

Miray Stand-Alone-Tool-Series



HDSHredder

Version 3.2

User's Manual



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1. INTRODUCTION

Thank you very much for choosing HDSHredder. We are always striving for offering you a software product, which meets your requirements as well as our own high ambitions. In case of having suggestions for improvement or not being satisfied with the software in certain aspects, we therefore kindly ask you to communicate the regarding criticism and suggestions to us at feedback@miray.de.

1.1. Chapter overview

1. Introduction: In this chapter, you find general information regarding this manual and the program. Particularly, it contains an overview of the available editions and their respective abilities.

2. Fields of application: Through its features, HDSHredder is suitable for many different areas of application. Here you find descriptions and hints for the most common areas of application of the program.

3. Supported hardware: In this chapter, you find a list of supported controllers, hard disks, and other media as well as information about which aspects to consider when using certain types of controllers or media.

4. Installation: For starting HDSHredder, you need a bootable HDSHredder CD or floppy disk at first. This chapter describes how you create a bootable HDSHredder medium within few minutes by means of the installation package in case you have not already received the program on a bootable medium.

5. Program instructions: This chapter contains the actual manual for operating HDSHredder. It is a step-by-step description of how to operate the program for securely erasing media with HDSHredder.

6. Operating Principles: Here you find useful descriptions and hints for gaining optimal performance when using HDSHredder with different types of media as each media type can have its very own characteristics.

7. Troubleshooting: In case you encounter any problems when using HDSHredder, you find detailed descriptions and support here. By means of these information you will be able to solve or bypass occurring problems in most cases.

8. Miscellaneous: In the last chapter you find miscellaneous information, particularly regarding our support and our license terms.

1.2. Character conventions

In this manual, angle brackets ('<' and '>') and italic type are used to depict a **key on the keyboard**, e.g. <Esc> for the escape key or <Return> for the return key. Some keys are represented by an according symbol, e.g. '↑' for the 'up'-key. Visual controls on the screen, particularly buttons are represented by brackets ('[' and ']') and italic type, e.g. *[next]*, *[back]*.

1.3. Features

HDS shredder allows you to erase complete hard disks or other data storage media as well as individual partitions easily but securely and irrevocably, according to international standards, if desired. The data once deleted cannot be recovered with data recovery software either. HDS shredder can erase hard disks regardless of the respective partition scheme, the data system used, and the installed operating system(s). With the erasure standards supported, HDS shredder provides a high security as well as a high level of flexibility with the option to freely define own deletion patterns. This makes HDS shredder particularly suitable for the tasks mentioned in → 2. *Fields of application* as well as for many other tasks.

1.4. Edition overview

There are different Editions of HDS shredder. They differ from each other by the amount of features they offer, particularly supported device types, performance and special options. The following table offers you a comparative overview of the editions and their features. Subsequent, there are short explanations referring to some of the topics listed in the table.

	Free	Basic	Standard	Professional
Device support				
IDE/ATA/SATA hard disks ¹⁾	✓	✓	✓	✓
Hard disks > 128/137 GB ²⁾	✓	✓	✓	✓
AHCI (SATA II)	✓	✓	✓	✓
USB 1.1 (UHCI, OHCI)	✗	✓	✓	✓
USB 2.0 (EHCI)	✗	✗	✓	✓
CompactFlash on IDE ³⁾	✗	✗	✓	✓
Firewire / IEEE1394 (OHCI)	✗	✗	✗	✓
SCSI hard disks ⁴⁾	✗	✗	✗	✓
Deletion modes ⁵⁾				
Quick & Easy	✓	✓	✓	✓
Automatic	✗	✓	✓	✓
Standards (see below)	✗	✗	✓	✓
User defined	✗	✗	✗	✓
Supported standards ⁵⁾				
VSITR (D)	✗	✗	✓	✓
BSI-GSB (D)	✗	✗	✓	✓
ACSI 33 (AUS)	✗	✗	✓	✓
AFSSI 5020 (USA, Air Force)	✗	✗	✓	✓
AR380-19 (USA, Army)	✗	✗	✓	✓
DoD5200.28M (USA)	✗	✗	✓	✓
DoD5220.22M (USA)	✗	✗	✓	✓
NCSC-TG-025 (USA)	✗	✗	✓	✓
DMA support ⁶⁾				
Multiword-DMA	✗	✓	✓	✓
Ultra-DMA-33	✗	✗	✓	✓
Ultra-DMA-66/100/133	✗	✗	✗	✓
Special modes ⁷⁾				
Erasing partitions	✗	✓	✓	✓
SmartDefectSkip	✗	✗	✓	✓
Deletion speed ⁸⁾				
up to 5 MB/sec	✓	✓	✓	✓
up to 10 MB/sec	✗	✓	✓	✓
up to 20 MB/sec	✗	✗	✓	✓
up to 90 MB/sec and more	✗	✗	✗	✓
License scope ⁹⁾				
Private use	✓	✓	✓	✓
Professionals / Corporations	✗	✗	✓	✓
Technician license	✗	✗	✗	✓

- ¹⁾ **SATA hard disks:** A necessary precondition is that they are connected to one of the SATA controllers supported by HDShredder and that the controller is configured accordingly (→ 3.3.2. *SATA/SATA II controller*).
- ²⁾ **Hard disks > 128/137 GB:** For IDE/ATA/SATA hard disks with a capacity of more than 128 GiB / 137 GB, HDShredder supports the special 48-bit addressing scheme and thus can handle hard disks of up to 2048 GB.
- ³⁾ **CompactFlash on IDE:** HDShredder supports CF-media via TrueIDE mode.
- ⁴⁾ **SCSI hard disks:** A necessary precondition is that they are connected to one of the SCSI host adapters supported by HDShredder (→ 3.4. *SCSI*).
- ⁵⁾ **Deletion modes:** Detailed information about the different modes are to be found in chapter → 6.2. *Deletion methods*.
- **Quick & Easy:** This mode securely erases a hard disk as quick possible. No deletion knowledge necessary.
 - **Automatic:** In addition to the 'Quick & Easy' deletion, this mode also allows to select between deletion speed and security level for optimal results.
 - **Standards:** Select one of eight international security standards for the deletion.
 - **User defined:** Create your own deletion standard with up to 398 runs, inverse bit patterns and random data.
- ⁶⁾ **DMA support:** Using DMA, deletion speed will be accelerated (up to factor 40), in case of Multiword DMA with up to 16,7 MB/sec, in case of Ultra-DMA even with up to 133 MB/sec (→ 3.3.3. *Multiword-DMA and Ultra-DMA*).
- ⁷⁾ **Special modes:** HDShredder knows special working modes to increase the efficiency of the deletion. Further information about this is to be found in chapter → 5.8. *Selecting the deletion method*.
- ⁸⁾ **Deletion speed:** Due to technical differences between the individual editions, there is an upper limit for the actually achievable deletion speed of each edition:
- ~ **5 MB/sec:** corresponding to PIO mode 2.
 - ~ **10 MB/sec:** corresponding to Multiword DMA mode 2.
 - ~ **20 MB/sec:** corresponding to Ultra-DMA mode 2.
 - > **90 MB/sec:** up to 133 MB/sec with Ultra-DMA mode 6, up to 300 MB/sec with SATA II.
- ⁹⁾ **License scope:** see also chapter → 8.1. *Terms of license*.

