Remote Tower Control – how it works

ANTOŠKO Matej

Department of Flight Preparation, Faculty of Aeronautics, Technical university in Košice, Rampová 7, 041 21 Košice, Slovakia,
E-mail: matej.antosko@tuke.sk

Abstract:
The article discusses the benefits of a remote tower control. It describes the principle of operation, air trafiic control methods and basic legislative requirements for establishing a remote tower control. The last part of the article is devoted to the first workplaces of remote tower control in the world.

Keywords:
Ait traffic control, remote tower, workplace.

INTRODUCTION

A remote tower service means that the people who are controlling airport traffic are physically located in a tower centre, instead of in the airport's own tower. Cameras, microphones and other equipment are installed at the airport, which provide extremely detailed information about weather and activities at the airport at all times. [1, 6]

As passengers, you will not even notice that the airport has a remote tower, other than the fact that the airport is now equipped with a camera mast. For the pilots flying the planes, there are no practical differences in procedures. They will still talk to the tower personnel on the radio, as they do today [3, 5].

A camera at the airport takes a 360° image of the airport, which contains more details than can be detected by the human eye. The cameras can zoom in on small details, show movements in images (e.g. birds), and also have an infra-red setting which makes it possible to see in the dark [2, 4].

Every airport is connected to the tower centre via redundant networks. If one network should fail, the other can be used to connect to the tower centre. These

networks are high grade networks used for aviation, and involve the use of both fibre cables and radio transmissions.

The tower centre in Bodø operates tower services at several airports. It houses the same staff who used to sit in the individual towers. With large screens, they have a full overview of every movement and operation at an airport, and can communicate directly with pilots and ground crews [7, 8].

Remote Tower Service (RTS) is a system which allows aerodrome Air Traffic Control (ATC) or Flight Information Service (FIS) to be provided from a location other than the aerodrome whilst maintaining a level of operational safety which is equivalent to that achievable using a manned Tower at the aerodrome to oversee both air and ground movements.

1. DESCRIPTION OF REMOTE TOWER CONTROL

Aerodrome Air Traffic Service (ATS) from a remote position is facilitated by the streaming in real time of the view from an assembly of fixed and moveable high definition digital video cameras situated at the remotely controlled aerodrome. This encrypted signal is used to replicate a view of the aerodrome and its vicinity onto a 360° LCD screen which is equivalent to reality but arguably better than the sector-limited view which would exist from a Visual Control Room on the aerodrome. Fixed cameras provide the main display and any necessary supplementary ones such as ramp close-ups and there are also one or more moveable cameras which can be directed as required from the RTS position replicating the way binoculars might be used in a conventional Tower. This visual situational awareness for the controller or flight information service operator is supplemented by a range of environmental sensors and microphones capturing sound and meteorological or other operational data. The system also easily facilitates a switch in ATS between ATC and FIS if required [9].

Whilst the initial focus has been on day Visual Meteorological Conditions (VMC) operations, night and low visibility operations can also be supported with the installation of additional sensing equipment and use of infrared or night-vision lenses and three dimensionally-augmented reality overlays. If the circumstances justify it, an Advanced Surface Movement Guidance and Control System can be installed to complement the RTS visual display available at the RTS location.

Fig.1 Remote tower workplace
Source: [11]

Fig.2 Camera system for remote control tower
Source: [11]

1.1 Automated Weather Observing System (AWOS)

Automated Weather Observing System (AWOS) is a fully configurable airport weather system that provides continuous, real time information and reports on airport weather conditions. AWOS stations are mostly operated, maintained and controlled by aviation service providers.

