



VR-Forces 4.4.1 Release Notes

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Systems Supported

VR-Forces 4.4.1 is available for the platforms listed in [Table 1](#). For toolkit users, application code must be built with the indicated compilers in order to link to VR-Forces libraries.

Table 1: Platforms supported

Operating System	Compiler
Windows Vista, Windows 7, Windows 8, Windows 10	Microsoft Visual C++ 10.0 SP 1 (64 bit) Microsoft Visual C++ 12.0 SP 1 (64 bit)
Red Hat Enterprise Linux 6 (64 bit libraries)	default compiler

3D Video Cards Supported

VR-Forces 4.4.1 supports NVIDIA graphics cards that support OpenGL 3.3 VR-Forces does not support AMD (formerly ATI) graphics hardware.



You must use NVidia driver 340.29 or later.



VR-Forces strives to provide the best 3D scene quality possible and cutting edge visualization effects. To provide this functionality, VR-Forces 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-Forces to run in 3D modes.

OpenGL 3.3 is the minimum requirement for rendering a 3D scene in VR-Forces. For the best visual quality and highest performance you should use the most recent NVIDIA GeForce card.

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 board.

Using Kepler Series Quadro Cards

There is a known issue with the Quadro drivers on Kepler series Quadro cards. NVIDIA says its 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, Kepler series Quadro you must make this change manually.

Starting MÄK Applications on Windows 10

The Windows 10 “All apps” menu does not support the folder structure that MÄK uses to organize startup shortcuts for applications, documentation, and tools. Everything gets dumped into a flat list under **All apps** → **MAK Technologies**. This makes finding the application you want to run tedious at best and confusing at worst, particularly if you have multiple versions of an application installed.

Fortunately, there is a fairly simple way to work around this problem. You can create a toolbar that points to the MÄK Technologies shortcuts folder. To do this:

1. Right-click the Taskbar at the bottom of the screen.
2. On the pop-up menu, choose **Toolbars** → **New Toolbar**. The New Toolbar - Choose a folder window opens.
3. In the Folder window, type: C:\ProgramData\Microsoft\Windows\Start Menu\Programs\MAK Technologies
4. Click Select Folder.

A new folder is added to the Taskbar. To open a MAK application, users guide, or tool, select it from the toolbar.

Disk Space Requirements

A full installation of VR-Forces requires approximately 14 GB of disk space.

Compiler Compatibility on Windows

MÄK provides versions of product releases that have been compiled with different versions of Microsoft Visual C++ (for example, 10.0, 11.0, and 12.0). When you run MÄK products together on the same computer, for example, VR-Forces and VR-Vantage Stealth, we strongly recommend that you run versions compiled with the same compiler. Mixing products compiled with different versions of the compiler can result in program instability.

Required Software for Toolkit Users

If you plan to build VR-Forces applications using the VR-Forces Toolkit, you must download and install VR-Link 5.2.1. You can download it from:

- ♦ <ftp://ftp.mak.com/out/products/vrlink5.2.1-win-vc10.exe>
- ♦ <ftp://ftp.mak.com/out/products/vrlink5.2.1-win64-vc12.exe>
- ♦ <ftp://ftp.mak.com/out/products/vrlink5.2.1-linux-rhe6.tar.gz>

If you plan to build the VR-Forces GUI, you must download and install QT 4.7.4 (VC 10) or QT 4.8.7 (VC 12). You can download it at:
<http://www.mak.com/support/resources/bonus-material>.

Qt is also available as a free download under the LGPL version 2.1 license at qt.digia.com. This version should be satisfactory for most VR-Forces customers. If you need a Qt commercial license, you must purchase the license from Digia.

MÄK Product Compatibility

To build VR-Forces applications, you must link with VR-Link 5.2.1. If you are building for HLA and want to link with the MÄK RTI, use MÄK RTI 3.x or later, although we recommend use of the latest release. If you are building for HLA Evolved, you must use MÄK RTI 4.0.4 or later.

License Manager

VR-Forces 4.4.1 uses FLEXlm 11.13.0.2.