2. FIELDS OF APPLICATION

HDSHredder is specialized to erase complete hard disks and other media or individual partitions easily and fast but also securely, i.e. finally. The data storage media remain usable after the erasure. The erasure is irreversible on the physical level. HDSHredder thus provides special advantages when erasing damaged media (→ 2.9. *Damaged storage media*). Furthermore, HDSHredder works independently of partition scheme, data system, and operating system, if needed. You thus also have the possibility to delete complete operating system installations in one go (→ 2.5. *Deleting the software installation*) or to perform a secure deletion in case of unknown/proprietary file systems (→ 2.8. *Proprietary formats*). All in all, the universal HDSHredder deletion procedure covers a broad range of areas of application. Hereafter, you will find descriptions of the most common applications of HDSHredder. The individual chapters offer an instruction and further tips for execution.

Tip: HDSHredder also allows you to delete data from media (e.g. hard disks) which have not been used in a PC (→ 2.10. *Arbitrary computer systems*).

Important: Media which have been erased with HDSHredder are further on fully operational and usable. The erasure with HDSHredder does not damage or destroy the media in contrast to mechanical or physical erasure procedures.

2.1. Deletion of data

Generally, the deletion of data constitutes the main area of application of HDSHredder. Select one of the higher standards for the secure deletion of data (→ 5.8.2. *Standards*) or an individually defined deletion pattern (→ 5.8.3. *Custom*). The deletion protocol, which can be created after a deletion process, provides information about the parameters and the result of the deletion. This protocol can also be used for principals as a confirmation of the completed deletion.

Note: The media erased with HDSHredder are further on usable after the erasure. The erasure does not damage the media themselves. Only a new formatting (and partitioning, if needed) is necessary to use the media again. However, a reconstruction of data once deleted with HDSHredder – also unintentionally – is not possible.

2.2. Disposal of computers

In case you give away computers for purposes of a final disposal, the erasure of the integrated hard disk(s) is recommended anyway. Otherwise, third persons are easily able to view your data. With HDS shredder, an erasure is no problem because inoperative operating systems or hard disk defects do not constitute a problem either and an erasure using HDS shredder is still possible. This also applies, of course, for the disposal of individual hard disks.

2.3. Sale of computers

Before selling a used computer or used hard disks, you should make sure that personal data and other sensitive data cannot be viewed or recovered by the buyer. HDS shredder allows you to erase the complete hard disk (→ 6.1.3. *Erasing an entire hard disk*) or an individual partition (→ 6.1.4. *Erasing a single partition*) fast and securely.

2.4. Passing on of computers

Also in case computers or data storage media are passed on within a company or an organization, it is desirable that no sensitive data are available on them any more. In contrast to mechanical or physical erasure procedure, HDS shredder offers the advantage to further use the erased media after the erasure.

2.5. Deleting the software installation

In some cases, it may be useful to not only delete the data but also the software and the operating system installed. If this involves commercial software, you want to continue to use, the installations then available could be considered as pirate copies. HDS shredder allows you to make sure that no one can use your software licenses unauthorized when selling or passing on used computers or hard disks.

2.6. Deleting photos and videos

When passing on or disposing mobile storage media, especially flash storage cards for digital cameras and video recorders, it is often forgotten that the pictures thereon or

other data could come into the wrong hands. HDS shredder allows you to erase these media easily and securely.

2.7. Deleting viruses

Although HDS shredder is not anti virus software: some viruses are so persistent that they hide in usually inaccessible areas of the hard disk (boot sector, MBR, unpartitioned areas). In this case, a complete erasure of the hard disk with HDS shredder and a subsequent new installation is not necessarily the most elegant but certainly one of the most secure solutions to finally delete damaging programs from your hard disk.

2.8. Proprietary formats

HDS shredder erases complete hard disks or individual partitions regardless of the file or operating system thereon. That is why HDS shredder allows you to erase all hard disks or partitions regardless of the software or file systems installed thereon. The deletion of proprietary or rare formats is no problem.

2.9. Damaged storage media

Damaged storage media are often simply disposed without further measures after the data recovery because they are “defective”. However, just as you third persons may be able to recover great parts of the data with the help of data recovery software. That is why you should erase defective storage media with HDS shredder as well – of course only after a possible data recovery.

Note: HDS shredder also runs on media with defective sectors. In this case, it simply overwrites all sectors which can still be written. The other defective sectors cannot be read any more anyway.

2.10. Arbitrary computer systems

HDS shredder cannot only be used on PC systems. Many special systems, e.g. in industry and medicine, are principally PC compatible as well. In this case, HDS shredder can be directly used on the concerned system. Thanks to its operating system independence, it does not have to work with the operating system installed on the system.

Therefore, you can use HDS shredder on arbitrary, PC compatible systems to delete the data thereon easily and finally.

Tip: HDS shredder can also be useful for special systems which are not PC compatible. Most of such systems use internal IDE, SCSI, or SATA hard disks or flash storage media. You can then simply install them in a PC and erase them there, in case HDS shredder does not run directly on the concerned special system.

3. SUPPORTED HARDWARE

This section contains detailed information about the hardware and hardware standards supported by HDShredder. Furthermore, there are special references to be found regarding the usage of certain device types.

3.1. Overview

Subsequent, you find a listing of the hardware requirements concerning the hardware used to run HDShredder as well as additionally supported devices. Please note that support for a certain hardware may depend on the edition used (→ 1.4. *Edition overview*)

Hardware Requirements

- PC 80586 or higher, 90 MHz, 32 MB RAM, VGA (optimal: VESA support)
- keyboard: standard, PS/2 or USB
- mouse: serial, PS/2 or USB (optionally, can be operated with keyboard only)
- bootable floppy or CD drive

Supported Media

- IDE/ATA hard disks (also > 128/137 GB), CompactFlash via IDE ¹⁾
- SATA hard disks
- SCSI hard disks
- USB hard disks (internal & external)
- Firewire hard disks (internal & external)
- USB sticks/keys ²⁾, CompactFlash I ³⁾, CompactFlash II ³⁾, MicroDrive ³⁾, SD/MMC ³⁾
- xD-Picture Card ³⁾, Memory Stick ³⁾, Memory Stick PRO ³⁾, Memory Stick DUO ³⁾

¹⁾ CompactFlash media with TrueIDE support

²⁾ must support the USB-Mass-Storage-Class protocol

³⁾ via an appropriate USB card reader

Supported Controllers

- PCI IDE controller
- Bus master IDE controller
- PCI SCSI adapter (→ 3.4.2. *Compatibility*)

- SATA controller with IDE interface (→ 3.3.2. SATA/SATA II controller)
- SATA II controller with AHCI interface (→ 3.3.2. SATA/SATA II controller)
- USB UHCI & OHCI controller (USB 1.1)
- USB EHCI controller (USB 2.0)
- IEEE1394 OHCI controller (Firewire)

Advice: The devices listed above represent the whole spectrum of hardware supported by HDS shredder. Detailed information about which devices are supported by your edition of HDS shredder is to be found in chapter → 1.4. *Edition overview*.

