learned some safety personnel considered again during subsequent internal audits."

That is not enough, though: "Unless all levels of management are personally involved in ensuring that safety practices and procedures are maintained," says the FSF, "the margins of safety gradually and insidiously begin to erode." In a particular airline which was introducing a new type into service, operations department pressure from middle management level was so high that safety suffered, reports the FSF. Maintenance hangar procedures were visibly being shortcut and ignored. "Attitudes to safety had been devastated. "During the supervisor's discussion about the pressure of work, he reached back and struck a match on the hangar wall (to light a cigarette) just below one of the many NO SMOKING signs," reveals the Flight Safety Foundation.

An effective audit team should not merely identify a safety shortcoming, says the FSF, but also "...identify the basic contributing factors to each event and disseminate the information to all affected parties."

The FSF gives an example of a recurring event which did not have an instantly identifiable basic cause. On a particular airline ramp the aircraft were often dented by ramp vehicles. When the FSF reviewed the situation it found that many of the dents were caused by belt-loaders which had driven up to the cargo doors without coming to a complete stop during their approach to the aircraft, contrary to published ramp procedures.

The FSF did not just stop there and conclude that ramp rules were being broken: "While watching the ramp operations during a peak activity period we saw only three belt-loaders were shifted between nine aeroplanes. Further investigation disclosed that a third unit [belt loader] was undergoing repair and three others had been parked from three weeks to five months waiting to be fixed.

The FSF found that two men had the task of trying to maintain more than 100 belt-loaders (and other ground equipment). The shortage of serviceable belt-loaders was causing drivers to race the few operating ones in an attempt to get flights out on time; hence the dents. The airline's management had failed to recognise," observes the FSF, "that inadequate maintenance capability in this single, small and remote shop was contributing to equipment damage and potential injury on the ramp, as well as significantly affecting on-time operation."

The greatest deficiencies that the FSF finds in maintenance and engineering departments are in record-keeping procedures and practices. Many airlines do not train their maintenance personnel in how to keep, manage and make use of the records, whether they are paper or computerised.

Totally computerised records, without proper management, have a flaw. "Some [maintenance departments] rely totally on computerised programs for planning and alerting functions. Few of these airlines do any cross-checking or monitoring to assure that the computerised record is not flawed. The alerting system is thus subject to a 'single-point failure'," says the FSF. "We frequently observe that intended limits have been exceeded, usually due to operator carelessness in monitoring the 'maintenance due' list."

CLEAR DIRECTION NEEDED

In the cabin and the cargo bay there is pressure to accept highly visible unsafe practices: in the cabin, says the FSF, the most common is overhead rack stowage of large and heavy passenger "hand luggage". In the cargo bay, claims FSF: "Some crews were inadequately trained to observe and direct cargo loading and were under inferred pressure to accept less-than-adequate load-restraint and tie-downs."

The cabin crews need the confidence of clear direction from management, with reminders if necessary, of what the company standards are for dealing with sensitive matters such as passengers bringing aboard heavy hand baggage.

Safety audits, as defined by the FSF, are intensely human tasks. They are based on interviewing staff at all levels about their jobs and about what they see around them. The most common problem which the FSF found among the airline people to whom it spoke was that they do not always speak to each other — especially across perceived barriers created by status and fear of recrimination.