

Working Model[®] 3D

Version 2.0

Getting Started with Working Model 3D

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Getting Started with Working Model 3D

Congratulations on your purchase of Working Model 3D!

Working Model 3D is an industrial-strength motion simulation tool that changes the way engineers design and develop mechanical systems.

Please Register!

Please be sure to fax the enclosed registration card. Once registered, you will be notified about periodic software updates.

The following information is contained in this document:

- **What's in This Package**
- **Recommended System Configuration**
- **Installing and Launching Working Model 3D**
- **Concurrent Network Licenses for Windows**
- **Using the CAD Integration Tools**
- **Technical Support and Other Services**
- **Notes for Working Model 3D**
- **Notes for Mechanical Desktop Users**
- **Notes for Solid Edge Users**
- **Notes for SolidWorks Users**

1. What's in This Package

This package contains the following items:

- Working Model 3D CD-ROM for installation
- Hardware Key (to be attached to the parallel port of your computer)
- User's Manual
- Tutorial Guide
- Product Registration Card
- Software License Agreement
- Getting Started with Working Model 3D (this document)

2. Recommended System Configuration

The following are recommended to run Working Model 3D 2.0:

- Pentium® based PC
- Windows 95 or Windows NT 4.0
- 32 MB of physical RAM
- Video card and monitor capable of displaying 256 colors or more
- 32 MB of hard disk space
- CD-ROM drive (installation only)

Working Model for Mechanical Desktop requires Mechanical Desktop 1.2 (installed with AutoCAD R13c4a).

Working Model for Solid Edge requires Solid Edge 3.0

Working Model for SolidWorks requires SolidWorks 97

3. Installing and Launching Working Model 3D

If you are planning to use Working Model 3D over a network, please see “**4. Concurrent Network Licenses for Windows**” as well.

If you are installing on Windows NT, you must have administrator-level privileges.

3.1 Installing Working Model 3D

To install Working Model 3D:

- 1. Quit all applications that are running on your machine.**

Please make sure that no application programs could possibly interfere with the Working Model 3D installation process.

- 2. Insert the Working Model CD-ROM into your CD-ROM drive.**

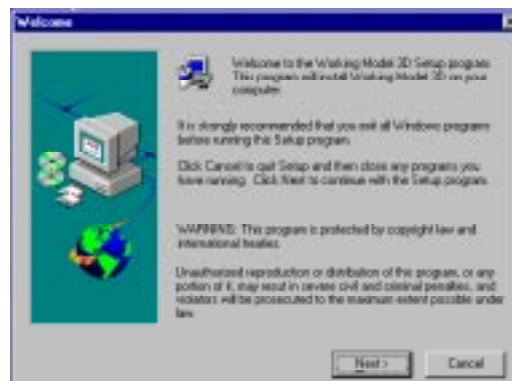
A welcome screen appears. If it does not appear, open the file Demo32.exe located on the CD.

3. Click Install Working Model 3D CAD-Integration Demo/Full Version.

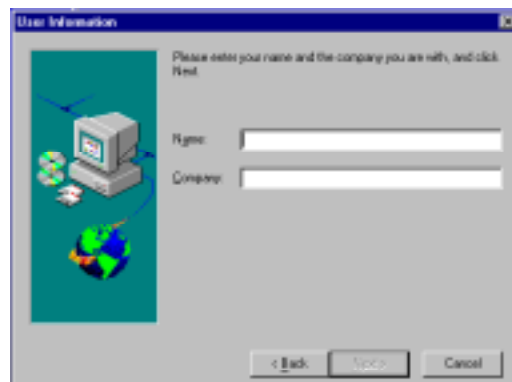
The setup program presents a window with important information on Working Model 3D.

4. Click Install Working Model 3D.

The setup program prepares the InstallShield Wizard, which will guide you through the rest of the setup process, then presents the Welcome screen:

**5. Click Next.**

The setup program presents a dialog to prompt you to customize your copy of Working Model 3D.

**6. Please enter your name and the name of your company, then click the Next button to proceed.**

The setup program scans your hard disk to detect if you have Mechanical Desktop 1.2, Solid Edge 3.0, or SolidWorks '97 installed. If any of these programs is found, it suggests installing the appropriate CAD Integration tools by checking the boxes in the following dialog:



- **Working Model for Mechanical Desktop**
 - **Working Model for SolidWorks**
 - **Working Model for Solid Edge**
7. **Select the optional CAD integration tools that you want to install (if any), then click the Next button to proceed.**

If you decide to install additional components later, you can always run the setup program again.

If you have selected any of the CAD integration tools, the setup program may prompt you to find the directory where the CAD programs are installed with the following dialog:



8. **Locate the directory containing the CAD program on your hard disk, then click the Next button to proceed.**

Working Model 3D Setup asks you to select the Program Folder in which it will install the Working Model 3D program icon (see below):

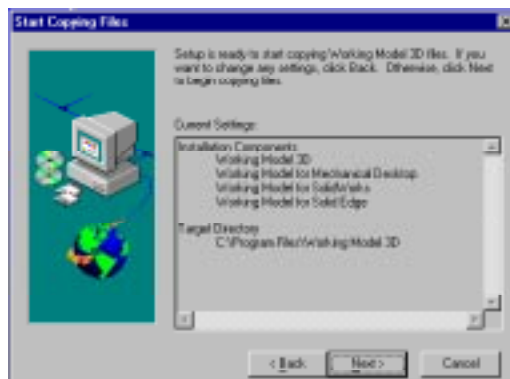


9. **Select the Program Folder in which you would like to add the Working Model 3D program icons.**

The default program group suggested is Working Model 3D.

