid-management level. He attributes this resistance to mid-managers’ perceived loss of a management tool/control and to traditional cultural concepts of “father-to-son discipline” that spill over into professional relationships.

“In the past, the mid-managers knew that when they received a FOQA notice to the fleet, they would know who had the problem, who made the mistake, who had the exceedances,” Fan said. “Now, the typical report to the fleet just says what happened and how the event happened, but not who did it. During the trial run of conditional nonpunitive FOQA in 2005, the majority of pilots were delighted, but not all of them agreed.”

The logic of the new policy still escapes mid-managers who adhere to traditional cultural values. “When we issued the first notice to the fleet with no crew identification on it, the mid-manager responsible for two Boeing 737

fleets asked me, ‘Can you tell me who made this mistake?’ I said, ‘Why do you want to know?’ He said, ‘If it’s another mid-manager’s fleet, then it is his problem — I am not going to do anything within my fleets.’” When told that the exceedance had involved a 737, the mid-manager insisted on knowing the crew names and whether the captain or first officer should be held responsible. Fan told him, “This is why I don’t want you to tackle the problem by finding a person — I want you to solve this problem in your fleet.”

Conditional nonpunitive FOQA offers greater objectivity and fairness than in the past, when disciplinary action varied for the same exceedance severity. The key reason is that mid-managers now have significantly reduced jurisdiction and discretion. “By deidentifying pilots if the event was just a minor exceedance of the set parameters, mid-managers cannot apply any punishment,” Fan said.

As in many countries, the Shanghai Airlines personnel handling FOQA data adhere to internal rules of strict confidentiality. No flight crew’s identity is disclosed in connection with a FOQA event except by an independent quality supervisor in flight operations.

Reports Pour In

The company said that from February 2005 through December 2007, flight crews submitted 1,518 reports — most pertaining to what pilots suspected were hard landings, landing long or other misconceptions of what constituted a “QAR” event (Figure 2). “Although the reports kept growing, the exceedances rate did not go up,” Fan said. These events led to a total of 77 notices to the fleet, in which the names of flight crews were disclosed nine times.

The FOQA office staff analyzes all flight data and also cross-checks the required flight crew event reports to see if an exceedance of parameters occurred and determine the significance of any confirmed event. If not confirmed, no further action is required.

“If there is an exceedance, the FOQA office sends it to the quality supervisor, who talks to the crew and decides whether the fleet needs to be notified or not, and whether the crew needs

to be identified or not,” Fan said. Exceedances can be minor, moderate or severe. Only severe exceedances trigger automatic notification of the fleet and disclosure of the crew names. Consequences for a pilot responsible for a severe exceedance include a monetary fine, 30-day suspension from flight duty and counseling/retraining in a simulator but do not include termination of employment. For events other than a severe exceedance, the program’s conditions come into play.

Among disciplinary actions, disclosure of names to peers is considered personally embarrassing yet acceptable to most pilots. “If we are announcing that somebody made a mistake ... everybody knows,” Fan

