Prepar3D v5

An exclusive interview with Lockheed Martin on their new upgrade

Above: From left: Adam Breed, Rob McCarthy, and Chris Metel. (All images Lockheed Martin) Below: A new trueSKY weather engine introduces dynamic volumetric clouds and different forms of precipitation.

The launch of Prepar3D (P3D) v4 marked a major milestone for the ESP platform. Not only did it introduce new features such as dynamic lighting, improved autogen and enhanced weather effects, its 64-bit architecture propelled Prepar3D to the next level. Since then the platform has evolved at a steady pace with new features and fixes continually being added. With Prepar3D v5 on the horizon, we decided to speak to the development team at Lockheed Martin, including commercial development lead, Rob McCarthy (RM), and engineering project managers, Chris Metel (CM) and Adam Breed (AB) to find out more.

PC Pilot: Thanks for agreeing to speak with us about Prepar3D v5. Can I begin by asking you how much of a jump v5 is compared with the previous v4 release and what do you consider to be the most significant upgrade?

RM: Hello Richard, we appreciate you taking the time to speak with us. After our largest window between major versions, we are excited to release Prepar3D v5 with many new features but the most significant upgrade is our support for DirectX 12.

PC Pilot: Can you highlight some of the advantages of DirectX 12 in terms of visual effects such as dynamic lighting, PBR, etc and how overall performance is compared with P3Dv4?

CM: Technically speaking, with DirectX 12 we can offload more work from both the CPU and the GPU to better process multiple threads. This allows the simulator to use the hardware more efficiently. From a user's perspective, they will see an increase in frame rates along with improved visual realism.

AB: This is a major change because we can implement our own command lists and buffers to the GPU to solve hard problems that are unique to flight simulation. This version marks a big shift as we now have low-level control of hardware and can put in optimisations that have been requested for years.

PC Pilot: What are the advantages of using trueSKY for

the weather engine?

CM: Making trueSKY an integrated part of Prepar3D increases the level of realism previously not seen in Prepar3D's lineage. From the dynamic volumetric clouds to the different forms of precipitation, it's quite impressive. I've mentioned to the team that I'm sometimes disappointed by the sky outside when driving home from the office compared to what I see in Prepar3D.

PC Pilot: In terms of performance and visual detail, how does it compare to the v4 weather engine? Is real-world weather supported?

AB: The advanced visual detail does come at a performance cost but the new DirectX 12 rendering engine will make it a great experience. What was novel about our weather engine approach is that we still left the legacy weather engine in place. Users can simply change a checkbox in the options to shift between the two weather engines. This aligns with our long-running philosophy about supporting backwards compatibility to the maximum extent possible, while still making major leaps forward.

RM: This release does not support real-world weather by default, but our open architecture through the Software Development Kit (SDK), supports all the necessary interfaces to allow injection of real-world weather.

PC Pilot: What was the catalyst in using NVIDIA WaveWorks 2.0 for the water simulation?

RM: Realism is extremely important to us. The visuals made possible with WaveWorks 2.0 were the initial spark to see what was possible. It is beautiful.

AB: Additionally, Prepar3D is often used for multi-domain simulation and training exercises. Live, Virtual and Constructive (LVC) training is a big focus of Lockheed Martin. Prepar3D, being a worldwide training environment, is often used across flight, maritime and land. WaveWorks 2.0 is a big step towards providing a better baseline simulation engine as we add new maritime-relevant training content.

CM: In addition to providing better support to our maritime and land users, we are also excited to see how seaplane pilots use this advancement.

PC Pilot: Can we expect to see improvements to the global scenery, such as terrain, land class, mesh elevation and shorelines?

CM: The team worked numerous hours to provide an entire globe refresh. Everything you mention was addressed. In fact, updating terrain and land classes was a big focus for v5.

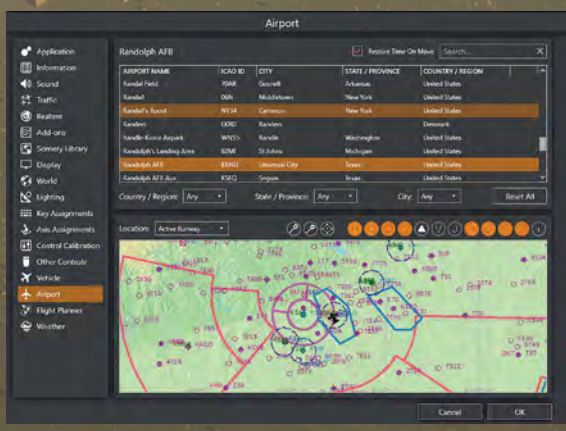
RM: The users will find improved airport and land class textures as well as new PBR textures for runways and taxiway signs. It is a significant visual improvement that makes the simulated training environment more realistic.