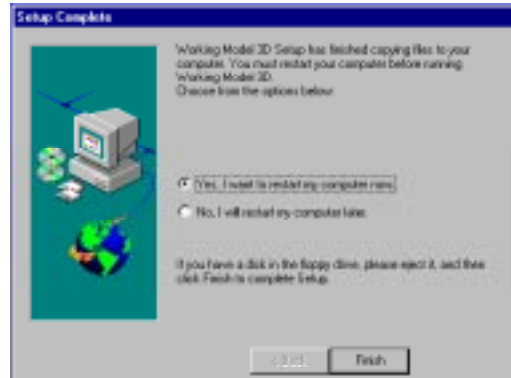
10. **Click the Next button to proceed.**

Working Model 3D Setup prompts you to verify the options you have selected (see below for a typical installation).



11. **Click Next to proceed or click Back to make any necessary changes.**

Working Model 3D Setup starts to copy the files to your system. The following dialog appears when installation is complete:



12. Click Finish to exit the Installer and restart your Windows system.

You must restart Windows in order for the hardware key to be effective.

After installation is complete, Working Model 3D can be found in the Start Programs menu.

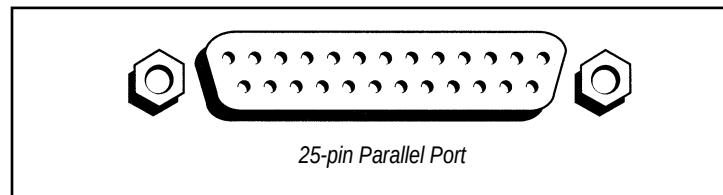
3.2 Attaching the Hardware Key

For Demo Version Users: You do not need a hardware key to run the demonstration version of Working Model 3D. Please skip to “3.3 Launching Working Model 3D”.

For Users with Network (Floating) Licenses: If you are running Working Model 3D with concurrent network licenses, please refer to “4. Concurrent Network Licenses for Windows”.

Before you launch Working Model 3D, please make sure to attach the hardware key to the parallel port of your computer. You can attach the hardware key between your parallel port and the printer cable.

The figure below shows an example of the 25-pin parallel port.



The hardware key needs to be attached at all times while running Working Model 3D. If the hardware key is removed, Working Model 3D prompts you to reattach the key or quit the application. (NOTE: The hardware key is NOT required during installation.)

If you do not have a hardware key, you can run Working Model 3D in demo mode. Some of the features will be disabled; for example, you will not be able to save, print, or export your models.

You must attach the hardware key to the machine on which Working Model 3D runs. For example, if you wish to run Working Model 3D installed on a network file server, you need to attach the hardware key to the client machine and not to the server. See “**4.2 Installing the Hardware Key Driver**” for more information.

If you have multiple ports, attach the hardware key to LPT1. If Working Model 3D does not find the key, try another port. In the unlikely event that you need to configure the hardware key driver, see the document README.TXT located in the Wm3d_cad\Install\Sysadmin\Sentinel directory of the Working Model 3D CD-ROM.

3.3 Launching Working Model 3D

After Working Model 3D Setup completes the installation, you can launch Working Model 3D from the Start Menu.

You are strongly encouraged to go over the exercises in the *Tutorial Guide*. The exercises provide you with useful tips and introduces key features that will make your experience with Working Model 3D more effortless and productive.

3.4 What Files are Installed?

Working Model 3D Setup creates the application directory (the default name is WM3D) on your hard disk, and creates the following subdirectories and files.

- PROGRAM: contains the Working Model 3D application (executable files and dynamic link libraries, or DLLs) and initialization files (located in the INIT subdirectory).
- SAMPLES / TUTORIAL AND DOCUMENTATION subdirectory: contains electronic copies of our documentation plus the ACIS files used in one of the exercises of the *Tutorial Guide*.
- SAMPLES / MODELS subdirectory: contains many Working Model 3D (WM3) files you can browse to learn what Working Model 3D can do.

- SAMPLES / MOVIES subdirectory: contains Video for Windows (AVI) files created by Working Model 3D, which present more examples in the movie format for rapid playback.
- SAMPLES / AUTOMATION SAMPLES subdirectory: contains files that demonstrate Working Model 3D's ability to send and receive data with other applications.
- SAT2WIM: contains the ACIS Converter application.

Depending on your operating system, Working Model 3D Setup may have installed system extensions.

3.5 Uninstalling Working Model 3D

Should you decide to uninstall Working Model 3D in the future, remove the program using the "Add/Remove Programs" control panel. Do *not* simply delete the Working Model 3D directory. The uninstall program removes the Working Model 3D files and clears the registry.

You can always re-install Working Model 3D using the Working Model 3D Setup CD-ROM.

4. Concurrent Network Licenses for Windows

NOTE: This section contains important information intended for system administrators. If you plan to use Working Model 3D on your local area network (LAN), please make sure that the network system administrator supervises the process.