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

- ♦ Windows: <ftp://ftp.mak.com/out/MAKLicenseManager-win64-setup.exe>
- ♦ Linux: <ftp://ftp.mak.com/out/MAKLicenseManager-linux64-setup.tar.gz>

A license manager FAQ is available at:

<http://www.mak.com/license-support.html>

Third Party Library Support

VR-Forces 4.4.1 uses the indicated versions of the following libraries:

- ♦ VR-Link 5.2.1
- ♦ Qt 4.7.4 (VC 10). 4.8.7 (VC 12)
- ♦ OpenSceneGraph 3.1.4
- ♦ Boost 1.46.1
- ♦ FreeGlut 2.4.0
- ♦ GL-Studio 5.0.2
- ♦ DI-Guy 13.2
- ♦ Triton 3.51c
- ♦ Silverlining 4.0741
- ♦ SpeedTree 6.3.2
- ♦ osgEarth top of tree (3.0+).

Using MÄK Products on Virtual Machines

In general, MÄK products run on virtual machines without any problems. The exception to this statement is that applications that use 3D graphics, such as VR-Vantage and the VR-Forces front-end, require a graphics card. Standard graphics cards typically do not work with VMs. To use a 3D enabled environment in a VM, please contact your VM vendor for options. NVidia produces the NVidia GRID card, which is designed to solve this problem. Your VM vendor may have additional information. For more information on NVidia GRID, please see <http://www.nvidia.com/object/virtual-gpus.html>

Network Compatibility

HLA only

VR-Forces 4.4.1 was built against VR-Link 5.2.1 and is compliant with:

- ♦ RPR-FOM 1.0 and 2.0.
- ♦ MÄK RTI 3.x, 4.x, and other RTIs that meet the HLA 1.3, IEEE 1516 SISO DLC API, or HLA Evolved specifications and are built with the same compilers as VR-Forces.

VR-Forces 4.4.1 is compatible with applications that use earlier versions of VR-Link if they support versions of the RPR FOM listed.

The VR-Forces 4.4.1 front-end is not compatible with RTI-NG Pro because it uses a non-standard version of *xerces_c_2_7.dll*.

DIS only

VR-Forces 4.4.1 supports DIS 4, 5, 6, and 7, and can therefore interoperate with DIS applications of any of these versions.

Backwards Compatibility

The VR-Forces 4.4.1 APIs are not compatible with VR-Forces 3.x or earlier. It is largely compatible with the 4.3.x API. Small changes may be necessary to migrate from 4.3.

Scenarios created with VR-Forces 3.12 and 4.x are forward compatible.

Support for MÄK Data Logger Recordings

The recordings provided with MÄK Data Logger 5.4 or later use the new FOM naming conventions. These should work seamlessly with the default HLA configurations in VR-Forces 4.4.1. If you want to connect VR-Forces 4.4.1 to recordings made with previous versions of the Logger, you must change the connection configuration to use the old FOM naming convention.

RPR FOM Versions Supported

VR-Forces 4.4.1 has built-in support for versions 1.0 and 2.0 (drafts 6, 17, and 20) of the RPR FOM and RPR FOM 2.0, draft 17 with DI-Guy extensions. It also supports VR-Link's ability to support alternative FOMs through the FOM Mapper. By default, VR-Forces 4.4.1 uses RPR FOM 2.0.

If you are building an application with the VR-Forces toolkit and you want to specify a version of the RPR FOM through code, pass the version number (for example, 2.0006) to the *DtRprFomMapper* constructor and pass the resulting object to the *DtExerciseConn* constructor. Also, make sure you are using a federation execution name that corresponds to the right FED file. For example:

```
DtExerciseConn conn("VR-Link20006", "MyApp", new DtRprFomMapper(2.0006));
```

In order to support RPR FOM 1.0, we have added the following extensions (which are supported in later versions of the RPR FOM):

- ♦ EnvironmentProcess
- ♦ GriddedData
- ♦ EmbeddedSystem.IFF
- ♦ EmbeddedSystem.IFF.NatoIFF
- ♦ EmbeddedSystem.IFF.NatoIFF.NatoIFFTransponder
- ♦ EmbeddedSystem.IFF.NatoIFF.NatoIFFInterrogator
- ♦ EmbeddedSystem.IFF.SovietIFF
- ♦ EmbeddedSystem.IFF.SovietIFF.SovietIFFTransponder
- ♦ EmbeddedSystem.IFF.SovietIFF.SovietIFFInterrogator
- ♦ EmbeddedSystem.IFF.RRB
- ♦ BaseEntity.AggregateEntity
- ♦ ObjectRoot.BaseEntity.PhysicalEntity.Lifeform.

