



VR-Engage 2.0 Release Notes

This release note contains the following release-specific information for VR-Engage 2.0.

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Systems Supported and System Requirements

This section describes platform support and system requirements for VR-Engage. To take full advantage of VR-Engage's visualization capabilities and optimize performance, you must use a modern game computer with a high quality NVIDIA graphics card.

For the most up-to-date information about systems supported, see the Product Versions page on the MAK web site at: <https://www.mak.com/support/product-versions>. For hardware requirements, see <https://www.mak.com/support/hardware-recommendations>.

VR-Engage 2.0 is available for the platforms listed in Table 1.

Table 1. Platforms supported

Operating System	Compiler
Windows 10	Microsoft Visual C++ 15.0 (64-bit)



The MAK data package contains data that the VR-Engage application requires. See "The makData Package and Product Compatibility" on page 5.

3D Video Cards Supported

VR-Engage 2.0 supports NVIDIA graphics cards that support OpenGL 4.5 or above. While we support NVIDIA Quadro cards, we strongly recommend GeForce cards. If you use a Kepler Series Quadro card, read the instructions in "Using Kepler Series Quadro Cards" on the facing page. VR-Engage does not support AMD (formerly ATI) graphics hardware.



VR-Engage strives to provide the best 3D scene quality possible and cutting edge visualization effects. To provide this functionality, VR-Engage takes advantage of OpenGL features that may not be supported on older video cards. When this is the case, you can disable these features, allowing VR-Engage to run in 3D modes.

OpenGL 4.5 is the minimum requirement for rendering a 3D scene in VR-Engage. For the best visual quality and highest performance, you should use the most recent NVIDIA GeForce card. The minimum recommended card is the 9xx series.

Some laptops have an NVIDIA graphics card and an Intel graphics card. You must configure your computer to use the NVIDIA card. To do so:

1. Open the NVIDIA Control Panel (in the System Tray).
2. Select Manage 3D Settings.
3. Select Global Settings.

4. Select Preferred Graphics Processor.
5. Select High-performance NVIDIA Processor.



You should always try to use the latest drivers available for your video card.



If you use an external monitor with your laptop and your laptop is not using the NVIDIA graphics card when running VR-Engage, try setting the main display to be the laptop's built-in monitor instead of an external monitor.

Using Kepler Series Quadro Cards

There is a known issue with the Quadro drivers on Kepler series Quadro cards. NVIDIA says it's related to the fact that the default profile optimizes for a fixed eyepoint (for applications like CAD). To run on these cards, you must change the global profile for the driver, as follows:

1. Open the NVIDIA Control Panel.
2. Select the Manage 3D Settings page.
3. Select the Global Settings tab.
4. In the list of driver profiles, select Workstation App - Dynamic Streaming.

We are working with NVIDIA to have their drivers recognize our applications and apply this profile automatically. In the meantime, for Kepler series Quadro you must make this change manually.

Disk Space Requirements

A full installation of VR-Engage requires approximately 5.5 GB of disk space, and an additional 49 GB for the complete MAK data package. If you also install VR-Forces, that requires at least 4 GB of disk space for VR-Forces and the VR-Engage add-ons. (If you install VR-Forces with the toolkit and the API documentation, that takes approximately 5.2 GB.)

Licensing

The VR-Engage application requires a VR-Engage run-time license in order to run. Internally, VR-Engage relies on VR-Vantage capabilities for its 3D visualization, VR-Forces capabilities for its ownship simulation, VR-Link for its networking, and so on, but these capabilities are built into VR-Engage and do not require separate run-time licenses of these MAK products.

MAK License Management

VR-Engage 2.0 uses FLEXlm 11.17.1. You must install the license management software to run VR-Engage. If you are upgrading from a version of VR-Engage that used an older version of FLEXlm, you must upgrade your license management files. You do not need a new license. Licenses are forward compatible.

The License Manager files are not part of the VR-Engage installer. You can download them at:

- Windows: <http://ftp.mak.com/out/MAKLicenseManager-win64-setup.exe>
- Linux (VR-Forces only): <http://ftp.mak.com/out/MAKLicenseManager-linux64-setup.tar.gz>

A license manager FAQ is available at <https://www.mak.com/support/license-support>.

VR-Forces Licensing Issues

With only a VR-Engage license, you can run VR-Engage, choose a terrain database to simulate on, create and place an entity, and control that entity. VR-Engage can only simulate and control a single entity at a time. When you "Change Role" and create a different entity to simulate, the entity you were previously simulating will be deleted and replaced by the new one.