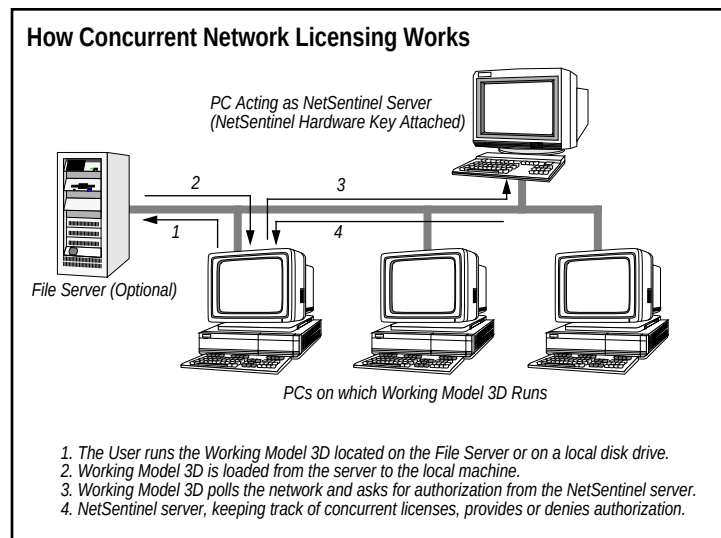
4.1 How does the Concurrent Network Licenses Work?

Working Model 3D employs the robust, versatile network licensing mechanism called NetSentinel™, developed by Rainbow Technologies, Incorporated. The concurrent network licenses allow each copy of Working Model 3D to poll your local area network to look for authorization to run.

NetSentinel Server—Monitoring Agent for Your Network

You need to assign one PC (in your network) to act as the **NetSentinel server**. This PC always runs a small software program to authorize any new request and to keep track of how many copies of Working Model 3D are running concurrently. You can designate any PC on the network as the NetSentinel server by installing and running the necessary software.

Meanwhile, Working Model 3D executables can be installed anywhere on the network. The files need not be located on the NetSentinel server or a file server. The diagram below summarizes the operating principle of the network licensing with NetSentinel server.



Supported Network Protocols

Network protocols supported by Working Model 3D include NetBEUI, IPX/SPX, and TCP/IP. See “**4.6 Enabling and Disabling Network Protocols**” for more information.

What If I Already Have Stand-alone License(s)?

Stand-alone licenses and concurrent network licenses can co-exist without interfering with each other. For example, suppose you had a single stand-alone license in your office, and at a later time you purchased a 10-user network licence. Then you have a total of 11 licenses, where one copy can always run on the machine that has the Sentinel Pro hardware key attached, and 10 other copies can run anywhere on the network.

NOTE: The hardware keys used in stand-alone licenses and network licenses are of different types. When you purchase the network licenses, you will receive the hardware key specifically designed to implement the network licenses.

Can I Add More Concurrent Network Licenses?

You can install multiple NetSentinel servers, or increase the purchased licenses monitored by a single NetSentinel server. Please contact your sales agent or Working Model, Inc. for more information.

You cannot “cascade” or connect multiple NetSentinel hardware keys in sequence on a single parallel port.

Once you upgrade the NetSentinel server(s) to increase the licenses, each copy of Working Model 3D automatically polls your network until all the NetSentinel servers and licenses are exhausted.

4.2 Installing the Hardware Key Driver

The PC designated as a NetSentinel server must have the NetSentinel hardware key attached in order to run the server software. In addition, you need to install the driver for the hardware key on the PC.

Working Model 3D CD-ROM has the installers located in the **Wm3d_cad\Install\Sysadmin\Sentinel** folder.

Installing the Hardware Key Driver on Windows NT

Working Model 3D CD-ROM provides separate hardware key driver installer for Windows NT systems based on 80x86, Alpha, MIPS, and PowerPC architectures.¹

- 1. Make sure you have the administrator-level privilege to your system.**
- 2. Locate the folder **Wm3d_cad\Install\Sysadmin\Sentinel\Win_nt** on the CD-ROM.**

The folder contains separate applications for Windows NT architectures.

¹. Working Model 3D only runs on 80x86 architecture, but the Net-Sentinel server software can run on any Windows NT system.

3. **Launch one of Setupx86.exe (for 80x86), Setupxp (for Alpha), Setupmps (for MIPS), or Setupppc.exe (for PowerPC), depending on your CPU architecture.**

A window with the title bar "Sentinel Driver Setup Program" is displayed.

4. **Choose Install Sentinel Driver in the Function menu.**

A dialog box with the default path for the NT driver is displayed.

5. **Change the drive letter if necessary and click OK.**

Upon successful driver installation, a dialog with the message "Sentinel Driver Files Copied Successfully" is displayed, followed by a dialog with the message "Driver Installed! Restart your system."

6. **Click OK to terminate the installation program.**

7. **Restart your computer.**

Installing the Hardware Key Driver on Windows 95

To install the hardware key driver on Windows 95 computer:

1. **Choose Run from the Start Menu and run the file Wm3d_cad\Install\Sysadmin\Sentinel\win_95\SENTW95.EXE on the Working Model 3D CD-ROM.**

The installation software launches and shows a blank window.

2. **Choose Install Sentinel Driver in the Functions menu.**
3. **Click OK when the "Driver installed! Restart your system" message appears.**
4. **Restart Windows 95.**

Installing the Hardware Key Driver on Novell

A Novell server communicates with the hardware key directly through the parallel port and does not require any driver software.

Installing the Hardware Key Driver on Windows 3.11, DOS, OS/2

Please refer to the document **Wm3d_cad\Install\Sysadmin\Sentinel\Readme.txt** for instructions.

