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ISO Compatible Quality Management System Enhances
Aviation Weather Services

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ISO compatible quality management system enhances aviation weather services

The Hong Kong Observatory's recent establishment of a quality management system has helped to demonstrate to the aviation community that the authority can and will provide timely and responsive meteorological services.

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THE Hong Kong Observatory (HKO), the designated meteorological authority of the Hong Kong Special Administrative Region of China, established an ISO compatible quality management system (QMS) for its aviation weather service at Hong Kong International Airport in 2002. This was primarily in response to an ICAO recommendation that meteorological authorities develop an audited quality system in accordance with International Organization for Standardization (ISO) standards.

ISO 9000 is a quality management standard widely adopted around the world for establishing a QMS. The certification of the Hong

Kong aviation weather service serves as a guarantee to the aviation community that the products and services provided meet the standards that have come to be expected internationally. It also assures customers that, besides cost effectiveness and productivity, continuous improvement of service quality remains a permanent objective.

With its emphasis on meeting customer requirements and achieving customer satisfaction, an ISO 9000 series QMS assures the aviation community that processes are in place to address their concerns. Through these processes, a closer relationship is fostered between the service provider and users, allowing them to understand each other's capabilities and requirements. Customers gain a deeper appreciation for the services provided, which helps to improve customer loyalty.

Internally, certification helps to control and improve the quality of services provided to the aviation community. It also increases responsibility, accountability and quality consciousness among HKO staff.

The HKO embarked on the implementation of an ISO 9000 series QMS for its aviation weather service in late 2001. An ISO 9000 quality management

consultant was hired to assist in setting up the quality management system and preparing for the certification. The system was put in place in March 2002 and the certification process was completed in October of that year. A full commitment from all parts of the organization and a solid infrastructure made this relatively quick process possible.

For ISO certification, a documented QMS that meets ISO 9001:2000 standards has to be developed. A quality management system is a set of processes that is designed to control and improve the quality of the products and services provided. The ISO 9001:2000 series is governed by eight principles, namely a customer focus, leadership, involvement of people, the use of a process approach, a systems approach to management, a process for continual improvement, a factual approach to decision making, and the development of mutually beneficial supplier relationships. The application of these principles is described briefly below.

Customer focus. ISO 9001:2000 puts much emphasis on customer focus. It is important that current and future customer needs are understood, that customer requirements are met, and that the organization strives to exceed customer expectations. To collect customer requirements and monitor the quality of services as perceived by the customers, a customer satisfaction survey which was started some 10 years ago has been institutionalized as part of the quality management system.

Customer feedback from such



The Hong Kong Observatory established an ISO 9000 series QMS for its aviation weather service in 2002. In implementing a quality management system, all processes have to be documented, monitored and improved as part of a continual improvement strategy.

surveys is integrated into HKO's regular improvement process. In addition, liaison group meetings are held twice a year for face-to-face discussions. Apart from these formal processes, there are also regular meetings with air traffic control personnel, visits to airlines and to the meteorological office in order to foster better mutual understanding.

All customer feedbacks and complaints are formally recorded and follow-ups documented. A formal response is then given to the customer before the feedback or complaint is considered "closed."

Leadership. It goes without saying that one of the main responsibilities of the top management of any enterprise is to establish the purpose and direction of the organization and to provide adequate resources for achieving the objectives. The top management should also create and maintain an environment in which staff will work towards the objectives. To lead the QMS implementation and certification process, the HKO appointed a management representative in early 2002 to establish the quality policy and quality objectives.

Involvement of people. To ensure successful certification it is important to have the full understanding and commitment of people at all levels of the organization, not just the management. Before implementing the system at the HKO, quality awareness training was provided to all relevant staff. With QMS implementation, all staff took on extra responsibilities, such as the day-to-day consistency checks as part of the data and product quality assurance and control process. After establishing quality documentation, further briefings were provided to staff to ensure that they understood their respective roles in the QMS. The training and briefings served to heighten responsibility,

accountability and quality consciousness among the staff.

Since aviation weather service is closely related to the safe operation of aircraft, all staff have to be qualified and competent in their jobs. This is achieved through the provision of adequate training. All aviation forecasters working at the Hong Kong International Airport, for example, must complete and pass the necessary training and be certified before they can serve as aviation forecasters. To maintain professional standards, the technical know-how of all aviation forecasters is audited on an annual basis.

Process approach. A process is a set of interrelated or interacting activities which transforms inputs into outputs. A QMS can be thought of as a single large process that uses many inputs to generate many outputs. This large process, in turn, is made up of many smaller processes. All activities and resources related to aviation weather services, including both operational and administrative ones, have to be managed as processes.

Take, for example, "product realization," which is one of the key processes. As with other processes this activity can be divided into smaller processes, in this case the identification and review of customers' product requirements, the development of the products, and the revision of procedures in light of the new product, etc.

The existing mode of operation of the HKO aviation weather service was reviewed and the end-to-end processes identified. Through

this review, workflow was streamlined and some work was automated. This helped to confirm that the processes were well thought out and effective.

All processes have to be



Introduction of a quality management system was relatively straightforward for the Hong Kong Observatory because many of the detailed procedures and processes required were already in place.

documented, monitored and improved as part of the continual improvement process. In most cases, monitoring and measurement activities take the form of self-checks and monitor checks. Monitoring and measurement activities are also carried out for products. However, the correctness of forecasts and warnings cannot be verified until after they have been delivered to customers. These processes have to be carried out by qualified staff, which comes back to the importance of the professionalism of staff discussed above.

