# ECA Position on Crew Screening Technologies

ECA welcomes the Commission's initiative to improve security at airports and to ensure more secure flights. ECA is striving to have adapted security measures that are safe, secure and affordable. While considering airport screening technologies, safe means that they should not harm screened people's health. Therefore ECA supports the introduction of certain technologies but has reserves on others

ECA is concerned by the poor results of weapons detected by the classical archway metal devices. Alternative means of weapon detection include body-scanners. The technologies behind the scanners are diverse and some of them are not appropriate and might even have a negative impact on passengers' and crews' health.

Screening technologies are often split in 2 categories: the one based on X-ray and the others.

## 1. Technology based on x-rays:

Although X-ray based scanners provide better quality images their radiations might be harmful specially for frequent flyers' and crew members' health. Several scientific studies have been made on the use of X-ray based scanners but were limited to estimate the maximum number of scans acceptable to remain within the safe limits. However pilots are exposed to radiation not only at security checks but also when they are airborne and fly at a high altitude.
According to the Council Directive 96/29/Euratom Art. 42 there is no significant health risk for air crew below 1milisievert (mSv) per year. Records made by companies to assess pilots' exposure to ionizing radiation show an annual exposure between 3 and 6 mSv for long haul flights. These records only take into account the radiations captured during the flights operated in 1 year. The cumulative doses of radiation (cosmic radiation, security screenings and natural radiation) received during a lifetime by crews are not considered as they are well above the limits advised by scientists.

As regards x-ray technology, a distinction must be made between 3 different techniques that have different applications: the backscatter, the low dose and the transmission scanner.

### *1.a Backscatter:*

The Backscatter emits radiations that are reflected by the body and captured. A significant property of this system is that the radiation is 'bounced back' by the body, instead of passing through the body. This reveals what is worn on the body. This type of radiation only superficially enters the body and is mostly reflected. This combination of properties allows a very low power setting. The radiation value given by the manufacturer is less than 0,0001 mSv, but the radiation value used for calculations is between 0,0001 to 0,002 mSv[1] per scan. Because of the combination of properties, this scanner is deemed appropriate for personal or access controls[2].

[1] This value varies according to several factor e.g. age of the scanning machine
[2] An example of such a system is AS&E's 'Smart Check' which is undergoing trials in the US and at some European airports.

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*1.b Low dose:*

There is also the 'low-dose' scans. The difference with the backscatter is that this radiation does pass through the body. The specific bundled radiation technology also allows an ultra-low radiation dose, which is about 10 times higher than the backscatter's dose. The manufacturer gives a radiation value of 0.0001 mSv. The radiation value used for calculations is between 0.0001 to 0.002 mSv per scan as well. This scanner has a number of variants and is also suited for passengers in wheelchairs and passengers with prostheses or casts. Because of its 'see-through' property, ECA considers this device less suited for regular personal and access controls. This system also reveals anything which may be hidden in body cavities. It is our understanding that such systems are being tested in e.g. Russia[3].

*1.c Transmission:*

Finally, there is the transmission X-ray scanner which is being used (e.g. by government bodies) for detection purposes and can see through the body. Consequently, they reveal what is in the body (more clearly than with the previous low dose system). The radiation of these devices is between 0.002 and 0.006 mSv per scan and is clearly higher than with the above-mentioned scanning methods. This makes these devices inappropriate for regular personal and access controls checks. However, they can be used as a means of detection by customs and justice services for a selected group of persons (such as suspected smugglers and 'mules') as a substitute for transport to a hospital[4].

## 2. Terahertz or millimetre wave technology:

This technology uses natural electromagnetic radiation, i.e. energy radiated by the body (and other materials). The frequency used is below infrared, between 0.1 and 20 Terahertz (= 20,000,000 Mhz). The technology is somewhat comparable to infrared, because infrared can also 'measure' and thus 'see' bodies' heat. This millimetre (mm) wave technology combines the properties of radiofrequencies and infrared to make certain materials transparent (such as clothing). The difference in radiated energy between the body and any objects worn thereon is measured and converted into a picture.

The millimetre wave technology consists of two types - Passive mm wave and Active mm wave

*2.a Passive mm wave*

This technology only captures radiation whereas nothing is emitted[5]. However, the disadvantage of these systems is that a very generic image is made, showing very little detail. Further investigation is therefore always necessary. While it is suitable as a 'stand–off' detection system, the combination of these properties makes the system unsuited as a personal and access control device.

*2.b Active mm wave*

In the case of an active millimetre wave, a signal is emitted with an ultra-low power, which is needed to 'enhance' the energy emitted by the body and objects, resulting in a sharper image. To help outsiders understand the applied power, it has a power output a thousand times lower than a cell phone[6]. Therefore such a system would be acceptable for the screening of crew members.

[3] An example of such a system is ADANI DRS 'ConPass LD'.
[4] For example the 'Soter RS' of OD Security.
[5] Such a system is for instance made by Brijot and ThruVision.
[6] An example of such a system is the L3 'ProVision', the scanner used at the Schiphol airport.

*2.c Terahertz*

As regards the Terahertz technology, various parties (including the medical community) are still investigating the usability of the upper part of the Terahertz range (i.e. above 20 THz). This wavelength also has radiowave and optical capacities. The advantage of such a system is that it offers a better picture quality and that materials can be distinguished. However, this technology is still in the experimental stage and the effects of using this radiation on materials are still being investigated. That is why this technology is not used for personal controls.

## 3. Medical aspects:

Crews are already exposed to cosmic radiations at high altitude and records of their ionizing radiations data (as required by the Council Directive Euratom 96/29) show yearly figures between 3 and 6 mSv (for long haul flights). Other radiation sources have to be added:

- 1mSv is the limit above which risks on health are not negligible,
- the 'natural radiation' is considered to be between 1 and 3mSv per year[7],
- the **ionization is a cumulative process**, all the radiations absorbed during a lifetime remain in the body and therefore increase with the number of flights and screenings
- The exposure to cosmic radiation are higher for ultra long range flights.

In the case of the millimetre wave, in spite of the fact that the radiation passes through materials such as clothes, the energy will not penetrate the body beyond the skin. This non-ionising radiation, in combination with the ultra-low power output, is considered harmless in several studies.

## 4. Privacy aspects:

Manufacturers have demonstrated that the issue of privacy can be overcome by using software that only show a schematic representation of the body rather than a picture of the body. As long as such a software is used and the pictures made by the scans are not recorded and stored the privacy aspect is no longer an issue that should preclude the use of body scanners.

## 5. Conclusion:

To improve the results and the performance of the security checks in terms of weapons found, a variety of methods are used to optimise or complement the metal detection actually in place. Nevertheless, these systems are still limited by their performances, cost and/or their impact on health. Any tool based on a technology that does not harm health and that ensures a satisfying level of security would be potentially acceptable for flying crews.

Against this background, ECA accepts the introduction of:

- Millimetre wave imaging
- Other technologies as long as they are proven to be safe and not harmful to the health in a global context (e.g. the explosive Trace Detection Portals)

ECA rejects the use of:

- X-ray based technologies
- Other technologies as long as they have not been proven safe for pilots.

[7] Report of the United Nations Scientific Committee on the effects of Atomic Radiation to the General Assembly http://www.unscear.org/docs/reports/gareport.pdf