4.3 Attaching the Hardware Key to NetSentinel Server

If the PC designated as the NetSentinel server has multiple parallel ports, attach the hardware key to LPT1. Proceed to “**4.4 Installing and Running the NetSentinel Server**”, and if the server software does not find the key, try another port. In the unlikely event that you need to configure the hardware key driver, see the document **README.TXT** located in the **Wm3d_cad\Install\Sysadmin\Sentinel** folder of the Working Model 3D CD-ROM.

4.4 Installing and Running the NetSentinel Server

NetSentinel supports most of the many PC network platforms and protocols in use today. This section provides installation instructions for some of the most popular network platforms and protocols. For complete instructions on all supported platforms and protocols, see the document **Wm3d_cad\Install\Sysadmin\NetSentinelNs_guide.doc** on the CD-ROM.

Windows NT, Windows 95

Copy **Wm3d_cad\Install\Sysadmin\NetSentinelServer\Win32\Nsrvgx.exe** located on the CD-ROM and launch it. Make sure to install the hardware key driver and attach the hardware key.

Windows 95

Copy **Wm3d_cad\Install\Sysadmin\NetSentinelServer\Win32\Nsrvgx.exe** and launch it. Make sure to install the hardware key driver and attach the hardware key.

Currently, NetSentinel only supports the NetBIOS protocol on Windows 95. The NetBEUI protocol must be installed on the NetSentinel server, using the Network Control Panel item on Windows 95.

Novell NetWare

Copy and load the Novell Loadable Module **NSRVNI.NLM** located in **Wm3d_cad\Install\Sysadmin\NetSentinelServer\Nwl**. You do not need to restart the operating system.

If you are running NetWare on other operating systems, such as Windows NT/95, OS/2, and Windows for Workgroups, see **Wm3d_cad\Install\Sysadmin\NetSentinelNs_guide.doc** for instructions.

OS/2, DOS, Windows 3.11, and Other Network Configurations

See **Wm3d_cad\Install\Sysadmin\NetSentilNs_guide.doc** for instructions.

4.5 Diagnostic Tools

The Working Model 3D CD-ROM contains several diagnostic tools to verify that the NetSentinel servers are functional. The tools are located in **Wm3d_cad\Install\Sysadmin\NetSentilTools**. See the document **Wm3d_cad\Install\Sysadmin\NetSentilNS_guide.doc** for more information.

4.6 Enabling and Disabling Network Protocols

When Working Model 3D launches on a client PC, the program by default only tries to find a hardware key attached to the client PC.

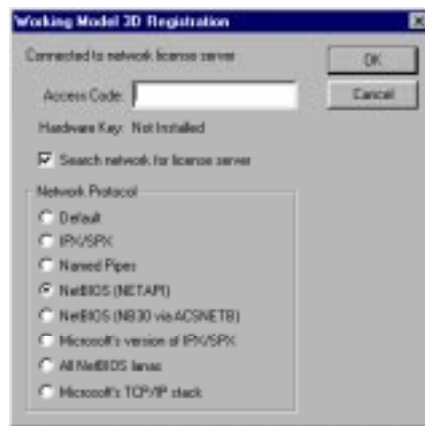
To enable the network search:

1. **Launch Working Model 3D.**
2. **Choose “About Working Model 3D...” from the Help menu.**

The About box appears.

3. **Click the Registration button.**

The Registration dialog appears, as shown below.



4. **Click the checkbox titled “Search network for license server.”**

The radio buttons in Network Protocol become active.

5. Check the radio button that matches the protocol used in your LAN.

6. Click OK.

Working Model 3D immediately polls the network to find a NetSentinel server.

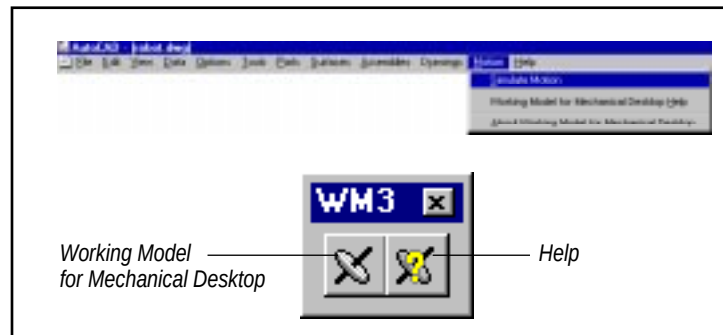
- If the search fails, you will see a warning that a server was not found. Make sure that a NetSentinel server is running in your LAN under the specified protocol, and try again.
- If the search succeeds, the Registration dialog disappears, and Working Model 3D is now enabled for concurrent network licensing.

5. Using the CAD Integration Tools

Working Model 3D includes CAD integration tools which map designs created in Mechanical Desktop, Solid Edge, and SolidWorks into functional models.

5.1 Using Working Model for Mechanical Desktop

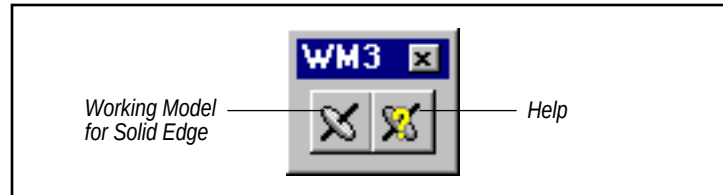
Once Working Model for Mechanical Desktop has been installed, two new items appear in the Mechanical Desktop window: a menu entitled **Motion** and a toolbar labeled WM3D (see below).



