

This fantastic idea for a circular runway is sadly going nowhere

April 27 2017, by Lindsay Cole



Credit: NLR/Endless Runway

Building a new runway is often a tight squeeze. For example, part of the opposition to a new runway in London, which has [provoked national debate](#), comes from the hundreds of families whose [homes will be demolished](#) to make way for the airport expansion. But a team of Dutch scientists have now come up with an airport design that would allow large numbers of aircraft to take off in a much smaller space than currently possible – by using a circular runway.

The [researchers behind the Endless Runway project](#) from the Netherlands Aerospace Centre argue that it would allow [aircraft](#) to land and take off in any direction. This would reduce fuel costs and turbulence and sometimes even allow flights to take off when they would otherwise be delayed because they are waiting for a space on the [runway](#). It could also help lower ticket prices and spread out noise pollution so it's not concentrated over one narrow area.

As a retired airline captain, I admire the idea. It is a fantastic and thought-provoking notion. To the general public, it probably sounds too good to be true. And sadly, it is. Even if its designers were to solve all its problems and find a backer, it probably couldn't come to fruition for decades.

This idea was actually first proposed [nearly a century ago, in 1919](#), and was further [tested by the US Navy in the mid 1960s](#). These trials were carried out at the General Motors circular and banked test track in Arizona and worked very well. But they were all completed on a smaller scale with much smaller aircraft, by pilots who were mostly accustomed to landing on an aircraft carrier.



Fantastic idea, too good to be true. Credit: NLR

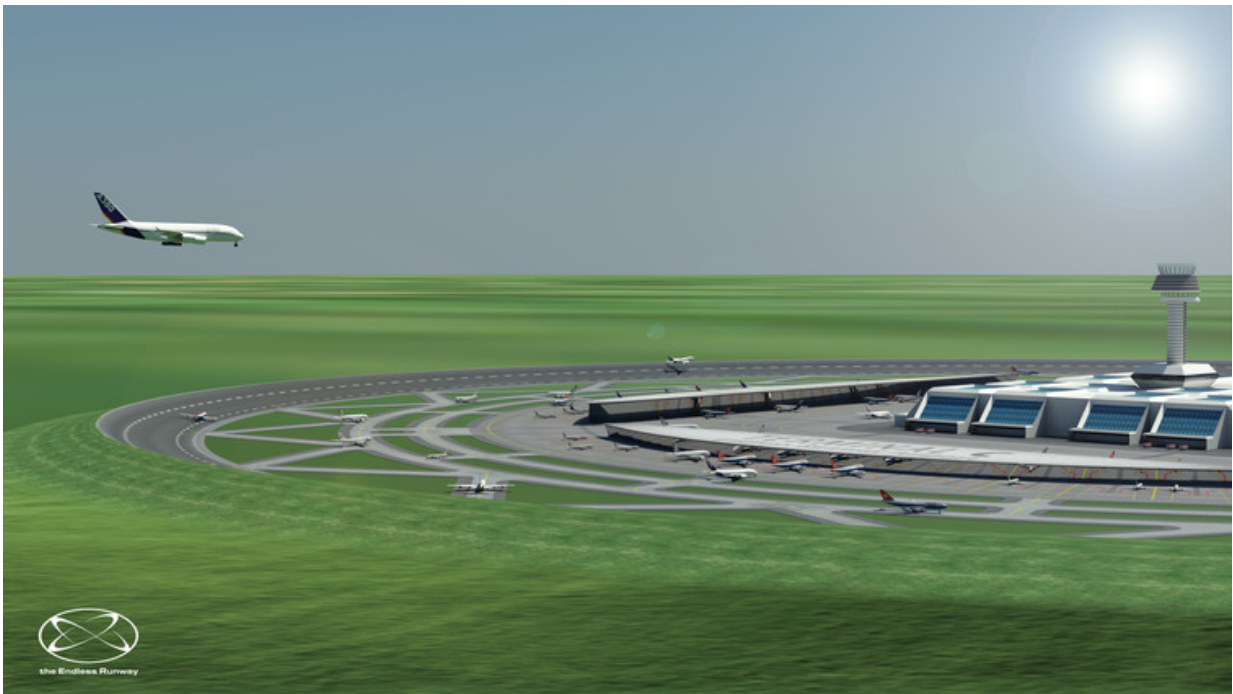
They were flown in perfect weather conditions without the need for the inherent safety protections of the computer technology used in today's aircraft landing systems. Crucially, the landings were done one at a time under test conditions, not every two minutes, day and night, from different directions, as a fully operating circular airport would require.

The bigger picture reveals there would be a succession of impediments to the success of this idea, particularly from the viewpoint of airport operators, air traffic control teams and pilots.

Every runway has precise instructions for the approach and landing phase of a flight, which pilots must be able to follow on their instruments when in cloud or low visibility. Similarly, when taking off, pilots have to follow precise routes, partly to minimise noise pollution

but mainly to keep them in a safe corridor, clear of any high ground. If aircraft could come from any direction and land as it suited them, there would be chaos.

What's more, sometimes aircraft have to land or abandon their landing in an emergency. Aborting a circular landing could mean the aircraft flying off in potentially any direction, perhaps into oncoming traffic on another part of the circle, or even into a mountain. What you need is a singular safe option, just as we have now.



Recipe for chaos. Credit: NLR

Today's technology only allows for a selected number of arrival routes using the [autopilot-assisted instrument landing system](#) that transmits guidance signals from the runway to the aircraft. This automatically flies

the aircraft down an unseen conveyor belt onto the start of the runway for manual landing, and will even automatically land the aircraft in thick fog.

These systems are currently fixed in one position and can't simply change the guidance for the aircraft to land in a different place. New guidance systems, known as Adaptive Runway Aiming Points, that could make it possible to reposition the landing point [are being developed](#). They are first small step towards the technological realisation of the circular runway.

However, it is not just a question of waiting for technology to catch up. [Traditional runways at airports are full of symbols and lights to aid safety](#). A circular airport could have aircraft landing in many different places, and indicating where one aircraft's section of runway ended and another's began would be impossible on a continuous runway.



New guidance systems needed. Credit: NLR

Changing conditions

As the Dutch researchers note, take-offs and landings on regular runways can be made difficult by strong (but consistent) crosswinds. An aircraft could lift off from a circular runway in a direction where these crosswinds wouldn't affect it, but there would only be two points on the circle where this was the case. On any long circular take-off or [landing](#) roll, there would be increasing and decreasing amounts of crosswind as the aircraft turns the corner.

What's worse, the wind might change from one side of the aircraft to the other. The headwind component, which is used to calculate speeds for take-off, would also vary considerably as you moved round the circle. You would need a way to account for all these fluctuating circumstances.

Finally, in order to land without scraping the wings or engines on a curving, banked runway, the pilot would have to be highly trained to transition from a stable, level approach to a [curving, banked movement](#). Alternatively, the autopilot could, possibly, be redesigned to cope.



In for a bumpy landing. Credit: NLP

The challenge of developing a successful circular runway proposal would at least give aircraft manufacturers the advantage of time to implement new autopilot capabilities. They could further use this time to take up another of the Dutch researchers' suggestions: a completely new fatter and wider aircraft design with the engines safely on top of the wings that would [better suit the new runway design](#). At the moment, such a design does not exist at all.

A circular runway fits nicely with the kind of artists' impressions of the future that show a space age 21st century full of self-driving hovercars and holidays on the Moon. And, in fairness, prototypes of these other technologies are already being developed. But until we overcome the inertia of the aircraft industry, find improbable investment and unimaginable political will, circular runways will sadly remain just a

vision.

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