The performance of these processes and products has to be measured against the quality objectives. For easy monitoring, the HKO developed a checklist from the quality objectives. Compliance with these quality objectives is checked every quarter.

Systems approach to management. Many of the HKO operational and administrative processes for providing aviation weather service had already been

documented. These processes were reviewed and any gaps between the ISO requirements and existing processes were identified. Quality system procedures were then developed for these gaps and applied so that the processes to achieve the best results could be aligned and integrated.

Continual improvement. ISO 9001:2000 puts much emphasis on the need to make improvements. Specifically, the effectiveness and suitability of the quality management system has to be evaluated, and improvement areas identified and implemented. Apart from management review using the data collected from the monitoring and measurement process to identify areas for further improvement, the HKO also made use of an established mechanism to review and improve service delivery. This takes the form of an operation and management group that includes all staff grades. Apart from regular meetings, staff are encouraged to make suggestions through e-mails and a web-based discussion forum on ways to improve processes. Through process re-engineering and automation, the man-hours required for provision of aviation weather service have been reduced by 30 percent over the past five years. The man-hours saved were then redeployed to the development of new and improved products for the aviation community.

Factual approach to decision making. Effective decisions must be based on the analysis of data and information. To collect the necessary data, processes have to be established to measure and monitor performance. A forecast verification system has been developed to give a score for each terminal aerodrome forecast (TAF) in accordance with the ICAO requirement for accuracy for each of the weather elements. Other performance statistics, such as timeliness and conformance to

specification, are also collected and analysed. These data serve as the basis for identifying areas requiring further improvement.

Apart from performance data obtained from monitoring and measurement activities, other performance information, such as customer satisfaction survey results and supplier performance records, are also collected in the data analysis process.

Mutually beneficial supplier relationships. Organizations depend on their suppliers to help them create value, and it is important that a mutually beneficial relationship is maintained. At HKO, suppliers are evaluated and selected on the basis of their ability to meet purchase order requirements and their past performance.

Apart from external suppliers, some services are provided by other divisions within HKO. An internal service agreement laying down the scope of the service is signed with all internal suppliers. This certifies that both parties know where their responsibilities lie.

Implementation process. The process leading to ISO 9000 series certification can be roughly divided into six steps: the training and appointment of management representatives; preparation of quality documentation; implementation of the quality system; commissioning of the certification body; internal audits; and certification audits.

In the first step, the training and appointment of management representatives, ISO 9000 awareness training was provided to all relevant staff, and a management representative and deputy management representative were subsequently appointed to lead the entire implementation and certification process.

The second step – the preparation of quality documentation – can be divided into

four layers: quality policy and objectives; quality manual and quality system procedures; operational manuals and procedures; and record-keeping.

It is important that quality objectives are measurable. In defining these objectives, the HKO made reference to the desirable accuracy and timeliness defined in ICAO Annex 3*. Apart from focusing on the product, the level of customer satisfaction is also included as one of the quality objectives.

The quality manual describes the scope of the QMS, the quality policy and interaction of the processes. The quality system procedures provide details about the procedures used. The quality manual and quality system procedures, as well as operational manuals and procedures, were developed around the existing framework. This approach minimized the resources required for implementing QMS. It also made it possible for staff to adjust to the new procedures more easily. In drawing up this documentation, the HKO closely followed ICAO and WMO regulatory and guidance material. Use was also made of established operational procedure manuals which summarize the know-how and work procedures that have been developed over the years.

Records are kept to provide traceability and to demonstrate conformance to requirements and effective operation of the QMS. Most of the weather information is now provided through electronic means and is regularly archived. This has eased the workload associated with record-keeping. Records are also kept to demonstrate that all equipment has

* The annexes to the Convention on International Civil Aviation (also known as the Chicago Convention) contain provisions, including standards and recommended practices, for various aspects of aviation. ICAO Annex 3 concerns meteorological services for international air navigation.

been calibrated regularly against measurement standards traceable to international or national specifications. For equipment where no such standards exist, the basis and procedures used for calibration or inter-comparison are fully documented.

Implementation of the quality system, as the third step in the certification process, was achieved in March 2002. For certification, an internal (first-party) audit and (third-party) certification audit had to be conducted. A second-party audit by customers is not mandatory. An accredited certification body was appointed in April 2002 to provide the certification audit service.

The final steps in implementation involved internal and certification audits. ISO 9001:2000 requires that an audit be conducted to verify whether the QMS conforms to the ISO

9001:2000 requirements, to determine whether the system is effectively implemented and maintained, and to verify whether quality activities and related results comply with planned arrangements. The results of the internal audit also help towards identifying areas for improvement of the QMS and enhancing the quality of products.

A team of internal auditors was trained with the help of the ISO consultant. About a month prior to the certification audit, an internal audit was carried out to ensure full compliance with the ISO requirements. A month's lead time was chosen so that there would be sufficient time to prepare the audit report and rectify any nonconformities before the certification audit. After the internal audit, a mock certification audit was carried out by the ISO consultant. The certification audit itself was conducted with the participation of a meteorological

expert from outside of HKO in October 2002. The auditing process proceeded smoothly and the award of the certificate took place in November 2002.

Summary. The Hong Kong Observatory was able to complete the entire ISO 9000 QMS implementation process in a timely fashion because many of the QMS components described above were already in place prior to the implementation of the system. The quality management system, developed around the existing framework, quickly gained the full understanding and commitment of all staff. The implementation of the QMS has helped to demonstrate to the aviation community that the HKO can and will provide good quality, timely, cost-effective, sustainable and responsive meteorological services.