Choose **Simulate Motion** from the **Motion** menu or click the left (gyroscope) button on the toolbar to activate Working Model for Mechanical Desktop.

5.2 Using Working Model for Solid Edge

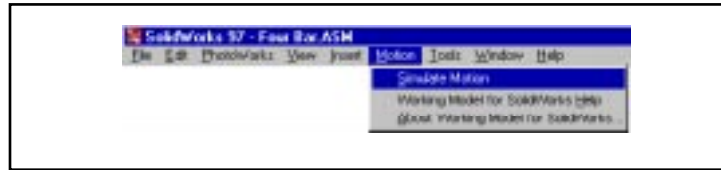
Once Working Model for Solid Edge has been installed and you relaunch the Solid Edge: Assembly, a new toolbar (see below) appears in the window when you are in assembly mode.



Clicking the left (gyroscope) button activates Working Model for Solid Edge.

5.3 Using Working Model for SolidWorks

Once Working Model for SolidWorks has been installed, a new **Motion** menu item appears in the SolidWorks menu bar when you are in assembly mode (see below):



Choose **Simulate Motion** from the menu to activate Working Model for SolidWorks.

6. Technical Support and Other Services

6.1 Technical Support

Technical support for the use of Working Model 3D is provided by Working Model 3D agents, authorized dealers, and Working Model, Inc.

6.2 Contacting Technical Support

Before contacting your technical support provider, please refer first to the Index, Table of Contents, and Troubleshooting sections in the *Working Model 3D User's Manual*. If you cannot find the answer to your question, please make sure to have the following information ready when contacting us or your sales agent:

- **serial number of the product**
- **product name (Working Model 3D version 2.0)**
- **operating system (e.g., Windows 95)**
- **hardware configuration (as much as possible)**
- **specific descriptions of the problem and a way to reproduce it**

Contact your local reseller directly to obtain technical support. To contact Working Model, Inc. for technical support:

- If you have **Internet** access, you can reach Working Model, Inc. via e-mail at **support@workingmodel.com**. If you have a file in question, you can e-mail the file to support@workingmodel.com.
- You can reach Working Model, Inc.'s support team via fax. Please send faxes to (415) 574-7541, attention "Working Model 3D Technical Support".
- To reach Working Model, Inc.'s **telephone** support team, please call (415) 574-7777. Support is available Monday through Friday, 8 am to 5 pm Pacific Time.

6.3 Consulting Services

Working Model, Inc. and its authorized dealers and agents also provide consulting services on the construction, modeling, and analysis of mechanical systems using Working Model 3D. For more information, call Working Model, Inc. at (415) 574-7777.

6.4 Working Model, Inc. World Wide Web

You can reach our World Wide Web server via **http://www.workingmodel.com**. The website features free demo files, technical notes, and periodic updates to our products.

7. Notes for Working Model 3D

This section describes solutions to some potential problems.

Simulation Generates Jaggy Plots

Decrease the Configuration Error and/or Animation Step to increase accuracy.

Assembly Process Seems to Progress, then Bodies Start to Fly Apart

If the assembly process of a closed-loop mechanism starts to converge at the beginning but breaks apart near the completion of the progress bar, try one of the following:

- The mass ratio of the bodies participating in the closed-loop assembly may be too large. A mass ratio of 1:100 may cause problems in Working Model 3D. Change the mass of the bodies to decrease the mass ratio, join the closed-loop assembly, then change the mass back.
- Instead of joining all the joints in the closed-loop assembly simultaneously, join one joint at a time.
- Arrange the bodies so that the Coord pairs of the joints are as close together as possible prior to the join. Since Working Model 3D assembles bodies through iterative calculations, joining is easier and faster if the mating Coords are already close to each other.

Rotational Spring Wrap

Working Model 3D takes into account the winding count of a rotational spring so that it can rotate around by more than 180 degrees. However, the winding count is only remembered during a simulation, and it starts at 0 degrees each time you start a run.

There is one case that warrants particular attention: If you open a file which already has a simulation history and then compute frames beyond the existing ones, the winding count will start out at 0 degrees at the point that new frames are computed. For example, suppose you open a file with 30 frames computed and the spring wound up 5 times at frame 30. If you run, when you reach frame 31, the engine starts to compute. It assumes that the spring isn't wound up, so the torque on the spring will be very small and the model may "jump".

To avoid this problem, simply reset the simulation and choose Erase History from the World menu. Now the simulation can start from its unwound state. At frame 31, the rotational spring will have a winding count of 5 and the simulation will proceed smoothly.

Working Model 3D Cannot Find the Hardware Key

If you have multiple parallel ports, try attaching the hardware key on a different port.

If you installed Working Model 3D on Windows NT without the administrator-level privilege, the hardware key driver could not be installed. If that is the case, your system may be lacking the driver software for the hardware key. To re-install the driver on your Windows NT system, see instructions listed in the document README.TXT in the Wm3d_cad\Install\Sysadmin\Sentinel subdirectory of the Working Model 3D CD-ROM.

Working Model 3D Setup Shows Errors That It Cannot Copy Sentinel.VxD on Windows 95 System

The file **Sentinel.VxD** is part of the driver software for the hardware key. Working Model 3D Setup automatically attempts to install the hardware key drivers. However, since these driver files are read-only, this error message appears if these files already exist in your system (either by the previous installation of Working Model 3D or another application that uses the same type of the hardware key). In most cases, you can safely ignore these error messages.