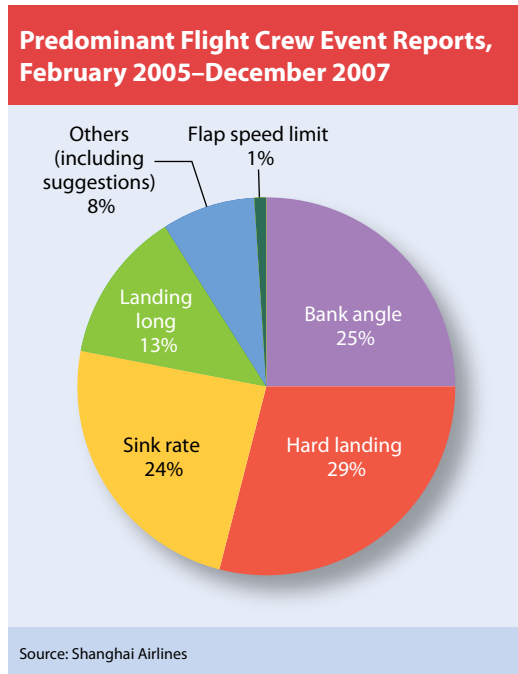


Figure 1

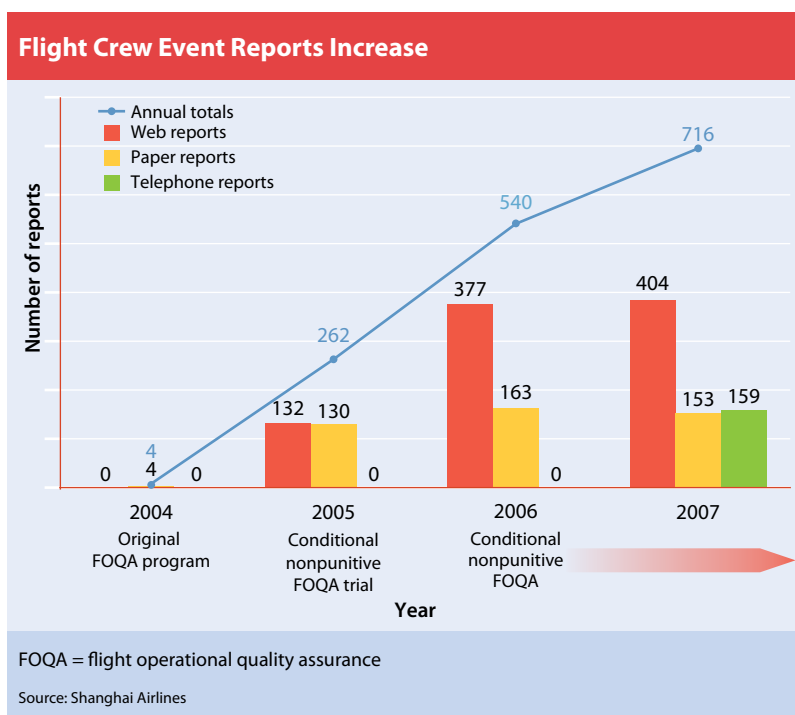


Figure 2

said. “Identifying all flight crew names, including who was the captain, who was the pilot flying, who was pilot monitoring is a form of punishment.”

He draws a distinction between punishment, a matter of justice, and motivating an aviation professional to improve his or her performance. “If we publish the pilots’ names in the notice to the fleet, that is not for encouragement or motivation — it is just a lesson for them, a kind of criticism of the crew,” Fan said.

Another reason why these pilots have accepted the idea of conditions is that line pilot representatives had a voice in determining which of thousands of flight parameters are recorded and what constitutes an exceedance during data analysis. “It’s quite an extensive communication between our office and the pilots,” Fan said. “We had wanted to identify flight crews for one type of exceedance, but the pilots said, ‘We don’t want to be identified for that.’”

Secure Web Site Access

Shanghai Airlines prefers input of flight crew event reports via a secure Web site but also accepts reports on paper and by telephone. Deidentified FOQA information on this special Web site is accessible only by company pilots. They can retrieve, for any listed event, the report title, airplane type, phase of flight, crew narrative of what occurred and lessons learned.

Beyond increased event reporting — which enables timely safety actions by the company — the conditional nonpunitive FOQA program has been successful in other respects, he said. “The pilots are now comfortable about reporting deviations, and they feel comfortable letting the first officers fly,” Fan said.

Whether other airlines follow this evolving model remains to be seen. “We have established a CAAC-approved

nonpunitive program ... but that’s not enough,” Fan said. “We want to increase the depth and breadth of the trend analysis program to establish the SMS within Shanghai Airlines, and design a vehicle for incorporating trend analysis data into the SMS. We also need to apply the lessons learned to enhance flight operations processes and pilot skills training — especially during flight simulator sessions.”

All airlines send to CAAC regional offices monthly reports of deidentified trend data. The regulator usually does not look at FOQA parameter exceedances of a specific flight but retains the right to obtain that data.

FOQA Benefits CAAC

CAAC oversees the safety of aviation from headquarters in Beijing through regional administrations and local field offices within each region. Its primary involvement in FOQA programs is inspections for QAR compliance and existence of a FOQA program, and safety guidance.

“We still have a lot of work to do to be more successful with FOQA programs in China,” said CAAC’s Fang. “We leave this job to the CAAC regional level. The regional administrations oversee the installation of the QARs and also the FOQA program of the airlines within each respective region. CAAC has given airlines a lot of freedom to do these programs. The Shanghai Airlines program is a benchmark.” CAAC in the near future will issue to airlines a second management document that is more explicit about its expectations of nonpunitive FOQA programs, he said.

“We have realized that programs using FOQA data mainly to punish the pilots still exist in some of the airlines,” Fang said. “The next management document will have a statement that a FOQA program should be used only

to improve safety. It cannot be used for other than that purpose. Corporate safety is more important than the individual saving face.”

Unlike the European Aviation Safety Agency and the U.S. Federal Aviation Administration, CAAC does not collect Chinese airlines’ FOQA aggregate data at headquarters and conduct trend analysis. “I think that is our future direction, however,” Fang said. “FOQA data are fundamental to improve safety ... foster a positive safety culture, and provide a forum or channel for pilots to communicate with each other, find problems and correct them in a timely manner.”

As more airlines decide how to evolve toward nonpunitive FOQA policies, CAAC remains optimistic. “Before launching nonpunitive FOQA, an agreement on conditions should be reached between the management and the line pilots, especially on the nonpunitive policy,” Fang said. “I am not sure about other world regions, but in Asia, it is hard — but not impossible — to adopt even a conditional program because of the culture. It is possible because if the airline leaders, the top management, realize the significance, they will be supportive.”

Note

1. FAA. “Statement of Nicholas A. Sabatini, Associate Administrator for Aviation Safety, Before the Committee on Transportation and Infrastructure on ‘Critical Lapses in FAA Safety Oversight of Airlines: Abuses of Regulatory Partnership Programs.’” April 3, 2008. Air carriers with annual operating revenue greater than US\$20 million as of December 2008 included 44 major/regional passenger air carriers and 24 cargo air carriers, according to the U.S. Bureau of Transportation Statistics. Smaller airlines also may qualify to operate FAA-approved FOQA programs but typical participants come from the same categories as these 68 air carriers.