If you are running a copy of VR-Forces on your network (which requires a separate VR-Forces license), then VR-Engage can interact with VR-Forces in a variety of ways:

- VR-Engage allows you to join a VR-Forces session and take manual control of one of the entities in the VR-Forces scenario. If you are controlling a VR-Forces entity, and then "Change Role" and ask to control a different entity, the original entity will still exist, as it is owned by VR-Forces.
- VR-Engage can initiate and receive changes to the terrain, for example, opening doors or destroying buildings. (VR-Forces acts as the dynamic terrain server).
- VR-Engage can reflect changes to time-of-day and weather that are published by VR-Forces.
- VR-Engage allows you to assign certain tasks to entities that are simulated by VR-Forces (for example, tell a subordinate to follow you, or move to a location you designate).

To simplify the startup workflow for certain use cases, VR-Engage gives you the ability to launch a VR-Forces back-end directly from the VR-Engage user interface, and to instruct VR-Forces to load and host a scenario of your choosing. This allows you to avoid separately launching VR-Forces from the start menu or command line, and automatically ensures that VR-Forces uses the same interoperability parameters as VR-Engage. A VR-Forces back-end license is always required to run VR-Forces, whether you launch it from the VR-Engage user interface, or launch it separately from the Start Menu or command line. If you do not have a VR-Forces back-end license available, VR-Engage does not allow you to launch VR-Forces and host a VR-Forces scenario.



When VR-Engage launches, it looks for a running VR-Forces and if it finds one, it connects to it. If it does not find one, it offers you the option to host and load a VR-Forces scenario, or start an Unhosted session. If you host a VR-Forces scenario, you will consume a VR-Forces license, which will prevent you from starting VR-Forces independently if you only have one license. If you start an Unhosted session, you can start or join a session only as an individual player; you cannot load and run a scenario.

Third-Party Libraries Supported

VR-Engage 2.0 uses the indicated versions of the following libraries:

- VR-Link 5.8
- Qt 5.15.2 (VC 15 and Red Hat 8)
- OpenSceneGraph 3.6.4
- Boost 1.63.0
- FreeGlut 2.4.0 (Windows), 2.6.0 (Linux)
- GL-Studio 7.0 (VC 15)
- DI-Guy 13.6 (development version)
- Triton 4.43
- Silverlining 6.20
- SpeedTree 6.3.2
- CDB API 2.2 (Windows), 2.1 (Linux)
- osgEarth 3.2
- CUDA 9.2 (Windows), 10.2 (Linux)

The makData Package and Product Compatibility

VR-Engage 2.0 is built against VR-Forces 5.0.1, VR-Vantage 3.0.1, and VR-Link 5.8. They both use the shared makData 16 package.

As of this release, the data installation is separate from the product installation. MAK applications can share the same data package, so you no longer need to install it separately for each product. For instructions on installing the data, see "[Installing the makData Package](#)" in the *VR-Engage Users Guide*.

Network Compatibility

VR-Engage 2.0 is compliant with RPR FOM 1.0 and RPR FOM 2.0 and includes FOM mappers for many draft versions of the RPR FOM. It is compliant with RTIs that support the HLA 1.3 specification, the SISO DLC HLA API 1516 version of the IEEE 1516 specification (SISO-STD-004.1-2004), or HLA Evolved. MAK recommends HLA Evolved.

To use an RTI with VR-Engage, it must use the same operating system and be built with the same compiler.

VR-Engage 2.0 supports DIS 4, 5, 6, and 7, and can therefore interoperate with DIS applications of any of these versions. MAK recommends DIS 7.

Backward Compatibility

Support for MAK Data Logger Recordings

While VR-Engage 2.0 works with all recent versions of the MAK Data Logger, please know:

- Versions of the MAK Data older than 5.5.1 (released in May 2018) have known problems with the encoding of DIS 7 Attributes, which can cause crashes in MAK products.

New Features and Updates

For VR-Engage 2.0, we have modernized the user interface to more closely resemble commercial game styles for menus, options, status overlays, pause screens, and more (Figure 1). Semi-transparent UI elements, minimalist design, and clean separation of in-game controls from configuration functions are hallmarks of the new design. You can learn more in "[Starting VR-Engage](#)" in the *VR-Engage Users Guide* and also in the *VR-Engage First Experience Guide*.

Improved Visuals and Performance

VR-Engage2.0 is built on the new VR-Vantage 3.0.x rendering engine, which brings advanced new visual features such as horizon-based ambient occlusion, IR illumination, and more localized weather effects (sleet, snow, and hail, in addition to rain and wind).

It is also built on the new, fully multi-threaded VR-Forces 5.0.x simulation engine, allowing VR-Engage to play in scenarios with much higher entity counts, greater performance, and more intelligent, coordinated behaviors for the non-player entities.