If you wish to remove the hardware key driver and re-install it, delete the following files:

```
\WINDOWS\SYSTEM\Sentinel.vxd  
\WINDOWS\SYSTEM\Rnbosent\Sentw95.exe  
\WINDOWS\SYSTEM\Rnbosent\Sentw95.dll  
\WINDOWS\SYSTEM\Rnbosent\Sentw95.hlp  
\WINDOWS\SYSTEM\Rnbosent\Sentstrt.exe
```

then follow the installation instruction listed in the README.TXT (located in the Wm3d_cad\Install\Sysadmin\Sentinel directory of the Working Model 3D CD-ROM).

Possible OpenGL Color Problems Using Service Pack 2 for Windows NT 4.0

When you use Service Pack 2 for Windows NT 4.0, various coloring problems may arise that are not present in previous versions. The coloring problems involve drawing the wrong colors in a variety of situations. Microsoft has confirmed this to be a bug in their implementation of OpenGL.

To resolve this problem, refer to the instructions in the Wm3d_cad\Updates folder of your CD.

My Video for Windows Export Does Not Work Well for RLE Compression

Some systems may experience problems while exporting Video for Windows files from Working Model 3D with the RLE compression mode. Try using another compression mode (such as Microsoft Video 1).

8. Notes for Mechanical Desktop Users

8.1 CAD Integration is Not Associative

The CAD integration products included in this package allow you to construct functional models in Working Model 3D based on designs created in a CAD program. Changes to such models within Working Model 3D are not reflected in the original CAD designs, however. In addition, modifications from within a CAD program to a CAD design which has already been modeled in Working Model 3D does not result in a change in the existing Working Model 3D document. Instead, you must create a new Working Model 3D document which incorporates the changes in the CAD design.

Every new Working Model 3D document based on a single CAD design is given an incrementally numbered filename. For example, suppose you are working with a CAD design document named “MODEL”. The first time you perform a motion simulation from this design, the Working Model 3D document is named “MODEL000.WK3”. The next time a simulation is performed from this CAD design, a new Working Model 3D document named “MODEL001.WK3” is created, and so on.

8.2 Bodies

A frame of reference for each body is computed automatically in Working Model for Mechanical Desktop as the geometric center. This coincides with the “Center of Gravity” computed automatically by Mechanical Desktop and is shown in the “Mass Properties” dialog box. The frame of reference will be aligned with AutoCAD’s World Coordinate System. Once in Working Model 3D, the user can customize the center of mass position as an offset from the frame of reference. Working Model for Mechanical Desktop also sets the mass for each body as the corresponding Mechanical Desktop component mass.

8.3 File Operations

If the Mechanical Desktop 1.2 assembly document lies in a read-only directory (e.g., a demo file on a CD-ROM), Working Model for Mechanical Desktop prompts the user to move the file(s) to a writable directory. This warning is necessary because the subsequent files (SAT and WM3 files) need to be created and saved in an easy-to-find directory (i.e., the same directory where the Assembly document resides), and not in the TEMP directory.

8.4 Constraints

Default Mapping to Optimized Rigid Joints

Working Model for Mechanical Desktop converts all combinations of assembly relations to rigid joints unless an explicit mapping exists for them. The configuration of the rigid joint may appear somewhat arbitrary in those cases, because it takes the raw coordinates given by Working Model for Mechanical Desktop and does not post-process the position/orientation data in such cases.

You can use this default feature to your advantage. For example, you could join two parts rigidly by simply providing a single planar mate instead of creating multiple, linearly independent assembly relations to eliminate all degrees of freedom.

In Working Model 3D, optimized rigid joints speed up the simulation performance significantly compared to measurable joints because bodies connected by optimized rigid joints are treated as one unit body. See Working Model 3D User's Manual for more information.

Underconstraining Mechanical Desktop Assembly

Mechanical Desktop allows the user to leave parts underconstrained. However, many users may choose to build an assembly by completely constraining the parts first. Therefore, before invoking Working Model for Mechanical Desktop, the Mechanical Desktop user needs to delete proper assembly relations to allow sufficient degrees of freedom in all intended joints. Otherwise, all fully-constrained assembly relations will all be translated to rigid joints.

8.5 Coordinate System

Working Model's global coordinate system is aligned with Mechanical Desktop's World Coordinate System (WCS). If your Mechanical Desktop assembly is defined relative to a User Coordinate System (UCS) upon

simulating motion, the model will still be located in terms of the WCS, or Working Model's global coordinate system within Working Model 3D. However, an auxiliary coordinate system, labeled "AutoCAD UCS" will appear in blue in the Working Model window.

You can redefine Working Model's global coordinate system so it is aligned with the AutoCAD UCS. Select the "AutoCAD UCS" coord and choose "Attach Coordinate System" from the Grid menu. Select the "Attach to:" radio button and then press "Make the attachment permanent". All objects will move so that the AutoCAD UCS is the same as the global coordinate system. See Chapter 3 of the User's Manual for details on coordinate systems.

8.6 Which Mechanical Desktop Component is Anchored in Working Model?

The grounded component, or base part in Mechanical Desktop (the first component instanced into the assembly) is the only component that is anchored in Working Model 3D. If the base part is a subassembly, NO components will be anchored in Working Model.

