

MACHINE SPECIFICATION: AVEVA LFM

Due to the continual pace of change in the development of IT hardware, it is impractical to specify specific machine models & specifications for optimal performance when using AVEVA LFM solutions. AVEVA tests & highlights known configurations that will offer good performance, in addition to minimum specifications for occasional use. This list is categorised to cover several typical uses of the AVEVA LFM portfolio, ranging from CAD work; LFM Server dataset generation; through to LFM NetView use.

Note: Please remember this is a guideline only and the procurement of higher specified machines can offer improved performance.

1. Engineering Users

1.1. Recommended CAD Machine Specification

Data use in AVEVA LFM: AVEVA LFM projects are usually centrally stored, managed, and accessed via networks on demand. This guarantees that the data represents current site conditions and is certified for use on the design project. Laser data can be modified to delete obsolete equipment from the scene, and also remove larger areas that may have changed following completion of the laser scanning site works. This 'demolition' process is controlled by authorised administration personnel, who may also append additional revised laser scanned images to the project that reflect the current 'as-operated' plant conditions. The integrated clash evaluation tools will respect these changes, and structured clash reports can be generated. Designers can choose to view the changes on demand – to highlight original conditions or the site in operation today. This data demolition is not permanent however and can simply be reversed if original conditions need to be restored.

You can find more information about this powerful feature set at:

https://www.aveva.com/en/Solutions/Laser_Solutions/

Please note that AVEVA LFM users do not need additional licences to access networked data.

COMPONENT	RECOMMENDATION
Processor	Intel Core i7 Processor. 8MB cache 4/8 Cores
Operating System	Windows 10 Pro x64
Memory	DDR3 1600 MHz 8GB RAM 1600 MHz
Graphics	NVidia Quadro K2200 with 4GB of GPU memory
Data Storage*	500GB SSD (Operating System & local project storage – if required)
Network	1GB Ethernet Card

*Local Data Storage (Alternatives): SATA Drive Bay – To allow all LFM Server project databases to be used locally for optimal access speed. Alternatively, use USB 3.0 external hard disks to view project data.

1.2. Minimum Recommended CAD Machine Specification

COMPONENT	RECOMMENDATION
Processor	Intel Core 2 Duo
Operating System	Windows 7 Pro x64
Memory	(4x1024) 667Mhz DDR2 Dual Channel ECC
Graphics	NVidia Quadro FX 2000
Data Storage*	500GB SATA (Operating System & local project storage – if required)
Network	1GB Ethernet Card

*Local Data Storage (Alternatives): SATA Drive Bay – To allow all LFM Server project databases to be used locally for optimal access speed. Alternatively, use USB 3.0 external hard disks to view project data.

Note: Any machine that will be consuming HyperBubble data (LFM Server 4.4 series onwards) will require a graphics card that supports OpenGL version 4.3 or higher and has at least 2GB memory. You may need to update your graphics driver to meet the minimum OpenGL requirements. When updating graphics drivers, please do so via the graphics card manufacturer's website.

Please review the HyperBubble creation and usage notes below for further information (Appendix 1).

1.3. LFM NetView Client Machine Specification

LFM NetView is designed to run on desktops, laptops, tablets, and smartphones. There are no specific mandated specifications to view LFM NetView projects

Supported Browsers:

- ▲ Google Chrome
- ▲ Internet Explorer 11
- ▲ Microsoft Edge

Note: LFM NetView will operate on other browsers but has been optimised and tested for use within the above.

2. Service Providers

2.1. Scan Conversion/Data Registration Machine Specification

This machine specification recommendation is for service provision companies that wish to utilise field laptops for data conversion and registration, and who have access to a separate dedicated 'generation' machine for dataset creation following registration and QA. The project dataset creation machine specification listed below can cover both workflows if separate machines cannot be justified.

COMPONENT	RECOMMENDATION
Processor	Intel Core i7 Processor. 8MB cache 4/8 Cores
Operating System	Windows 10 Pro x64
Memory	DDR3 1600 MHz 32GB RAM
Graphics	NVidia Quadro K2200 with 4GB of GPU memory
Data Storage	7200 rpm Serial ATA II (SSD if available). Network or USB 3.0 external hard disks for transfer/backup
Network	1GB Ethernet Card

Note: Processing several scans in parallel is memory intensive. If less memory is available, please reduce the maximum conversion number as appropriate to the notes below.