Figure 1. VR-Engage 2.0



User, Admin, and Lockdown Modes

When deploying VR-Engage for training, it's often important to limit the players' access to administrative functions that should be handled by the instructor/operator. In the default User mode, the player is very restricted in what they can do with the application, more so when they are not hosting the session. The Admin mode allows VR-Engage users to do more, supporting battle lab or experimentation use cases. The Lockdown mode is even more restricted than User mode; the player cannot choose a role but is assigned one by an instructor/operator. For more information, see "[Admin, User, and Lockdown Modes](#)" in the *VR-Engage Users Guide*.

Improved Configuration

We have refactored and enhanced two of our key systems for extending and customizing VR-Engage:

- The "role refactor" gives you more power to create, edit, and manage custom roles. You can inherit common parameters from generic role parents, and so role-specific configurations are simple and only need to include parameters that are unique to the role or entity type: eyepoint location, weapon HUDs, and status overlays, Vortex mechanism files for specific vehicle dynamics, and so on.
- The "input refactor" greatly reduces the effort involved in configuring VR-Engage to work with new input/output devices by providing an abstract, named set of runtime functions that can be mapped to various device axes, buttons, and other elements. See "Configuration Specifics" on page 10.

Content

We've added hundreds of new models, all attributed with textures and properties for visual rendering as well as material classifications for physics-based sensor rendering. New models designed for immersive scenes include rotating parts (wheels, blades, treads) and new particle systems for realistic visual effects. You can view the full listing in the *VR-Forces Entity Model Catalog*. (For the entities that VR-Engage players can control out of the box, as well as information about configuring VR-Forces entities for player control, see the *VR-Engage Users Guide*.)

Unified Data Directory

The MAK data package is now installed in a central location separate from the product installation, allowing VR-Vantage 3.0.x, VR-Forces 5.0.x, and VR-Engage 2.0 to share data. You no longer install the data separately for each product. Instead, you can install the data packages in a common location—on a machine where multiple products are installed, or on a network share—to supply 3D models, 2D icons, audio files, terrain configurations, HUDs, overlays, particle systems, and more. This significantly reduces the disk space required when running multiple MAK ONE applications. See "The makData Package and Product Compatibility" on page 5.

Entity-Specific Changes

Human Characters

- Players can now carry or drag other soldier human characters when they are injured. You can choose to drag the soldier by their armpits or drag strap, or put them into a fireman carry. See "[Carry or Drag a Person](#)" in the *VR-Engage Users Guide*.
- While playing a human character, you can use the Action menu to indicate whether you want to see the compass in degrees or NATO-MIL. You can also specify the north reference. See "[Using the Compass](#)" in the *VR-Engage Users Guide*.

- You can specify the default settings for the compass. See "[Compass Settings](#)" in the *VR-Engage Users Guide*.
- Support for laser designator and rangefinder devices, and improved binoculars overlays.
 - The new AN/PED-1 LLDR simulation object can be used for forward observer training. See "[Using the AN/PED-1 LLDR](#)" in the *VR-Engage Users Guide*.

(This simulation object was added to support the MAK FIRES portable training system, designed for Call for Fire (CFF) training. If you are interested in learning more, visit mak.com/products/training-solutions/mak-fires or contact your sales representative.)
 - The binoculars now use the M22 reticle, using 10 MIL increments. It is scaled such that the edges of a 10-mil wide angle originating at the observer would pass through adjacent 10 mil markers in the reticle image. This is also supported in VR.
- DI-Guy Character Viewer is now included with the tools that are part of the VR-Engage installation. See the [Using the Character Viewer](#) chapter in the *Adding Content to MAK Applications Reference Manual*.

Aircraft

- The AH-64 E (Apache Guardian with FCR) is now VR-capable.
- You can now land rotary-wing aircraft on aircraft carriers.

Ground Vehicles

- The M1A1 AIM (AUS) and M1A1 AIM (AUS) Mineplow entities now have a Driver/Gunner role.
- As a gunner, you can now change weapons on the LAV using the Action menu.
- The GTK Boxer CRV's Commander RWS role can now lase targets. See "[Using the Laser Designator](#)" in the *VR-Engage Users Guide*.

Other Improvements and Changes

- Improved VR and MR functionality, including support for VRgineers XTAL-3 Mixed Reality headset. Also easier access to the action menu, overlay HUDs, and performance diagnostics while in VR/MR.
- Options to reduce texture resolution when running on GPUs that have insufficient texture memory for the highest fidelity terrains and models. These new command-line options are listed in "Configuration Specifics" on the next page
- Improved heuristics for limiting the amount of terrain data that is paged in when using binocular or other sensors with magnification, without sacrificing visual quality.