For both RPR FOM 1.0 and 2.0 VR-Forces 4.4.1 relies on the LgrControl and View-Control custom MÄK extensions.

New FED File Naming Convention

VR-Forces 4.4.1 uses the FOM naming conventions introduced in VR-Link 5.2. This section describes these changes.

Historically, VR-Link has named FED files using the convention VR-Link<RPR FOM version>.fed or VR-Link<RPR FOM version>.xml. For example, the FED file for RPR FOM 2, draft 17 was *VR-Link20017-1.fed*. This naming scheme has two problems. First, it is confusing for end-users of applications that use VR-Link (but who are not themselves VR-Link customers) to be using a FOM named that way. Second, the file-name was not versioned, so any updates that we would make to the existing FOMs could cause compatibility problems. In fact for this latter reason, we had refrained from fixing a few minor bugs that we found over the years until now.

Effective with this release, VR-Link introduces a new naming convention: MAK-<FOM name><FOM revision><FOM version>.fed (or *.xml*, or *_evolved.xml*, as appropriate). For example, *VR-Link20017-1.fed* has been renamed *MAK-RPR20017-1-1.fed*.

Additionally, given the power of HLA Evolved FOM Modules, starting with RPR 2.0 we are now providing the RPR standard FOM for HLA Evolved, currently named RPR_FOM_v2.0_1516-2010. MÄK's extensions, are in FOM Modules that our software will automatically add to an exercise. This means that if you have another RPR-based FOM, such as NETN or NASMP, you will have a much easier time using it without needing to modify the FOM.

VR-Link continues to include FED files and XML files using the old convention, so you do not have to change any existing scripts or code.

[Table 1-1](#) lists legacy FED files and how they map to new FED files. Many of the FED files delivered in previous releases do not have updated versions, usually because they are rarely used.

Table 1-1: Old FED file to new FED file mappings

Old FOM	New FOM
HLA 1.3	
DI-Guy-13_0.fed	
DI-Guy.fed	
VR-Link.fed	MAK-RPR1-1-1.fed
VR-Link05.fed	
VR-Link07.fed	
VR-Link08.fed	
VR-Link10.fed	MAK-RPR1-1-1.fed

Table 1-1: Old FED file to new FED file mappings

Old FOM	New FOM
VR-Link16.fed	
VR-Link20006.fed	
VR-Link20014.fed	
VR-Link20017-1.fed	MAK-RPR20017-1-1.fed
VR-Link20017-6.fed	MAK-RPR20017-6-1.fed
VR-Link20017.fed	
VR-Link20020.fed	MAK-RPR2-1-1.fed
VR-LinkBOML16.fed	
VR-LinkDDM.fed	
VR-LinkMC02.fed	MAK-RPR1-MC02-1-1.fed
VR-LinkTM.fed	MAK-RPR1-TimeManagement-1-1.fed
VRL-20017-1-Link16.fed	
VRL-DIGuy20017.fed	
VRL-DIGuy20017DDM.fed	
1516-2000	
DI-Guy-13_0.xml	
DI-Guy.xml	
VR-Link.xml	MAK-RPR1-1-1.xml
VR-Link20014.xml	
VR-Link20017-1.xml	MAK-RPR20017-1-1.xml
VR-Link20017-6.xml	MAK-RPR20017-6-1.xml
VR-Link20020.xml	MAK-RPR2-1-1.xml
VR-LinkBOML16.xml	
VR-LinkDDM.xml	
VR-LinkTM.xml	MAK-RPR1-TimeManagement-1-1.xml
VRL-DIGuy20017.xml	
VRL-DIGuy20017DDM.xml	
HLA Evolved	
DIGuyModule_1300.xml	MAK-DIGuy-1_evolved.xml
DIGuyModule_1302.xml	
RPR_FOM_v2.0_draft20_1516-2010.xml	RPR_FOM_v2.0_1516-2010.xml
VR-Link20014_base_evolved.xml	

