Airfield pavements must support extreme and ever-increasing loads under all weather conditions, and the FAA is hard at work ensuring that our nation’s pavement materials stand up to these demands.

The FAA’s pavement testing facilities have offered unparalleled aircraft simulation since their inception in 1999. Paving materials are tested until failure with repeated, realistic aircraft loads in order to establish standards for our nation’s airport pavements.

In 2013, ATR expanded its full scale accelerated testing capabilities with the addition of the outdoor National Airport Pavement and Materials Research Center (NAPMRC). NAPMRC complements the work done inside ATR’s National Airport Pavement Test Facility (NAPTF) with a state-of-the-art Heavy Vehicle Simulator, Airfields Mark VI (HVS-A). NAPMRC is a unique research facility that allows engineers to investigate the performance of asphalt and other pavement materials outside, at very high tire pressures and aircraft wheel loads. HVS-A’s automated heating system allows it to replicate the high temperatures pavements face in summer, even during wintertime.

The research performed at NAPMRC will support the integration of advanced pavement materials at airfields. New-to-airport technologies like Warm Mix Asphalt (WMA), Reclaimed Asphalt Pavement (RAP), and Stone Matrix Asphalt (SMA) are under consideration as the FAA completes airport pavement testing.

This outdoor accelerated pavement testing will produce improved pavement design and standards for more durable, economical, and environmentally-friendly pavements that are proven to withstand the effects of both aircraft loads and environmental conditions.

Exposure to the elements key to research on airport pavement durability
Recent trends in aircraft production intending to extend flight range capability have led to a significant increase in tire pressure and wheel loads. The latest generation commercial aircraft, Airbus A350-900, exerts tire pressures and single wheel load greater than any previous generation at up to 250 psi and a 73,000 lbs. load. Further increases of this magnitude may soon test the limits of standard paving materials, and ATR is actively preparing for just that.

The FAA’s HVS-A, also known as “Mark VI,” is the largest of its kind at 121 ft. long, 16 ft. wide, and 14 ft. high. Equipped with enhanced control systems, it has greater wander capability than previous generation HVS’s and is capable of applying bi-directional or unidirectional loading via a single wheel (max. load 100,000 lbs.) or dual wheel (max. load 50,000 lbs. per wheel). Full scale accelerated testing is being executed on NAPMRC’s four outdoor lanes and two indoor lanes designed and constructed to withstand aircraft loads at high temperatures and high tire pressures. Test Cycle-1 (TC1) at NAPMRC compared the performance (rut resistance) of Warm Mix Asphalt (WMA) to conventional Hot Mix Asphalt (HMA), when subjected to high tire pressure and high temperature. During construction, the test pavements were instrumented with a number of sensors including strain gages, pressure cells, moisture sensors and thermocouples in order to monitor pavement response under trafficking and environmental conditions. TC1 testing was completed in 2018, and Test Cycle-2 is now under construction to evaluate Reclaimed Asphalt Pavement and three WMA technologies.

Visit the ATR Website at www.airporttech.tc.faa.gov

What’s in the mix?

Today, Hot Mix Asphalt (HMA) is the only asphalt pavement technology with FAA specifications for use at our nation’s airfields.

NAPMRC engineers are researching the effects of aircraft tire pressure and gear loads on these other technologies that may come to offer more sustainable alternatives to HMA:

- **Reclaimed Asphalt Pavement (RAP)** re-uses asphalt (removed during rehabilitation or reconstruction) to replace some of the virgin material used in an asphalt mixture. Preserving resources that may otherwise end up in huge stockpiles, RAP conserves energy and reduces the cost of obtaining quality virgin aggregate.

- **Stone Matrix Asphalt (SMA)** is gap-graded HMA designed to maximize rutting resistance and durability. Its stone-on-stone skeleton improves friction and reduces reflective cracking.

- **Warm Mix Asphalt (WMA)** defines a variety of technologies that mix and place asphalt pavement at lower temperatures and with less fuel than HMA. Reduced emissions exposure improves working conditions, and slower cooling allows construction in lower temperatures and extends the construction season.