- A number of the controls for entities have changed. See the chapter on "[Mouse, Keyboard, and Game Controller Mappings](#)" for details.
- You now select a connection when you start VR-Engage, as described in "[Starting VR-Engage](#)" in the *VR-Engage Users Guide*. To customize the configuration, see "[Configuring the Simulation Connection](#)".
- VR-Engage Ground, VR-Engage Air, and VR-Engage Sensor Operator are no longer standalone products. You can have the same functionality using command-line options. See "Configuration Specifics" below.
- When you are playing a role and press **Esc**, you no longer return directly to the Choose Role panel. This now opens a menu screen, where you can choose from different options. See "[Overview of the Application Menu](#)" in the *VR-Engage Users Guide*.
- While hosting a session, you can now play, pause, and rewind the scenario.
- When you are zoomed in with binoculars, input devices are now slowed down to allow you to better focus on what you are looking at.
- Nahimic software can have a negative impact on performance. VR-Engage now warns you if the Nahimic service is running. See "[Performance and Display Issues](#)" in the *VR-Engage Users Guide* to learn how to prevent this issue.

Configuration Specifics

- Xbox controllers are now supported out of the box.
- VR-Engage uses a newly refactored input design, which makes it possible to configure roles for input, mapping to a single abstract event interface, rather than a set of specific devices. For information, see "[Configuring Joysticks and Keyboard Control](#)" in the *VR-Engage Users Guide*.
- The role definition files have been consolidated and the *.entity* files that use them have been updated. This provides a more modular and reusable configuration.
- New command-line options are now available for VR-Engage:
 - You can use the `--appMode [user|admin|lockdown]` option specify the mode of VR-Engage that you want to run. User and Lockdown mode limit the features that the user can access. See "[Admin, User, and Lockdown Modes](#)" in the *VR-Engage Users Guide*.
 - Use the `--airMode`, `--groundMode`, and `--sensorMode` options to launch VR-Engage and limit entity creation and control to humans and also aircraft, ground vehicles, or sensors respectively. This replaces the functionality of what were previously separate applications.
 - Use `--limitEntityTextures`, `--limitTerrainTextures`, or `--limitGpuMemoryPercentage` if you experience crashes caused by high VRAM.
 - With the new shared data directory, you can use `--sharedDataDir`, `--sharedDataRoot`, `--sharedDataStem` to specify the directory, root, or stem of the shared data directory.

- If you want to use a cache that will allow you to run multiple instances of VR-Engage or remote display engine from the same installation, use `--appCacheDir`.
- `--disableIndirectEntities`. Disables indirect rendering of entities.
- `--disableTerrainObserverViews`. Prevents any terrain-specific observer views from being loaded.
- `--enableDofConstraints`. Degree of freedom constraints are disabled for simulation objects by default. Use this command-line option to enable degree of freedom constraints.

For details about these and other command-line options, see "[Command-Line Options](#)" in the *VR-Engage Users Guide*.

Documentation

When you press **F1**, this now opens the keyboard and game controller mappings where you can learn how to control various roles. In Admin mode, you can also choose **Help > Controls Mapping**.

To access the local HTML help for VR-Engage, press **Shift+F1** or, in Admin mode, choose **Help > Help**.

Documentation Updates

Documentation has been updated for this release. The guides are provided as PDF files in the `./doc` directory. Online help is available when you press **Shift+F1** or from the VR-Engage Help menu in Admin mode. You can also find the most current PDFs at <https://www.mak.com/support/product-user-guides>. (You must be able to log in to the web site.)

Fixed Bugs

Problems identified in previous releases have been fixed. For a summary, please see the `./doc/FixedDefectsVRN2.0.csv` file.

Known Problems

VR-Engage has the following known problems:

- If you use the settings covered in "[Installing the makData Package](#)" in the *VR-Engage Users Guide* for the shared data, SensorFX works correctly. If you launch VR-Engage with SensorFX and see an error about data, however, you can resolve it by setting the JRM_DATA_DIR environment variable to indicate the location where you installed the data. Enter the path to the SensorFX directory in the format *mydata\location*/ModelData/sensorFX where *mydata\location* is the full path to the *./SharedData/16/latest* directory. An example of the full entry is: E:/SharedData/16/latest/ModelData/sensorFX.
- While engaged in a pilot role, releasing a bomb on another entity's laser designator requires that you first match your laser code to that of the other entity. VRE-2405
- Mixed reality does not work with the Vive Pro. Virtual reality works correctly. VRE-1790
- If a human character is executing a plan and a player engages and then disengages, the character does not resume its plan. VRE-1777
- The Plug-ins Loaded page of the VR-Forces Plug-ins dialog box has been suppressed. Look at the *./bin64/vrfSim.log* file for a list of the loaded plug-ins. VRE-1481
- You cannot take control of a VR-Engage-controllable human entity that is currently performing a DI-Guy animation task indefinitely. VRE-261

For information on other issues that you might encounter while using VR-Engage, see the [Troubleshooting](#) appendix in the *VR-Engage Users Guide*.