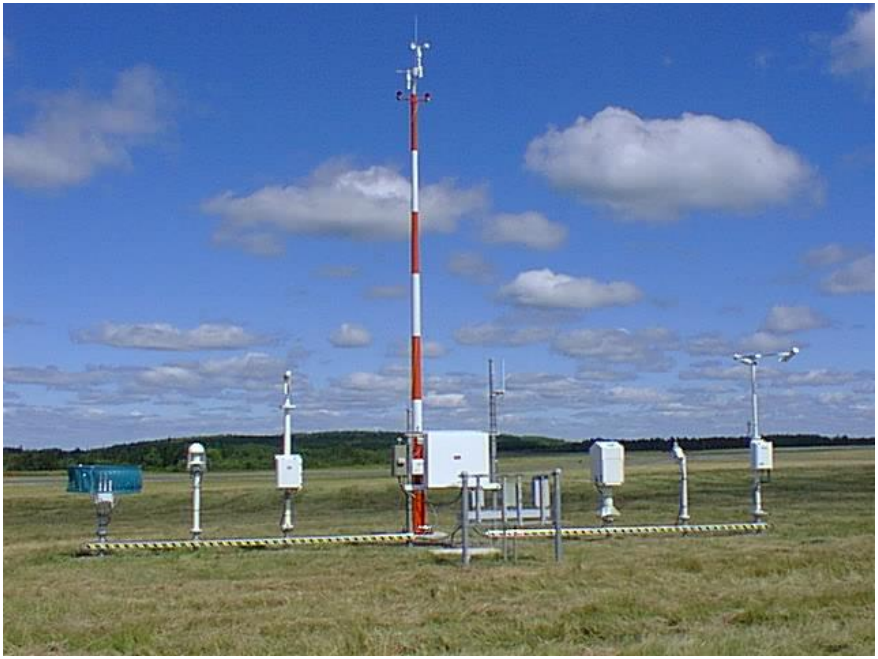

Fig.3 Automated Weather Observating System (AWOS)
Source: [12]

AWOS Measurements depending on the configuration, AWOS measure a combination of the following parameters:

- Barometric pressure (in hectopascals (hPa) / inches of Mercury (inHg)), altimeter setting and density altitude
- Wind speed and wind gusts (in knots), wind direction (from which the wind is blowing) and variable wind direction (in degrees of the compass)

- Temperature and dew point (in degrees Celsius)
- Visibility and variable visibility (in metres/miles)
- Sky condition (in oktas), cloud ceiling height (in metres/feet) and liquid precipitation accumulation (in centimetres/inches)
- Precipitation type (e.g. rain, snow, drizzle) identification
- Thunderstorm detection (via a cloud-to-ground lightning detector)
- Freezing rain detection (via a freezing rain sensor)
- Runway surface conditions.
- Non-certified sensors may be attached to AWOS systems, but weather data derived from those sensors must be clearly identified as "advisory" in any voice messages and may not be included in any METAR observations.

2. FIRST STEPS OF REMOTE TOWER CONTROL

Following a lead in support for the development of the Remote Tower concept by both the German ANSP Deutsche Flugsicherung (DFS), and the Swedish ANSP Luftfatsverket (LFV) over many years, the world's first operational approval for routine provision of Remote Tower Service was given to Swedish ANSP LFV by the Swedish Transport Agency Transportstyrelsen on 31 October 2014. This approval was then first used for ATS at Örnsköldsvik Airport which, since 21 April 2015, has been provided from Sundsvall, which is some 80 NM to the south west. An extension of the system to two other aerodromes also controlled from Sundsvall will make the latter the world's first RTC. The equipment being used is manufactured by Saab which continues to work with LFV to jointly promote the installation and operation of the system both within and outside Sweden [10].

On 3 July 2015, European Aviation Safety Agency (EASA) issued guidance material on the implementation of ATS using a RTS for the single airport case only. This notes the criticality to an RTS of the means of communication between the location where ATS is being provided and the place where it is being provided from. The importance of ensuring redundancy needs, especially if these communications rely on a third party provider, is stressed. The AMC includes separate lists of 'operational hazards' for RTS provision of aerodrome ATC and FIS and their operational effects a well as a checklist for RTS implementation approval. Ongoing work by EUROCAE WG-100 to develop a Minimum Aviation System Performance Specification (MASPS) for the visual presentation which

RTS requires is noted and related Guidance Material has also been issued by EASA under Part ATCO in respect of the training and licensing of controllers who are to work in RTS positions.

Despite the currently-restricted scope of the EASA AMC, it is widely envisaged that some of the benefits of RTS may derive from its provision at more than one aerodrome from a single remote location, in which case that location is described as a Remote Tower Centre (RTC). Such an arrangement provides considerable flexibility, both pre-planned and ad hoc, in the provision of air traffic service in areas with a number of relatively low-traffic aerodromes or where the requirement for the provision of ATS may be unpredictable - diversions, SAR or civil State aircraft use for example.