Table 1-1: Old FED file to new FED file mappings

Old FOM	New FOM
VR-Link20014_evolved.xml	
VR-Link20017-1_base_evolved.xml	MAK-RPR20017-Base-1-1_evolved.xml
VR-Link20017-1_base_evolved_with-UpdateRate.xml	
VR-Link20017-1_evolved.xml	MAK-RPR20017-1-1_evolved.xml
VR-Link20017-1_evolved_withUpdateRate.xml	
VR-Link20017-6_base_evolved.xml	MAK-RPR20017-Base-6-1_evolved.xml
VR-Link20017-6_evolved.xml	MAK-RPR20017-6-1_evolved.xml
VR-LinkDDM_base_evolved.xml	
VR-LinkDDM_evolved.xml	
VR-Link_LgrControl_evolved.xml	MAK-LgrControl-1_evolved.xml
VR-Link_ViewControl_evolved.xml	
VR-Link_VrlExt_evolved.xml	MAK-VRFExt-1_evolved.xml
VR-Link_base_evolved.xml	MAK-RPR1-Base-1-1_evolved.xml
VR-Link_evolved.xml	MAK-RPR1-1-1_evolved.xml
VRL-DIGuy20017DDM_evolved.xml	
VRL-DIGuy20017_evolved.xml	
updateRate.xml	MAK-updateRate-1_evolved.xml
VR-LinkBOML16_module.xml	MAK-BOML16-1_evolved.xml
	MAK-VRFAggregate-1_evolved.xml

New Features and Updates

VR-Forces 4.4.1 has the following new features and updates.

- ♦ Improved checkpointing. VR-Forces quickly saves snapshots of a scenario at specified intervals. These snapshots can be loaded in seconds and can also be saved as checkpoints.
- ♦ The Flee task has changed. Entities flee more quickly than in previous releases. You can no longer specify that an entity stop when hidden.
- ♦ Improved crowd behaviors. New crowd units with automatically assigned behaviors. New crowd tasks:
 - Crowd Along Line
 - Crowd Around Location
 - Crowd Around Object
 - Crowd in Front of Entity
 - Protest
 - Protest Along Line
 - Wander in Area.
- ♦ Moved up to a new version of makSilverlining that fixes a stall when in full screen, with VSync on, when the environment map is regenerated.
- ♦ Move up to top of tree osgEarth to fix a problem where feature culling was sometimes incorrect with feature tiles that were above sea level.
- ♦ Moved up to Triton 3.51c which removed the user-function shaders from the engineering mirror so they do not override our own versions of the files. This was causing a bug in the reflection of dynamic lights on Triton ocean.
- ♦ Change to allow posture/weapon state processing to work again after an explicit animation has been used. Use an animation of "" to re-enable posture / weapon state processing.
- ♦ Changed the height from which ocean intersection rays originate in geocentric terrains. This improves the accuracy of the intersections (especially away from the equator) since the ray is only approximately normal to the geode.
- ♦ Terrain paging on pages that have effects textures and which still have the original unencrypted effects texture files in place will now load much faster.
- ♦ Added thread-safety improvements to effect texture loading for paged terrains
- ♦ The rate at which the driver ticks will determine how much time is spent 'sleeping' when no message is available; it is recommended that this be kept reasonably small; for a 30Hz host, we would recommend a 90Hz (or higher) tick rate for the driver.
- ♦ Frustum-based culling is no longer supported (except from the API, intended only for use on single-channel systems). Users can choose between front facing culling or no culling on the Entity Display Settings page.

