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Book Review: *Why Airplanes Crash: Aviation Safety in a Changing World*

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WHY AIRPLANES CRASH: AVIATION SAFETY IN A CHANGING WORLD by Clinton V. Oster, Jr., John S. Strong, C. Kurt Zorn. Oxford University Press, New York, New York, 1992. Pp. xv, 200.

Reviewed by J.E. Murdoch III.

The regulation of aviation safety has always been a complex, demanding assignment. Oral history has it that during the early days of the Civil Aeronautics Agency an inspector would accomplish his duties by hanging around an airline's ready room. There he would hear tales of bad equipment from pilots and mechanics on their way to or from the airline's operations. This episodic sampling technique is still viewed as the ideal for many of the world's aviation regulators; one hundred percent surveillance provides a high level of confidence for compliance.

Presidents Carter, Reagan, Bush, and now Clinton have issued staffing directives that have made the "airline ready room" surveillance model unrealistic and impossible. Further, OPM grading systems virtually mandate that the most senior, knowledgeable FAA personnel are assigned to manage the certificates of the largest airlines' operations and maintenance. This places the most expert inspectors with the air carriers with the fewest problems. Finally, Vice President Gore's task force is attempting to "reinvent the government." This necessitates a close examination of structural and organizational characteristics of the FAA. This review questions how the FAA accomplishes its mission.

In the context of these developments, trends, and forces, the Oster/Strong/Zorn examination of aviation

safety data is most timely and suggests that new methods of safety regulation may be appropriate. *Why Airplanes Crash* analyzes numbers collected by the FAA, NTSB, ICAO, and other safety bodies, but does so with the new perspectives and exacting discipline of the academicians. The conclusions, and more importantly, the questions their methodologies suggest, need to be closely examined by the Congress, the Administration, the Department of Transportation, the FAA, and the aviation community during their joint examination of the aviation safety regulatory function.

The authors quickly dispatch the premise that deregulation has caused any diminution of safety by a rigorous review of the data. They then shift their focus to the data available, detailing the strengths and weaknesses of each of the sources. Next, these three professors catalogue traditional causes that the relevant safety agencies attribute to the accidents. Historically, the last factor cited in the report was *the* cause of the accident/incident. The innovative approach adopted by these academicians is to lay the blame on the event that initiated the sequence of actions that resulted in the accident (p. 26). The authors explain that such a different approach results in some changes in data classification; pilot errors that were previously identified as "unforced" now may be attributed to the engine failure that was the first, although perhaps not controlling, event.

Based on this novel approach, Professors Oster, Strong, and Zorn develop "risk tiers" (p. 7), categories of performance or correlation between certain actions and results. These analytical constructs suggest areas for increased regulatory emphasis. One such risk tier derives from an examination of the causes for accidents (p. 30). While "equipment failure" and "environment" pose greater threats and would be fertile areas for increased FAA scrutiny and effort, surprisingly "seatbelt not fastened" is the next highest risk tier. This conclusion suggests that the FAA would be well advised to spend time

and dollars on a public education program addressing the value of wearing a seatbelt while travelling. During a period of decreased budgets, it is ironic to spend more money on an advertising effort similar to NHTSA' television crash-dummy program. However, it may be more effective to incur such costs than to attempt to improve safety through traditional regulatory methods — adding rules, increasing surveillance, etc. A public awareness campaign might produce a significant improvement in safety results at a relatively small cost.

More striking and pertinent to the FAA's internal mission are the book's conclusions, made in several contexts, that bigger entities pose lesser safety risks. Historically, the agency has assigned its most senior, capable operations and maintenance experts to regulate the Uniteds, Americans, Comairs, and Air Wisconsin — the carriers with the largest fleets, most pilots, and most mechanics. These regulated entities provide "numbers," which allow the FAA to justify to OPM GS-15 grades. These important certificates received greater scrutiny than the organizations more susceptible to failure. The data developed by Professors Oster, Strong, and Zorn indicate that the greatest safety risks are found outside these "large" classifications and reside with the smaller, less sophisticated organizations. The GS-15, the resulting hypothesis would suggest, should not use his/her expertise to regulate the knowledgeable, well-established, large airlines, but would be better utilized guiding the new company with less experience, less developed systems, new personnel, and as-of-yet, unperfected procedures.

The authors examine seven major issues in *Why Airplanes Crash*. First, they analyze the major U.S. airlines, those operating under 14 C.F.R. Parts 121 and 135, and ask some questions about these two classes of carriers based on trends in the data developed under this new method (Chapter 2). Their second area of focus is the segment of the less regulated and less scrutinized U.S. operators — jet charter operators, air taxi operators, cargo

carriers, and general aviation (Chapter 3). The professors ask some telling questions about this matching of pilot skills and aircraft capabilities with the operational missions of these entities. Their next focus is to compare the U.S. experience with Canada's track record (Chapter 4). While the Canadian authorities apply different approaches, the performances of the two aviation industries are roughly comparable. What is different is a variation in pilot performance between the two countries: The airmen of Canada (as well as those flying in Alaska) evidence a lower rate of error. The authors leave open the question of why this delta exists.

The fourth inquiry (Chapter 5) is a macro comparison of the North American safety history as against the global record. It is not surprising that the United States and Canada grade out significantly better than other regions; the authors' conclusion that Western Europe has done equally well is also expected. It is, however, revealing that certain factors (e.g., engine failure - Africa, weather - Middle East, pilot error - Latin America and Africa, terrorism - Africa, terrain - Middle East) are clearly targets that the local aviation safety organization should emphasize for improvement.

Based on NTSB Member Laubers's interesting observation that there is a need for "leading safety indicators," Chapter 6 attempts to develop such data. After a thorough definition of possible operational and economic criteria, the professors disappointingly conclude no statistically significant measures of merit exist.

Recent events (the Aloha B-737 fuselage failure) compel the authors to review the data on aging aircraft (Chapter 7). They conclude that the FAA's and the industry's recent change in maintenance and inspection procedures is sound. There is some need, however, to give more attention to existing data, to enhance the interpretation of the trends that such reports suggest, and to develop multinational maintenance standards (necessitated by the movement of equipment among nations - a phenomena

facilitated by the global leasing companies). The basic message here is that the FAA and industry responded well to this crisis, but that more can be done to prevent similar phenomena in the future.

The final area of inquiry is the politically charged issue of terrorism. While the data suggest that there has been improvement in preventing or interdicting such threats, the authors observe that the technical sophistication of the terrorists compels further emphasis on operational and technological strategies to respond to this worrisome risk.

The final chapter summarizes the previous conclusions and adds some other useful observations. Professors Oster, Strong, and Zorn have brought some new perspectives to a debate that is replete with data and scarce on useful conclusions. Their book provides new devices that contribute to the comprehension of the numbers, suggests questions that require further scrutiny, and identifies solutions that may respond to the concurrent conflicting demands of lower budgets and higher demands for improved performance. *Why Airplanes Crash* advances our understanding of the dynamic, difficult task of aviation safety regulation through some worthwhile analyses that derive from an academic discipline. The book provides important thoughts that those charged with regulating the FAA should carefully consider.

Comments