CONCLUSION

The remote tower system may in the future fundamentally affect the amount of money of the funds spent on air traffic control services. It's one of the few systems to improve the flexibility of air traffic controllers and substantially reduce personnel costs while maintaining the same or higher safety standards. The largest benefits are seen in the system by airline representatives and, in particular, representatives regional airports. From their point of view, the system efficiently redistributes work and solves the problem with a lack of management.

REFERENCES

[1] HOVANEC M., et al.: *Bezpečnosť a ergonómia v letiskových procesoch*. 2018. In: 7th International Scientific Conference of Doctoral Students : Zborník príspevkov zo 7. medzinárodnej konferencie doktorandov. Košice : Technická univerzita v Košiciach. 2018 s. 31-36 [online]. ISBN 978-80-553-2979-6

[2] JENČOVÁ E., et al.: *Comparison of the Accuracy of Selected Forecasting Methods*. 2018. In: Transport Means 2018. Part 3 : proceedings of 22nd International Scientific Conference. - Kaunas (Litva) : Kaunas University of technology s. 1494-1499 [print, online]. ISSN 1822-296X Available at: <https://transportmeans.ktu.edu/wp-content/uploads/sites/307/2018/02/Transport-means-A4-III-2018-09-2... >

[3] KAĽAVSKÝ P., et al.: *Prehľad výrobcov simulátorov pre výcvik pilotov*. 2018. In: Vzdušný priestor pre všetkých a letecké navigačné služby 2018. Košice : TU. 2018 S. 254-261. ISBN 978-80-553-2962-8

[4] KAĽAVSKÝ P., et al.: *Methodology of Pilot Performance Measurements*. 2017. In: Magazine of Aviation Development. Vol. 5, no. 2 (2017), p. 25-30. - ISSN 1805-7578

[5] SABO J., ANTOŠKO M.: *Optimalizácia pracovného prostredia detekčnej kontroly na letiskách*. 2017. In: Bezpečnosť a doprava. Brno : CERM, 2017 P. 132-141. ISBN 978-80-7204-976-9

[6] SABO J., et al..: *The flight simulator capabilitties to simulate meteorological aspects*. 2017. In: Distance Learning, Simulation and Communication 2017. Brno : University of Defence, 2017 P. 264-272. ISBN 978-80-7231-416-4

[7] SOCHA L., et al.: *Critical elements in the area of possible improvement and development of flight training effectiveness*. 2018. In: New Trends in Process Control and Production Management. London : Taylor and Francis Group. 2018 S. 471-476. ISBN 978-1-138-05885-9

[8] SVETLÍK J., et al.: *Optimizing workspace for homogeneous assemblies of rotational motion modules*. 2018. In: SACI 2018. Timisoara: Politehnica University. 2018 P. 573-579. ISBN 978-1-5386-4639-7. Available at: <http://conf.uni-obuda.hu/saci2018/... >

[9] SVETLÍK J., et al.: *Modeling the accuracy of the manufacturing machine*. 2018. In: MMS Conference 2017. Ghent : EAI, 2018 978-1-63190-158-4. Available at: <http://eudl.eu/proceedings/MMS%20CONFERENCE/2017?articles_page=3... >

[10] TOBISOVÁ A., et al.: *Letecké nehody ako krízové situácie letiska a ich dopady na finančné náklady letiska*. 2017. In: Aplikace simulátorů ve výcviku leteckých specialistů. - Ostrava : LET'S FLY., 2017 P. 260-270. ISBN 978-80-270-2104-8

[11] SAAB: *Sweden first in the world with remotely operated air traffic management*. 21.04.2015. [online] Available at: <https://saab.com/news-and-media/2015-04/sweden-first-in-the-world-with-remotely-operated-air-traffic-management/>

[12] Penn State Department of Meteorology. *Real-Time Weather and Computing System*. [online] Available at: http://www.meteo.psu.edu/~j2n/1_21_asos2.jpg

[13] VITTEK, P., KRAUS, J., SZABO, S.: *Moderní přístup k hodnocení provozní bezpečnosti v letectví,* Brno, CERM , 2016., 197 p., ISBN 978-80-7204-944-8.