- ♦ Added a 'smoother' to transition between LOD/culled and buoyant states so the entity doesn't jump to the new location. This transition has been added to both the LOD out and LOD back in stages.
- ♦ Changed buoyant entities to reset their buoyancy model when the ocean height changes so they instantly jump to the correct ocean level instead of needing their buoyancy model to bring them back to the surface.
- ♦ Added an additional Sea Level clamp LOD distance that is currently 10x the LOD distance. The various cull distances are now as follows:
 - Minimum Cull Distance: Within this range, buoyancy is always calculated
 - Buoyancy LOD Distance: Between Minimum cull distance and Buoyancy LOD Distance, buoyancy is calculated unless front face culling is enabled and the entity is behind all observers.
 - Sea Level clamp LOD Distance (currently always 10x Buoyancy LOD Distance: Between Buoyancy LOD Distance and Sea Level clamp LOD Distance, entities are clamped to sea level (plus waterline offset, if any). Beyond Sea Level clamp LOD Distance the buoyancy model does not affect entities at all.

Documentation Updates

VR-Forces Users Guide, VR-Forces First Experience, and online help have been updated for this release.

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The video tutorials for terrain composition and model creation distributed with VR-Forces were created using VR-Vantage. Although there are obvious differences in the overall GUI, the menu options and procedures for these activities are largely the same in VR-Forces as in VR-Vantage. Some VR-Forces videos were created with previous versions. Again, although there are some changes in the GUI, these procedures have not changed in any material way.

Fixed Bugs

The following problems identified in previous releases have been fixed:

- ♦ The Simulation Object Editor did not respect the data directory argument when started from the command line. 57948
- ♦ Ships did not sink. 57876
- ♦ Moved up to a new version of makSilverlining that fixes a stall when in full screen, with VSync on, when the environment map is regenerated.
- ♦ If a rotary wing entity was near the last point of a route when it started a Patrol Route task, it stopped at the end point before continuing the task. 57779
- ♦ Rotary wing entities did not reach their ordered speed. 57768

- ♦ Extended data could not be set from a Lua script. 57981
- ♦ Spawn and sink points could cause a crash if the Tactical Graphics Palette was not present. 57761
- ♦ Fixed crash that could occur when deleting entities using the rail movement system. 57758
- ♦ There was a random crash when removing an object that was doing rail movement. 57750
- ♦ Fixed a performance issue when using spot reports. 57748
- ♦ The target selection controller did not initialize correctly on startup. 57744
- ♦ Fixed a problem when choosing visual modes in the Simulation Object Editor. 57733
- ♦ Entities were created in unwanted locations when using a touchscreen to place the entities. 57725
- ♦ Fixed a potential crash when using a custom GUI layout file. 57686
- ♦ vrflauncher now correctly uses a connection specified on the command line if the launcher GUI is not used. 57563
- ♦ Overlay layers are no longer cleared when importing a scenario. 57505
- ♦ Fixed an issue where play/pause could become disabled when you imported a pre-VR-Forces 4.4 scenario and also specified a deconfliction name for the import. 57504
- ♦ Fixed a simulation engine crash on exit when using VC12 and HLA. 57502
- ♦ Fixed effect texture loading to be thread safe. This fixes a crash bug when using effects textures with paging databases such as MetaFlight/Terrapage.
- ♦ Fixed a problem that when a buoyant entity transitioned between LOD'd/Culled state back to buoyant state there was a stall that was linear with the time the entity has been LOD'd out. The fix is to reset the buoyancy motion model if the entity has been LOD'd/culled out longer than a set time (currently set to 1 second.)
- ♦ Fixed disappearing buoys when buoyancy was disabled and then re-enabled.
- ♦ The observer animator set the final orientation incorrectly in tether mode. 57704
- ♦ Fixed bug that caused articulated parts to not update if no linear/angular rate was provided.
- ♦ The path used for GLStudio HUDs is supposed to be specified in *./appData/settings/vrflGui/default_CockpitSettings.mhsx*. However, for 64 bit builds, this was being hard-coded to *./data/Huds64*. Usage of the specified path has been restored, and the default value changed to *./data/Huds64*.
- ♦ A crash bug on exit when using TerraPage terrains has been fixed.
- ♦ In the case where a new GLStudio HUD was requested and there was an existing one, the new HUD would be created twice.