3.2. Compatibility

HDS shredder has been developed for the hardware listed in → 3.1. *Overview* and has been tested on a multiplicity of according devices. HDS shredder also works well with many other devices. You may use the Free Edition of HDS shredder to easily check out in advance and for free whether the device in question is supported (→ 3.2.1. *Compatibility test*).

3.2.1. Compatibility test

You can use the Free Edition of HDS shredder to find out easily if your hard disks, other media as well as the associated controllers are supported properly, even if a higher edition is required to use them with HDS shredder. For this purpose, simply start HDS shredder Free Edition on the respective PC, chose *drive* as deletion area and move on to the drive selection (→ 5.6. *Selecting the deletion area*). All drives displayed there as well as the associated controllers have been recognized by HDS shredder and are supported by one of the available editions. Which edition will be necessary to utilize a certain device type can be seen from the info box at the right side of the list box when you select the regarding drive (→ 5.7.4. *Information on the drive*).

Note: Please ensure that you connect the needed USB devices before starting the program to ensure that they are recognized correctly (→ 5.1. *Preparing steps*).

3.2.2. Standards

To be able to support as many devices as possible, HDS shredder implements the effective standards for the appropriate device types. Device support in HDS shredder primar-

ily refers to the standards applicable to the appropriate device type. In addition, we perform extensive tests with each device type. Those test also reveal that there is a number of devices, which themselves implement their respective standard only insufficiently or even inaccurately. Furthermore, it is possible that some problems occur in certain hardware configurations, usually in certain combinations of controller and device. If possible, HDS shredder tries to support even such devices and to bypass the according deficiencies of the hardware. However, these kinds of problems can not always be bypassed. Hence even extensive tests cannot completely prevent that a problem appears in your special hardware configuration. In most cases this can be solved by setting the options appropriately (→ 5.9. *Selecting the options* and → 7. *Troubleshooting*). In case of even this does not work, our support team (→ 8.5. *Support*) will be there to assist you with solving the problem.

3.3. IDE/ATA/SATA

In principle, HDS shredder supports all IDE/ATA/SATA hard disks. A necessary precondition is, that they are connected to one of the IDE/ATA/SATA controllers supported by HDS shredder (→ 3.3.1. *IDE/ATA controller* and → 3.3.2. *SATA/SATA II controller*).

3.3.1. IDE/ATA controller

HDS shredder supports standard IDE controller (ISA) and PCI IDE controller. These may be (internal) onboard controllers as well as (external) PCI/ISA adapter cards. In case of ISA/Standard IDE controllers, the first two channels are scanned for hard disks. HDS shredder recognizes available PCI IDE controllers automatically and scans them for connected hard disks.

Note: If there are one or more PCI IDE controllers available in the system, ISA controllers that are possibly present, too, will not be taken into account.

Regarding the *PCI IDE controllers* supported by HDS shredder, this refers to a standardized programming interface, which is supported by a large majority of IDE controllers. Nevertheless, there are also others, especially external PCI hard disk controllers, which implement a different, usually proprietary interface. They are often also called “IDE controllers”, as they allow IDE hard disks to be connected. Since ‘IDE’ stands for a programming interface (program ↔ controller) as well as for a hardware interface (controller ↔ hard disk), it results in a double meaning. Refer to → 3.2.1. *Compatibility test* to determine whether your PCI controller is compliant with the PCI IDE standard).

3.3.2. SATA/SATA II controller

Precondition for the support of SATA drives is an SATA controller with IDE interface or an SATA II controller with AHCI interface. All popular chipsets from Intel with ICH-5/-6/-7 incorporate such an IDE-compatible SATA controller. Regrettably, many other SATA controllers only offer a proprietary programming interface. Nevertheless, it may be possible in case of onboard SATA controllers to activate a compatibility mode in BIOS setup, which would allow HDSHredder to access the SATA controller. As for SATA II controllers, many models already implement the AHCI interface supported by HDSHredder.

Tip: With the Free Edition of HDSHredder you can easily check out whether your SATA or SATA II controller is supported (→ 3.2.1. *Compatibility test*). Connect at least one SATA drive and start HDSHredder. If the SATA drive is recognized, HDSHredder also supports the associated SATA/SATA II controller.

Note: It might possibly be necessary to adjust the SATA settings in BIOS. As mode of operation, “*IDE*”, “*ATA*”, “*compatible*” or “*AHCI*” should be chosen, but in no case “*RAID*” or “*SATA*”. Additionally it may be necessary to set the controller configuration to *combined*, especially for allowing simultaneous use of IDE and SATA hard disks. In this case there are only ports 0 and 2 or 1 and 3 available for SATA. Please connect the SATA hard disks accordingly in this case.

3.3.3. Multiword-DMA and Ultra-DMA

HDSHredder automatically recognizes and uses bus master IDE controllers, which allow data rates up to 133 MB/sec resp. 7.8 GB/min. Hereby, Multiword DMA (up to 16.7 MB/sec) as well as Ultra-DMA (UDMA) are supported. This can increase achievable data transmission rates by a multiple higher of the rates that can be achieved without DMA (in PIO mode). HDSHredder recognizes automatically, whether controller and hard disk support DMA and then automatically selects the fastest usable mode (Multiword DMA or Ultra-DMA 33/66/100/133).

Note: Take into account that both, hard disk *and* IDE controller have to support a certain DMA mode. If the actually achieved speed values do not match the technical data of a hard disk, the reason may be that the IDE controller only supports lower modes. Furthermore, the achievable values also depend on the physical abilities of the hard disk, i.e. a hard disk with UDMA-6 (theoretically 133 MB/sec) currently achieves an actual transfer rate of about 60 MB/sec.

3.3.4. Bus master IDE controller

Precondition for using DMA mode is that the attached PCI IDE controller also supports the Bus master IDE standard. This is the case for most of the established internal and external IDE controllers. Whether your PCI IDE controller supports Bus master IDE can be determined by means of the program **PCISniffer**, if necessary, which can be downloaded for free at <http://www.miray.de/download/sat.pcisniffer.html>. The field *Classcode* in PCISniffer has to contain the value *01018x* (x = arbitrary) for the respective PCI IDE controller.