PC Pilot: What changes have been made to the autogen, for example, landmarks, vegetation, animated traffic and wildlife models?

CM: Autogen textures were updated and various autogen model changes were made, including addressing the long-standing request to adjust building heights. We also added a ton of new landmark buildings across the globe like One World Trade Centre, Shanghai Tower and Burj Khalifa. For vegetation, we continued to add new SpeedTree models with updated textures.

AB: We have added various new region-specific animals from seagulls to kangaroos. This was a big request from various training groups - often those animals are used to train specific procedures and emergencies.

PC Pilot: Are there any updates to the core navigation database and are there any plans to include Navigraph support and can customers expect any updates to the default airports?



Above: The user interface has been made to be more streamlined and intuitive. The main options menu has been expanded to enable users to change weather, vehicles, airports and graphics settings without having to leave this screen.

A new entry to the Prepar3D general aviation fleet is the conceptual single-engine utility aircraft referred to as the LM CUASE.

RM: Yes. We reviewed and updated all airports, over 24,000, to ensure the runways and taxiways were up to date. That included reviewing and updating the complete underlying worldwide navigation database. This was a major update that took some focus but we were able to fully modernise the dataset. Furthermore, we added the ability to create sloped airports.

PC Pilot: You mentioned sloping runways are now available. How many of the default airports have this feature?

AB: We selected a handful of airports that can really show off the sloping capabilities. We wanted to have specific examples that communicate the training value of having this new capability. A lot more to come on this.

CM: For this initial release, we have sloped about 20 airports but anticipate this growing as we publish future point releases. A big goal was ensuring the SDK terrain tools supported sloping, so third-parties could develop or update their airports with realistic slopes. We accomplished that and we expect those developers to be making product announcements very soon.

PC Pilot: In terms of visual detail, have any airports been upgraded, for example with improved jetways, lighting or PBR effects?

RM: Airports have been visually improved via updated airport and land class textures as well as new PBR textures for runways, taxiways, taxiway signs, among others. We also reviewed major airports and updated them when appropriate.

CM: We are also excited that v5's default airport is a brand-new Randolph Air Force Base, which was built by Orbx.

PC Pilot: Apart from upgrades to the graphics and weather engine, has new content been added such as aircraft or other vehicles?

CM: We have added a couple of conceptual aircraft including a civilian single-engine utility aircraft referred to as the LM CUASE and the LM TTA turboprop trainer. We wanted these new aircraft to be used as examples to help communicate the endless training opportunities that can be accomplished using Prepar3D as a simulation platform. These two new aircraft help accomplish that goal for general aviation.

RM: In addition, we included two new public F-35 variants that were developed by IndiaFoxtEcho Visual Simulations. One is the F-35B, which supports short take-off and vertical landing (STOVL). All three F-35 variants have also been updated to high-resolution PBR textures.

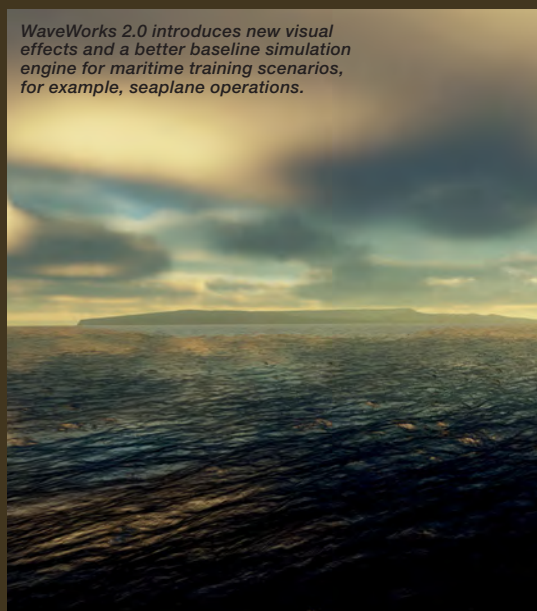
PC Pilot: Are there any changes to the minimum systems requirements compared with P3Dv4? Obviously, support for DirectX 12 is now required.

AB: Right, hardware that supports DirectX 12 is now required. That would be the main change to the minimum requirements. Still, most GPUs purchased in the last five years should support that at some level. One big detail that has flown under the radar is that v5 supports DirectX 12 on Windows 7. That is a very important feature for some training customers who are unable to update their operating system.

PC Pilot: In your experience, how does v5 compare with Prepar3D v4 in terms of performance, for example, VRAM usage?

RM: Performance is markedly improved in v5 compared to v4. We have taken advantage of the capabilities and control offered in DirectX 12 to really push performance in

One of the F-35B variants supports short take-off and vertical landing (STOVL).