8.7 Naming Convention for Working Model Bodies

Once the Working Model 3D window appears the name of each assembly component is shown in the object manager list to the left of the main window. The component label begins with the name of the highest level assembly containing the component, and is followed sequentially by each successive sub-assembly level. Each level is separated by a forward slash ("/"). The last entry in the label is the actual Mechanical Desktop component name. If two components have duplicate names and duplicate subassembly path names, Working Model for Mechanical Desktop will not be able to properly resolve connections. Hence, an error message will appear prompting the user to rename the highest level subassembly before attempting to simulate motion.

8.8 Creating Constraints to Entire Subassemblies

If you create a constraint between a component and a subassembly in Mechanical Desktop, a Working Model 3D constraint will be created between this component and the *first component* in the list of subassembly components. You are free to create constraints with other components within the subassembly, yet Working Model for Mechanical Desktop will attach the constraint to the first one. Geometrically, the constraint will still appear in the proper location. To determine the component ordering within a subassembly in Mechanical Desktop, use the Browse command under the

Assemblies->Assembly Instances menu. You may want to “Reorder” the component instances with the browser to bring a desired component into the first position.

8.9 External Components

Assembly components must be designated as component definitions within their external file.

8.10 AutoCAD 3DSOLIDs Must Be Local

Externally defined components must originate from AutoCAD Designer Parts and not 3DSOLIDs. Any 3DSOLID-base components should be localized prior to simulating motion.

8.11 Working Model for Mechanical Desktop Toolbar is Missing

The Working Model for Mechanical Desktop installer modifies two files associated with your AutoCAD/Mechanical Desktop installation. These files are DRIVE:\mcd\acad.ini and DRIVE:\r13\com\support\acad.rx. The file acad.ini contains the path variable ACAD in the first section entitled [General]. This variable must include the path to Working Model for Mechanical Desktop (the location of Amotion.arx). Typically the path to Working Model for Mechanical Desktop is C:\Program Files\Working Model 3D\Mechanical Desktop, unless specified differently during the Working Model 3D installation. Hence, the path variable should appear as follows

[General]

....

ACAD=C:\mcd\win; C:\Program Files\Working Model 3D\Mechanical Desktop;

Additionally, the file acad.rx must contain the single line “Amotion3.arx”.

9. Notes for Solid Edge Users

9.1 CAD Integration is Not Associative

The CAD integration products included in this package allow you to construct functional models in Working Model 3D based on designs created in a CAD program. Changes to such models within Working Model 3D are not reflected in the original CAD designs, however. In addition, modifications from within a CAD program to a CAD design which has already been modeled in Working Model 3D does not result in a change in the existing Working Model 3D document. Instead, you must create a new Working Model 3D document which incorporates the changes in the CAD design.

Every new Working Model 3D document based on a single CAD design is given an incrementally numbered filename. For example, suppose you are working with a CAD design document named “MODEL”. The first time you perform a motion simulation from this design, the Working Model 3D document is named “MODEL000.WM3”. The next time a simulation is performed from this CAD design, a new Working Model 3D document named “MODEL001.WM3” is created, and so on.

9.2 Bodies

Center of mass for each body is computed automatically in Working Model for Solid Edge as the geometric center.

9.3 ACIS Unit System in Solid Edge

Working Model for Solid Edge requires that the default distance unit specified in Solid Edge’s SAT export options be meters. If the distance unit is not set to meters, Working Model for Solid Edge warns you and quits. To remedy this situation:

- Choose Save As from the File menu,
- Set the export option to ACIS (*.SAT) in Save As dialog,
- Click Options button,
- Set the units to meters in SAT Export Options dialog,
- Click OK to close the Options dialog, and
- Click Cancel to close the Save As dialog.

9.4 Limited Subassemblies

Working Model for Solid Edge supports subassemblies in a limited fashion. This occurs because Solid Edge's code does not specify which part in a subassembly owns the feature participating in a given assembly relation. As a result, Working Model for Solid Edge is only capable of detecting assembly relations between top-level subassembly components, but not all the way down to Part-to-Part level (unless the relation is strictly between parts, and not subassemblies). Therefore, Working Model for Solid Edge only translates top-level subassembly relations, and treats all subassembly components as rigidly connected bodies.

9.5 Constraints

Default Mapping to Optimized Rigid Joints

Working Model for Solid Edge converts all combinations of assembly relations to rigid joints unless an explicit mapping exists for them. The configuration of the rigid joint may appear somewhat arbitrary in those cases, because it takes the raw coordinates given by Working Model for Solid Edge and does not post-process the position/orientation data in such cases.

You can use this default feature to your advantage. For example, you could join two parts rigidly by simply providing a single planar mate instead of creating multiple, linearly independent assembly relations to eliminate all degrees of freedom.

In Working Model 3D, optimized rigid joints speed up the simulation performance significantly compared to measurable joints because bodies connected by optimized rigid joints are treated as one unit body. See Working Model 3D User's Manual for more information.

Underconstraining Solid Edge Assembly

Solid Edge 3.0 allows the user to leave parts underconstrained. However, many users may choose to build an assembly by completely constraining the parts first. Therefore, before invoking Working Model for Solid Edge, the Solid Edge user needs to delete proper assembly relations to allow sufficient degrees of freedom in all intended joints. Otherwise, all fully-constrained assembly relations will all be translated to rigid joints.