Note: For using Bus master IDE, the settings and initializations made in and by the PC's system BIOS play a major role. In case of HDShredder having problems with utilizing DMA, it is likely that certain BIOS settings have to be accommodated accordingly. (→ 7.4.3. *Problems with DMA*).

3.3.5. Speed

The speed that can be achieved with DMA always depends on the physical abilities of the regarding hard disk. The following rough classification shows the approximate speed that can be expected by a certain drive type:

Type	Age	Speed
older drives	about 5-10 years	about 1-10 MB/sec
newer drives	about 2-5 years	about 10-30 MB/sec
top model	about 0-2 years	about 30-80 MB/sec and more

3.4. SCSI

In case you have an edition of HDShredder which also supports SCSI hard disks, the following chapter provide important information regarding utilization and compatibility of SCSI drives and controllers.

Note: As HDShredder embeds original driver code of the hardware manufacturers, Miray Software has no influence on actual compatibility. Hence, the following statements are of informative nature only, are based on specifications of the manufacturer and are not legally binding (→ 8.3. *Disclaimer*).

3.4.1. Utilization

You can use HDS shredder with SCSI hard disk in the same way as with any other media. HDS shredder automatically recognizes supported SCSI controllers and connected SCSI hard disks at program start and displays them, along with other recognized media, in the according selective lists.

3.4.2. Compatibility

In principle, HDS shredder supports all SCSI hard disk drives. Precondition is that they are connected to a SCSI controller supported by HDS shredder. Currently, HDS shredder supports the popular Narrow-, Wide-, Ultra- und Ultra-Wide-SCSI controllers from Adaptec.

Tip: Whether your SCSI controller is supported can be determined easily with the Free Edition of HDS shredder (→ 3.2.1. *Compatibility test*). Connect at least one SCSI drive to the SCSI bus and start HDS shredder. If the SCSI drive is being recognized then HDS shredder also supports the SCSI controller.

3.4.3. Manufacturer information

According to information from the manufacturer, the drivers used in HDS shredder currently support the following SCSI controllers:

- | | |
|---------------------------------|------------------------------|
| • Adaptec AHA-2930U | • Adaptec ASC-19160 |
| • Adaptec AHA-2940 Ultra | • Adaptec ASC-29160 |
| • Adaptec AHA-2940UW | • Adaptec ASC-29160LP |
| • Adaptec AHA-2940AU | • Adaptec ASC-29160N |
| • Adaptec AHA-2944UW | • Adaptec ASC-39160 |

3.4.4. Driver information

According to information directly from the drivers, they support a number of other SCSI controllers, too, which are partly constructed as onboard chipset (AIC) and partly as adapter cards (AHA, ASC). They can be recognized definitely by their respective PCI vendor ID and PCI device ID, which are listed in the following table.

Vendor	Model	Device	Vendor	Model	Device	Vendor	Model	Device
9004h	AHA-2930U	3860h	9004h	AIC-7860	7860h	9005h	AHA-3940/3950U2x	0050h
"	AHA-2930CVAR	3868h	"	AIC-7895	7895h	"	AHA-3950 U2x	0051h
"	"	3869h	"	AIC-7880	8078h	"	AIC-7896/7 U2	005Fh
"	AHA-4944(U)W	3B78h	"	AHA-2940U(W)	8178h	"	AIC-789x	006xh
"	AIC-755x	5x75h	"	AHA-3940U(W)(D)	8278h	"	"	007xh
"	AIC-785x	5x78h	"	AHA-2944UW	8478h	"	AIC-7892(A/B) U160	008xh
"	AIC-7560	6075h	"	AHA-3944U(WD)	8578h	"	AIC-789x	009xh
"	AIC-786x	6x78h	"	AHA-4944UW	8678h	"	"	00Axh
"	AIC-7870	7078h	"	AIC-7887	8778h	"	"	00Bxh
"	AHA-2940(W)	7178h	"	AIC-7888	8878h	"	AIC-7899(A) U160	00Cxh
"	AHA-3940(W)	7278h	"	AHA-4944(U)W	EC78h	"	AIC-789x	00Dxh
"	AHA-2944	7478h	9005h	AHA-2940/2950U2W	0010h	"	"	00Exh
"	AHA-3944(W)	7578h	"	AIC-789x	001xh	"	"	00Fxh
"	AHA-4944(U)W	7678h	"	"	002xh	"	AHA-2930U2	0180h
"	AIC-7877	7778h	"	"	003xh			

The IDs of your respective controllers can be determined by means of the program **PCISniffer**. At <http://www.miray.de/download/sat.pcisniffer.html> you can download it for free from the Miray homepage. For the regarding PCI SCSI controller, the values displayed by PCISniffer for the fields *Vendor ID* and *Device ID* have to match the values specified above for your SCSI controller.

3.5. USB

If your edition of HDS shredder also supports USB storage media, the following chapters contain important information regarding utilization and compatibility of USB storage media and controllers.

Note: Please take care to connect USB devices already before starting HDS shredder (→ 5.1. *Preparing steps*) and if possible directly to the PC resp. to the USB controller (→ 3.5.3. *Hubs*).

3.5.1. Mass-Storage-Class

USB storage media that is intended to be used with HDS shredder has to support the *USB-Mass-Storage-Class-Protokoll*. This is an official standard, which is supported by almost all current USB sticks, USB card readers, USB hard disks etc. If you are not sure if a certain USB storage medium is supported by HDS shredder, you can check this

out easily and for free in advance by means of the Free Edition (→ 3.2.1. *Compatibility test*).

3.5.2. UHCI, OHCI and EHCI

Regarding USB devices, it is crucial that HDS shredder supports the respective USB controller. HDS shredder is capable of all three common USB standards, UHCI and OHCI for USB 1.0/1.1 as well as EHCI for USB 2.0. In the area of standard PCs, all current USB controllers, onboard controllers as well as adapter cards, offer one of these three interface standards. In case you are not sure though whether your USB controller is supported by HDS shredder, you can check this out easily and for free in advance by means of the Free Edition (→ 3.2.1. *Compatibility test*)

3.5.3. Hubs

USB devices usually may also be connected via a USB hub. Nevertheless, for achieving the highest possible transfer rate, it is recommended to rather connect them directly to the PC resp. to the USB controller.

3.6. Firewire (IEEE1394)

If your edition of HDS shredder supports Firewire, you can connect arbitrary Firewire drives or card readers. Connected devices must support the “Serial Bus Protocol” (SBP) in order to be recognized and operated correctly by HDS shredder.

Note: Please take care to connect Firewire devices already before starting HDS shredder (→ 5.1. *Preparing steps*) and if possible directly to the PC resp. to the Firewire controller.

4. INSTALLATION

4.1. Introduction

HDS shredder does not need an installation in the usual sense. In case you do not already have HDS shredder available on a bootable medium (→ 4.1.1. *Bootable medium*), it is necessary to create a bootable HDS shredder medium before using HDS shredder for the first time (→ 4.1.2. *Software package*).