WaveWorks 2.0 introduces new visual effects and a better baseline simulation engine for maritime training scenarios, for example, seaplane operations.

Lockheed Martin added two new F-35 variants, developed by IndiaFoxtEcho Visual Simulations, with updated high-resolution PBR textures.

ways that weren't previously possible. VRAM usage is comparable at similar settings but to take advantage of performance gains, more VRAM is used compared to v4 in some cases. New graphical features, particularly the Enhanced Atmospherics setting, will require more VRAM to run effectively compared to having this setting disabled.

PC Pilot: In terms of Virtual Reality support, are there any new features or additional support being added to v5?

AB: We have continued to have a strong focus on Extended Reality (XR) integrations - specifically with a strategic focus on Mixed Reality (MR). For example, we are excited to announce that v5 has native support for Varjo's XR-1 headset. The MR experience in v5 is second to none for flight training. We will have additional announcements throughout 2020 on more XR advancements planned for Prepar3D.

PC Pilot: Will existing add-ons for P3Dv4 work in v5 or will third-parties have to update their products?

RM: Yes. Backwards compatibility is a major focus for us. Most third-parties will need to update their installers to find v5 but any other changes to update their products from v4 to v5 should be minimal. We continued our extensive beta program with major third-parties to keep synergy across the development process. With the rendering engine update, there are visual differences, specifically with lighting, that could have some impact on third-party textures, dynamic lights and effects. We expect the overall impact to be minimal and for third-parties to quickly release their v5 versions close to launch.

PC Pilot: What are the main changes made to the SDK and have any new tools been added and will there be any performance improvements for third-party content?

CM: One of the biggest new SDK features is the ability for developers to slope airports. We also gave developers more control with blending airport elevations to the surrounding terrain. Additionally, developers can better control terrain elevation surrounding airports, more granular vehicle engine overrides and improved PBR dynamic lighting.

PC Pilot: Have any improvements been made to multiplayer functionality?

AB: We have addressed some of the common multiplayer requests by streamlining the network setup and lobby interactions. Continuing to refine and expand the multiplayer functionality is a goal and will further progress in point release updates.

RM: We took a fresh look at how we were doing multiplayer with improved usability being a key focus. The host can now perform a synchronised scenario reset, keeping all clients connected without having to go through the scenario setup process for each run. We made the lobby accessible during the session and users can also switch vehicles while in multiplayer. This is just the start; we've got a lot more additional multiplayer enhancements in store.

PC Pilot: Can you highlight any changes to the user interface?

RM: Our main goal here was to keep the user interface familiar while improving the look and feel, making UI interactions more streamlined and intuitive, while refining the overall layout and organisation of elements across the entire interface. The main options menu has been expanded to allow users to change weather, vehicles, airports and even graphics settings all without having to leave this screen. The display area is better utilised, leading to a much better experience when customers use unique resolutions and display scaling.

PC Pilot: For moving around in P3D, have any improvements been made to the camera views?

CM: We improved camera controls with both the mouse and controllers by making camera adjustments more intuitive and easier to perform. Holding the right mouse button down and moving the mouse will rotate the camera instead of requiring the space bar to be pressed. Also dragging the middle mouse button will pan the view in 3D space. Additionally, cameras will no longer snap back to the centre when rotating views inside the cockpit or around the 3D model in external views. If users prefer the old camera controls, these new control schemes can also be turned off in the menu.

PC Pilot: In terms of changes to the flight model, have any updates been done here?

RM: We made several improvements to ground contact reaction including processing every ground contact point separately. This means each wheel will process surface types and elevations separately, allowing much more accurate ground reaction. We also included a new conceptual turboprop aircraft, the LM TTA, as well as additional engine extensibility tools to third-parties to better tune specific engine components.

PC Pilot: Moving forward, are you able to tell us what areas further development will focus on?

CM: The v5 release is really the start of a whole new simulation engine. Right now, we are focused on further optimising performance of the new rendering engine.

AB: Making world-class XR integrations is a big focus. Prepar3D v5 redefines what is possible with XR and we will continue to expand the immersive capabilities. I am also excited about continuing the advancement of the multiplayer engine.

RM: Just like the 64-bit update in v4, overhauling the core engine to DirectX 12 opened up an infinite number of new possibilities for us. The best part is we've only just scratched the surface here and can't wait to take advantage of these new capabilities as v5 development continues.

PC Pilot: Thank you for speaking with us about Prepar3D v5. We look forward to seeing what the new version will bring to flight simulation over the coming year.

By Richard Benedikz PCP

A big focus for Prepar3D v5 was updating terrain and land class data for the entire globe.