- ▲ Go to *Options > User > Gateway > Maximum Simultaneous Conversions* to change this option.
- ▲ The default setting is (number of machine processor cores – 1). I.e. 4 core m/c = 3 simultaneous conversions.
- ▲ There should be a minimum of 2GB RAM per core for this to work optimally.

Consequently, an 8 Core machine with 8GB of RAM will need to be adjusted from 7 (default) scans to 3 or 4. LFM Server will do this automatically following the successful conversion of the initial batch of 7 scans, but this will severely impact machine performance initially.

2.2. AVEVA LFM Project Dataset Creation - Machine Specification Inc. LFM NetView, LFM NetView Object Preparation & HyperBubble Resources

Dataset compilation or 'generation' utilises a series of machine intensive operations. These involve moving and processing large amounts of data over several hours or even days. It is recommended that service provision companies use dedicated generation machines to run this process in isolation to other work. Please note that it is susceptible to slow processing if undertaken on unsuitable machine configurations, and where disk drives are the main limiting factor.

Please remember this is a machine guide line only. You may be able to source a better specification machine. However, it is impractical for AVEVA to test every possible specification.

COMPONENT	RECOMMENDATION
Processor	Intel Core i7 Processor. 8MB cache 4/8 Cores
Operating System	Windows 10 Pro x64
Memory	DDR3 1600 MHz 32GB RAM
Graphics*	NVidia Quadro K2200 with 4GB of GPU memory
Data Storage**	<ul style="list-style-type: none"> • 1 x 250GB – SSD - Machine O/S • 1 x 1TB – SATA (7200rpm) - Source laser scan (.zfc) files • 1 x 1TB – SSD - Temporary file storage • 1 x 1TB – SATA (7200rpm) - Final dataset storage
Network	1GB Ethernet Card

***Graphics:** LFM Server Generator does not utilise the GPU and is not sensitive to graphics card selection. Therefore, machine used purely for generation does not require the K2200. However, it is recommended standard practise to review the generated LFM Server data in Server Mode before delivering to the customer. A machine that is used to do this will require the K2200 or similar.

**** Data Storage:** Disk capacities should meet the needs of the project. Please allow approximately 1GB per scan being compiled into a LFM Server project for the temporary and final storage drives as a guide. These recommendations relate to the optimal machine configuration for dataset generation. It is possible to use fewer (or all mechanical) disks, but this will potentially increase processing times significantly. We would not encourage customers to use external (USB) drives for this process due to speed, data quality, and reliability issues. Storage should be on physically separate disks and not one disk with multiple partitions.

Note: Any machine that will be producing HyperBubble (LFM Server 4.4 series onwards) or LFM NetView data will require a graphics card that supports OpenGL version 4.3 or higher and has at least 2GB memory. You may need to update your graphics driver to meet the minimum OpenGL requirements. When updating graphics drivers, please do so via the graphics card manufacturer's website.

Please review the HyperBubble creation and usage notes below for further information (Appendix 1).

APPENDIX 1 - HyperBubble Creation and Use Specification

The HyperBubble requires additional resources to be created by either the service provider or the user. This step is applied post generation from LFM Server:Server Mode. Please see the associated product help guides for further information regarding workflow.

HyperBubble publishing and rendering requires a reasonably powerful graphics card with the very latest drivers. It has been developed using NVidia graphics cards, and we recommend using these where possible for optimum performance and reliability. We have also tested with a selection of alternate cards which are detailed below.

Do not rely on Windows graphics driver properties to update to the latest version, use the NVidia tools instead. Visit <http://www.nvidia.com/download/scan.aspx?lang=en-us> to get the latest drivers.

LFM Server tests your setup for the correct graphics support and HyperBubble publishing and rendering will be disabled if your system does not meet the minimum requirements.

The supported OpenGL version information is saved in the LFM Server log file on startup (example below):

```
24: 2018-05-03 14:22:58:          Open GL Major version: 4
25: 2018-05-03 14:22:58:          Open GL Minor version: 5
```

The above example reports v4.5. The minimum needed is v4.3.

Supported Cards: NVidia GeForce or Quadro, or AMD FirePro W Series, with at least 2GB memory and capable of supporting OpenGL version 4.3 or later. AMD FirePro S Series should also function but hasn't been verified to date.

Please note that updated graphics drivers may be needed to meet the OpenGL requirement.