4.1.1. Bootable medium

In case you have HDS shredder already available on a bootable medium, you can start and use the program immediately on any PC and without any preceding installation, as described in chapter → 5.2. *Starting the program*.

Note: It is possible that, although you have HDS shredder on a physical medium, it may not be in a bootable form but rather as an installation package. In this case it is also necessary to create a *bootable* medium at first, according to the subsequently provided descriptions.

4.1.2. Software package

As far as you do not have HDS shredder on a bootable medium already, you have to create one before using HDS shredder for the first time. The software package, which you should have obtained in this case, contains the files needed for this purpose. The following chapters describe how to create a bootable medium. The required procedure can be different according to the media type or operating system used. The bootable medium created in this way then can be used to start HDS shredder on any PC without any further installation (→ 5.2. *Starting the program*).

4.2. Installation with Windows

The HDS shredder software package contains an installation program for creating a bootable floppy disk or CD/DVD with only few mouse clicks. To use the installation program, please extract all files of the installation package into an empty folder. Then execute the file **install.exe** from this folder.

4.2.1. Installation interface

When starting the installation program the main window appears (→ *fig. 1*).

- If you want to create a **bootable floppy disk**, choose the desired drive at 'Floppy drive' and click on *[Create Floppy]*.
- To create a **bootable CD/DVD**, choose the desired drive at 'CD/DVD writer' and click on *[Create CD/DVD]*.

Follow the instructions and wait until the installation program announces successful creation of the bootable medium. Then click on *[Exit]*. Afterwards, please proceed with chapter → 5. *Program instructions*.



Fig. 1: Main window of the installation program

Note: When creating a CD/DVD, please *always* use a new, empty blank CD/DVD. Otherwise there may be problems when starting HDS shredder.

4.2.2. CD/DVD writer not selectable

It is possible that there is no drive offered for selection at 'CD/DVD writer' although a CD/DVD writer is available on the system. In most cases this results from already installed software for the CD/DVD writer (e.g. drivers for direct access to the CD/DVD writer with Windows Explorer). It "reserves" the drive in a way that the installation program cannot access it. If possible, deactivate or uninstall the CD/DVD writer software. As an alternative, please create a bootable CD/DVD from that ISO image which is also contained in the software package (→ 4.3.2. *Creating a bootable CD/DVD*).

4.3. Installation with other operating systems

4.3.1. Creating a bootable floppy disk

You can also create a bootable HDS shredder floppy disk without the installation program with any operating system. For this purpose, the HDS shredder software package

contains a floppy disk image in the file **HDS shredder.img**. You can create a bootable 3.5"/1.44MB floppy disk from this image with any appropriate disk imaging program.

Tip: Under UNIX and Linux you may use the tool *dd*, which is available on these systems, with the following syntax: *dd if=HDS shredder.img of=/dev/fd0*.

After having created a bootable floppy disk, you can start HDS shredder on any PC as described in chapter → 5. *Program instructions*.

4.3.2. Creating a bootable CD/DVD

The HDS shredder software package contains a so called *ISO image* in the file **HDS shredder.iso**. It can be used to create a bootable HDS shredder CD with any operating system using a CD writing software of your choice as far as it supports creating CDs from an ISO image. Further information can be found in the manual of your CD writing software.

- Extract the file **HDS shredder.iso** from the HDS shredder software package.
- Start your CD writing software and choose 'Create CD from image file' (or similar, according to the respective CD writing software)
- Specify the file **HDS shredder.iso** as image file.
- Insert a blank CD into the according drive.
- Write the CD.

Tip: The easiest way of creating a bootable HDS shredder CD under Linux is using the software tool *cdrecord* with the following syntax: *cdrecord HDS shredder.iso*.

After having accomplished these steps you have created a bootable HDS shredder CD. From this CD you can start HDS shredder directly on any PC with a bootable CD/DVD drive as described in → 5.2. *Starting the program*.

Note: Generally the instructions provided above for creating a bootable CD using the ISO image can also be adopted to DVDs. However, some CD/DVD writing software refuses writing an ISO image to a DVD. The HDS shredder installation program (→ 4.2. *Installation with Windows*) for example also writes DVDs without any problem. Booting from a DVD created this way also works smoothly.

5. PROGRAM INSTRUCTIONS

The following chapters give a detailed description on how to operate HDShredder, from the start to the end.

Note: According to the edition you use, there can be deviations between the features described or illustrated herein and the features supported by your edition. If one or several of the features of the program described below cannot be used in your edition, you can check in → 1.4. *Edition overview* whether your edition supports the respective feature.

5.1. Preparing steps

If you want to use USB devices for the following deletion process and your edition of HDShredder supports USB, connect these devices before starting HDShredder and leave them connected until the deletion process is finished. Otherwise it is not guaranteed that HDShredder recognizes them correctly. Do not use a USB hub to connect USB storage devices, always connect the USB storage devices directly to the USB controller or the PC case.

Note: To start HDShredder, you need a bootable HDShredder CD or floppy disk. If you don't have HDShredder on a bootable storage device, you can create such a device as de-scribed in chapter → 4. *Installation*.

5.2. Starting the program

Insert the bootable HDShredder CD or floppy disk into the corresponding drive. Switch on the computer or reboot it. Make sure that the BIOS boots from the respective floppy disk or CD drive. HDShredder is then started automatically from the CD or floppy disk and the program screen appears.

Hint: For troubleshooting loading problems of HDShredder please view chapter → 7.1. *Load errors*.

5.3. Program screen

The HDS shredder program screen (→ *fig. 5*) contains two fields in a lighter blue. They are the ‘active’ area of the program where all information is shown and all operation steps are executed.

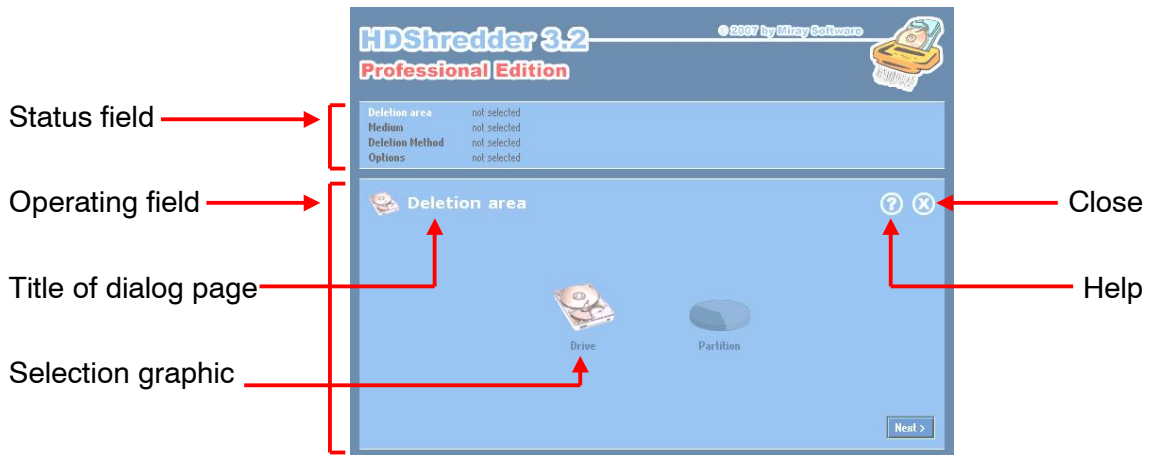


Fig. 5: Program screen

5.3.1. Status field

The upper field is the status field (→ *fig. 5*). It shows the parameters selected for the deletion process (*deletion area, medium, deletion method, and options*). Thus you see at any point of the program which parameters you have already selected. Furthermore, the right side of the status field also shows license information.