Issues with Top-Down Design or "In-place" Parts

Solid Edge allows "top-down" design, whereby you can create individual parts "in-place" based on the geometric features of the existing assembly. Every part created in-place ends up being anchored and you do not need to

specify assembly relations. Working Model for Solid Edge does not detect such constructions and takes every such part as anchored. You need to reapply appropriate assembly relations to have physical constraints in Working Model.

Assembly Relation with the Background Reference Planes

Working Model for Solid Edge anchors bodies that have assembly relations with the background reference plane.

Missing Assembly Relation

Under rare circumstances, Solid Edge may fail to expose all Assembly relations to Working Model for Solid Edge.

Specifically, the following sequence of events exhibit this problem: (1) a part is constructed in-place (i.e., in the top-down fashion), (2) the “ground” or anchor relation is deleted, and (3) the Part is re-mated using Insert command.

In that case Working Model for Solid Edge cannot detect the pair of planar and axial relations that constitute the “Insert” mate type. To work around this problem, you need to use Mate and Align commands to assemble the parts in question.

This bug is reportedly fixed in Solid Edge 3.0, but legacy files from Solid Edge 2.0 still exhibit this problem.

9.6 Coordinate System

All geometric constraints coordinates (for planes and axes) are given in “Assembly Coordinates”, which is a global coordinate system fixed to the grounded body. Working Model for Solid Edge relies on this assumption to locate Coords for constraints.

For example, you may design a collapsible chair with cross members in slanted angles. If one of the members is a shaft and happens to be the first part introduced in the Assembly, the Assembly Coordinates may coincide with the principle axes of the shaft. As a result, the assembly ported to Working Model 3D may not appear to “sit straight” on the ground.

You can redefine Working Model’s global coordinate system so it is aligned with a part in the model. Select the part and choose “Attach Coordinate System” from the Grid menu. Select the “Attach to:” radio button and then press “Make the attachment permanent”. All objects will move so that the part’s coordinate system is the same as the global coordinate system. See Chapter 3 of the User’s Manual for details on coordinate systems.

9.7 Toolbar Issues

If you change monitor settings, the Working Model for Solid Edge toolbar may appear garbled. In that case:

- Remove the custom toolbar from the View->Toolbars menu
- Quit Solid Edge
- Launch Working Model for Solid Edge from the Start menu to re-install the toolbar

Working Model for Solid Edge detects the new monitor settings and installs the correct toolbar images.

10. Notes for SolidWorks Users

10.1 CAD Integration is Not Associative

The CAD integration products included in this package allow you to construct functional models in Working Model 3D based on designs created in a CAD program. Changes to such models within Working Model 3D are not reflected in the original CAD designs, however. In addition, modifications from within a CAD program to a CAD design which has already been modeled in Working Model 3D does not result in a change in the existing Working Model 3D document. Instead, you must create a new Working Model 3D document which incorporates the changes in the CAD design.

Every new Working Model 3D document based on a single CAD design is given an incrementally numbered filename. For example, suppose you are working with a CAD design document named "MODEL". The first time you perform a motion simulation from this design, the Working Model 3D document is named "MODEL000.WK3". The next time a simulation is performed from this CAD design, a new Working Model 3D document named "MODEL001.WK3" is created, and so on.

10.2 SolidWorks Reference Geometry is Not Supported

MotionWorks does not recognize reference geometry in SolidWorks files. Therefore, mates designed in SolidWorks using reference axes or reference planes will be ignored when using MotionWorks to simulate motion in Working Model 3D.

10.3 Bodies

The center of mass for each body is computed automatically in Working Model for SolidWorks as the geometric center.

10.4 Constraints

Default Mapping to Optimized Rigid Joints

Working Model for SolidWorks converts all combinations of assembly relations to rigid joints unless an explicit mapping exists for them. The configuration of the rigid joint may appear somewhat arbitrary in those cases, because it takes the raw coordinates given by SolidWorks and does not post-process the position/orientation data in such cases.

You can use this default feature to your advantage. For example, you could join two parts rigidly by simply providing a single planar mate instead of creating multiple, linearly independent assembly relations to eliminate all degrees of freedom.

In Working Model 3D, optimized rigid joints speed up the simulation performance significantly compared to measurable joints because bodies connected by optimized rigid joints are treated as one unit body. See Working Model 3D User's Manual for more information.

Underconstraining SolidWorks Assembly

SolidWorks allows the user to leave parts underconstrained. However, many users may choose to build an assembly by completely constraining the parts first. Therefore, before invoking Working Model for SolidWorks, you may need to delete proper assembly relations to allow sufficient degrees of freedom in all intended joints. Otherwise, all fully-constrained assembly relations will be translated to rigid joints.

10.5 Coordinate System

All geometric constraints coordinates (for planes and axes) are given in "Assembly Coordinates", which is a global coordinate system fixed to the grounded body. Working Model for SolidWorks relies on this assumption to locate Coords for constraints.

For example, the user may design a collapsible chair with cross members in slanted angles. If one of the member is a shaft and happens to be the first part introduced in the Assembly, the Assembly Coordinates may coincide with the principle axes of the shaft. As a result, the assembly ported to Working Model 3D may not appear to "sit straight" on the ground.

You can redefine Working Model's global coordinate system so it is aligned with a part in the model. Select the part and choose "Attach Coordinate System" from the Grid menu. Select the "Attach to:" radio button and then press "Make the attachment permanent". All objects will move so that the part's coordinate system is the same as the global coordinate system. See Chapter 3 of the User's Manual for details on coordinate systems.

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