5.3.2. Operating field

The lower field is the *operating field* (→ *fig. 5*). In the upper left of the operating field is the title of the currently shown dialog page together with a corresponding symbol. In the upper right are two general operating elements: with the Help button [?] you can call up the interactive help at any point of the program (→ 5.5. *Help*). With the Close button [X] you can end the program at any time (→ 5.12. *Ending the program*). At the bottom of the operating field, you find the buttons [Next] and [Back], with which you can go to the next or previous dialog page.

5.4. Operation

To erase a medium, you are led through five consecutive dialog pages where you can select the individual parameters for the deletion and start and control the deletion process. These five dialog pages are shown in the *operating field*.

5.4.1. Graphical operating elements

To control the program, HDS shredder knows different operating elements (→ fig. 6). The names which are used within this manual to designate the different elements are listed and illustrated by examples in the following illustration.

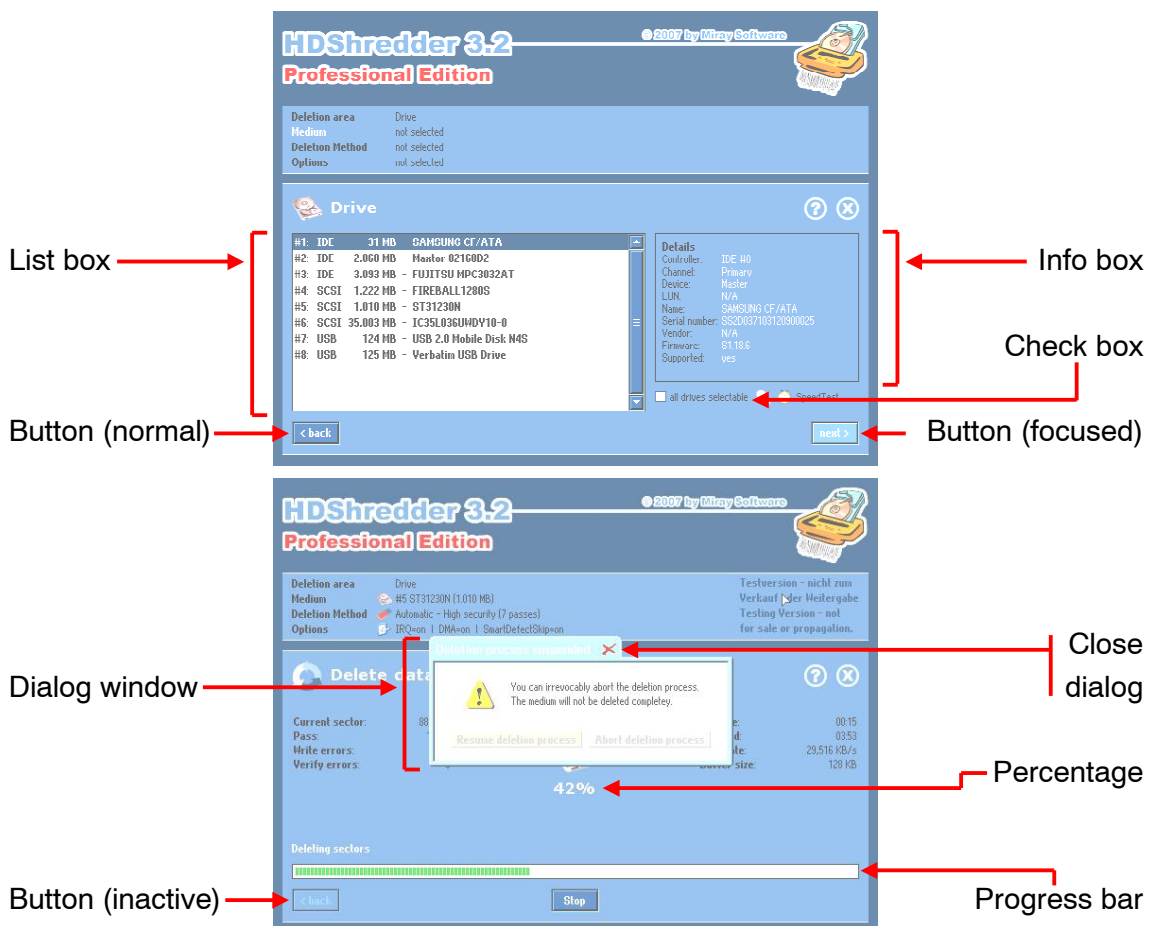



Fig. 6: Graphical operating elements

5.4.2. Operation with keyboard and mouse

HDS shredder is operated by keyboard and mouse. It is also possible to operate the program exclusively by keyboard or exclusively by mouse.

5.4.2.1. Keyboard operation

The operation with the keyboard always refers to the respectively focused graphical element. This element is highlighted by color, brightness, or an additional frame. With the tabulator key you can switch the focus in turn to the other operating elements. The following control keys have a function when operating the keyboard:

Key	Operating element	Function
<Tab>	(all)	Switch to the next element
Arrow keys (←/→/↑/↓)	List field	Select list element
	Selection graphic	Highlight element
<Space key>	Button	Press button
	Selection graphic	Select highlighted element
	Link	Show link target
<Return>	Button	Press button (in dialog windows only)
	Link	Show link target
<Esc>	Window	Close windows (only windows with  in the title)
	(in operating field)	Close HDS shredder

5.4.2.2. Mouse operation

Operating HDS shredder with the help of a mouse is done according to the 'point and click' principle. The right mouse key has no special function. HDS shredder does not use drag-and-drop.

5.5. Help

You can open a context-related help window at any point of the program by pressing the key <F1> or the [?] symbol in the upper right corner of the operating field (→ fig. 5). The help gives you useful hints on the current program screen. The underlined text links in the help window enable you to jump to other help topics at any time.

Note: The program help is designed to give you useful hints when using the program. The help is no complete program instruction. That is why you should use this instruction especially when you have problems or need extensive information on a topic.

5.6. Selecting the deletion area

On the first dialog page (→ ill. 7), you can select the desired area of erasure. You can choose between the options of erasing a complete hard disk and an individual partition. The following table provides you a short overview over the available options. A detailed description of the areas of erasure and their effect can be found in chapter → 6 **Fehler! Verweisquelle konnte nicht gefunden werden.. Operating Principles.**



Fig. 7: Selecting the deletion area



Entire drive

Deletes all data on the selected drive.
(→ 6.1.3. Erasing an entire hard disk).



Single partition

Deletes only the data on the selected partition.
(→ 6.1.4. Erasing a single partition).

After having selected the deletion area, you go to the next step by pressing [next] in the lower right corner of the operating field (→ 5.7. Selecting the medium).

Already when selecting the deletion area, HDSHredder starts the recognition of connected devices and drives. If the recognition is not finished yet, a corresponding note will be displayed before the next dialog page will be shown. This can take up to one minute or more. The time needed also depends on the number of drives connected. If it takes more than five minutes, you can assume that there is a technical problem. In this case you find further information in chapter → 7. Troubleshooting.

5.7. Selecting the medium

In the two following steps, you select the medium for the deletion process. The left half of the operating field shows a selection list. On the right side is an info box containing details on the currently selected element. According to the selected deletion area, you can select either a drive or a partition. The following two sub-chapters give you more detailed information. After having selected the medium, you come to → 5.8. *Selecting the deletion method*.

5.7.1. Selecting a drive

When selecting a *drive*, you see the devices recognized by HDS shredder in the selection list. The info box beside the selection list shows more details on the selected element (→ 5.7.4. *Information on the drive*).

Select the desired drive. You confirm your selection by pressing *[Next]* in the lower right corner of the operating field and go to the next step.



Fig. 8: Selecting a drive

5.7.2. Selecting a partition

When selecting a *partition*, the recognized drives and the partitions found on them are shown in the selection list. The partitions belonging to a drive are listed below it in an indented form. The drives themselves cannot be selected. The frame with the details on the right side of the selection list shows details concerning the drive where the currently selected partition is located on.



Fig. 9: Selecting a target partition

Select the desired partition. You confirm your selection by pressing *[Next]* in the lower right corner of the operating field and go to the next step.

5.7.3. Deactivated list entries

There are two cases in which entries in the media selection list are deactivated and therefore cannot be selected:

- In the selection dialog for a *partition*, the list entries for the corresponding drives are always deactivated because a partition but not a drive is to be selected.
- If HDS shredder recognizes drives, but the edition used does not support them, these drives or the partitions created on them are also deactivated. In order to use HDS shredder for these drives, you need a higher edition. For further information on the supported drives and the capacities of the different editions of HDS shredder, please consult chapter → 1.4. *Edition overview* or the HDS shredder website at <http://www.hdshredder.de>.

Tip: To see the details of drives which are recognized by HDS shredder but not supported by your edition (→ 1.4. *Edition overview*), activate the checkbox '*All drives selectable*' below the details. Then you can also select these drives to show the corresponding details. You can see under the point '*Supported*' from which edition on the respective drive is supported.

5.7.4. Information on the drive

On the right side of the selection list for the drive or partition, you find a frame containing details on the currently selected drive. When selecting a partition, the data of the corresponding drive is shown here. The following information is available:

Controller	Type (<i>IDE/SCSI</i>) and number (0-15) of the controller
Channel/Device	Channel used by the drive (<i>primary/secondary</i>) and Connection of the drive (<i>master/slave</i> resp. 0-15)
LUN	Logical number of the drive (0-255)
Name	Name of the device (according to the internal drive data)
Serial number	Device number (according to the internal drive data)
Manufacturer	Name of the manufacturer (according to the internal drive data)
Firmware	Version of the firmware (according to the internal drive data)
Supported	Drive type supported by the edition used

Note: 'Yes' appears under the point 'Supported', if the edition you use supports the selected drive. Otherwise HDShredder indicates here from which edition on that drive is supported.

5.7.5. Sector viewer

Under the 'Details' window, there is a small symbol with a magnifier. A click on that symbol opens a window where you can view the content of the currently selected medium in form of individual bytes. This particularly enables you to make a comparison between the data stored before and after the erasure procedure.

5.7.6. SpeedTest

On the lower right of the operating field you can find the trigger for a speed test, labeled as 'SpeedTest'. Here you can start a speed test for the currently selected medium. Since it is only a pure reading test, all data on the drive stays unchanged. The test shows you the speed which can be achieved with the currently selected medium. In the first line it serves as an orientation guide for examining whether it would be reasonable to use a higher edition on the tested system or not. The result reports the maximum achievable speed for linear reading on the selected medium and therefore is also a real performance value of the hardware.

5.8. Selecting the deletion method

The dialog page 'Deletion method' provides different deletion methods to be used for different areas of application. These procedures are grouped into three categories. The category *Automatic* allows you to perform a simple and secure erasure fast and easily without needing any further detailed technical knowledge except of the criteria of time and security. The category *Standards* is designed for users required or wanting to fulfill certain standards of erasure for themselves or for their client. In the category *Custom*, you can define all details of the deletion method by yourself. Further information concerning the functions of the different deletion methods can be found under → 6.2. *Deletion methods*.

5.8.1. Automatic

Select the desired option:

- **Fast:** One run within the shortest time possible gives you the security that no one can view or recover your data with the help of normal means.
- **Medium:** The best possible combination of security and time.
- **High security:** Deletes data using an internationally recognized method which is also considered to be secure against the data recovery in the laboratory.

By clicking *[Next]* at the right bottom of the dialog box, you confirm your selection and come to the next step.

Note: If you want to have the highest security possible but you are not sure whether the available time is sufficient, you can simply use the erasure procedure *High security*. In case of a lack of time, you can abort the procedure at any time. This will not affect the erasure progress attained up to that point of time and you may achieve a higher security. **Example:** You achieve a higher security aborting the procedure *High security (7 runs)* after 4 runs than only using the procedure *Medium (3 runs)* but letting it run till the end.

5.8.2. Standards

Simply select the desired standard from the list displayed. By clicking *[Next]* at the right bottom of the dialog box, you confirm your selection and come to the next step.

5.8.3. Custom

This category offers you a mask where you can define your own erasure procedure fast and easily. This own erasure procedure is based on three parameters and a repetition counter.

5.8.3.1. Deletion pattern

You can disable or enable the parameters individually, if necessary, using the selection box at the respectively left side of the parameter. Depending on their activation, they will be taken into account within the erasure procedure. As default, only the upper parameter *Deletion pattern* is enabled. You define a deletion pattern as follows:

- **Deletion pattern:** Here, you set the pattern to be used for overwriting the sectors. *Please consider the following note.*

- **Alternating pattern:** If this parameter is enabled, the pattern indicated here is always written on the medium in a further run immediately after the pattern specified under 'Deletion pattern'.
- **Iteration(s):** The value set here indicates how often the cycle consisting of deletion pattern and alternating pattern is to be repeated.
- **Finalize with random values:** After having executed all repetitions, a final run with random numbers as a pattern can be carried out.

Note: The deletion patterns are entered in hexadecimal notation. The deletion pattern is always interpreted as 32 bit value. However, you can also enter a value of 16 or 8 bits only. This value will then be automatically converted in a 32 bit value by placing the entered value 2 or 4 times after one another. **Example:** The input mask converts 5Fh into 5F5F5F5Fh. There is small display behind the input field graphing the entered value as a binary curve.

5.8.3.2. Verification

You can select the option *Verify* for the different deletion patterns and the final run. If this option is enabled, the respective deletion run is followed by a verification run to check whether the previously written patterns can be read from the medium, i.e. it is verified whether the deletion pattern has actually been written on the medium.

5.9. Selecting the options

On the dialog page *Options*, you can set the options with which you want the following deletion process to be executed. Principally, HDShredder automatically sets the optimal options for the selected drives and deletion method. Modify the options only in order to troubleshoot problems (→ 7. *Troubleshooting*) or when you are sure that this improves the performance of HDShredder.

Note: An improper modification of options can possibly lead to a deterioration of the erasure performance.

If the settings of the individual options comply with your demands, click *[Next]*. You then come to the next dialog page where you can start the deletion process (→ 5.10. *Deleting data*).

5.9.1. Locked options

The options have different possibilities of availability and selectability. Locked options cannot be modified, but the displayed setting is valid. → Fig. 10 shows the different possibilities.

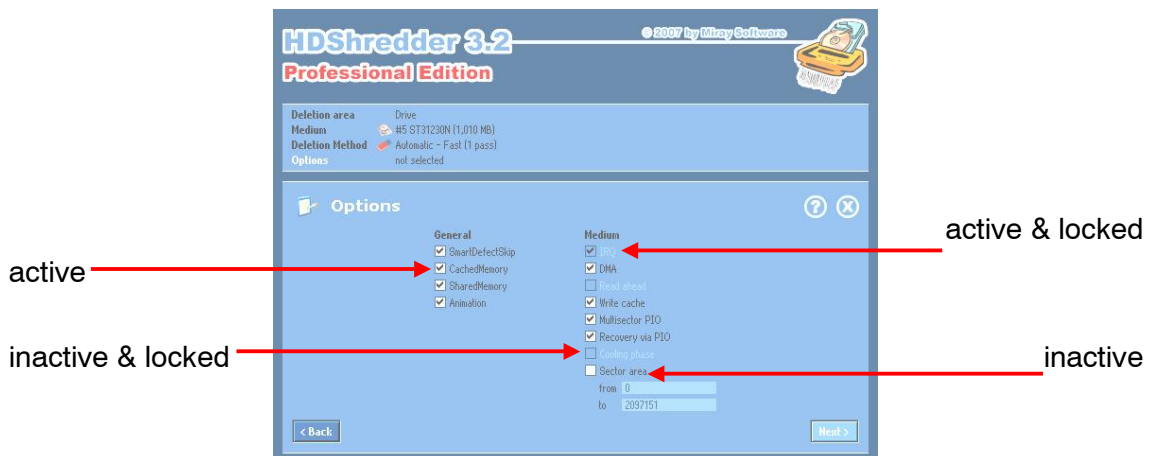


Fig. 10: Selecting options

5.9.2. General options

In the column 'General', you find options, which relate to the operating method of HDShredder and the deletion process in general.

Option	Meaning
SmartDefectSkip	Special deletion algorithm. Ensures fast deletion runs even in case of defective sectors.
CachedMemory	Use fast intermediate memory.
SharedMemory	Use fast data transfers.
Animation	Switch off erasure animation; possibly a slight speed increase.

5.9.3. Options for the medium

In the column 'Medium' you find setting possibilities, which relate especially to the drives selected for the deletion process.

Option	Meaning
IRQ	In the IRQ mode, the drive will be optimally synchronized. Only this leads to a maximum transfer rate.
DMA	For highest transfer rate and the shortest deletion time.
Read Cache	Use fast read buffer.
Write Cache	Use fast write buffer.
Multi-sector PIO	Increases speed by about 10% compared to the standard mode in a deactivated DMA mode (see above).
Recovery via PIO	Optimal handling of defective sectors.
Cooling phase	To fix data errors or interruptions during the USB data transfer (→ 7.6.2. <i>Other device problems</i>).
Sector area	Define a deletion area (→ 6.1.5 Fehler! Verweisquelle konnte nicht gefunden werden.. Erasing a sector area).

5.10. Deleting data

On the dialog page 'Delete data' (→ fig. 11) , you can start the deletion process. Check beforehand in the status field whether the settings for deletion area, medium, deletion method, and the selected options are correct. If not, go back to the corresponding dialog page by clicking (repeatedly) [Back] in the lower left corner of the operating field and adjust the settings. As soon as you want to start deletion, click [Start] in the bottom center of the operating field. During deletion, you can follow the process via the displays described in the following subchapters

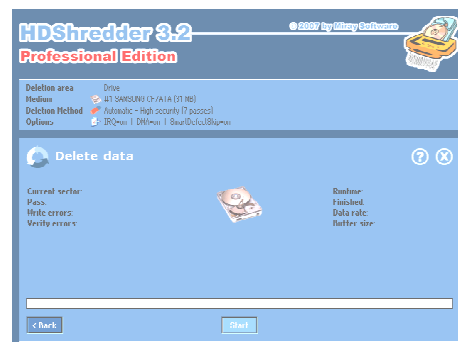


Fig. 11: Dialog page 'Delete data'

5.10.1. Security query

Before the final start of the deletion process, a security query (→ fig. 12) appears where the target medium of the deletion process as well as corresponding security notes are displayed. Click [Start deleting] to start the deletion process and

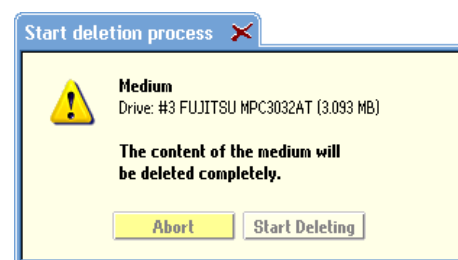


Fig. 12: Security query

[Cancel] to return without starting the deletion process.

Warning: All data in the target area will be irretrievably deleted by starting the deletion process.

5.10.2. Erasure animation

In the center of the operating field, you see the erasure animation (if you have not deactivated it when selecting the options) after the start of the deletion process. The erasure animation shows that the deletion process is running. Especially in case the other indications only change marginally or do not change at all for a time, e.g. in case of read or write errors, the erasure animation shows that HDShredder is still running.

5.10.3. Status indication

On the left and right side of the operating field, you see the fields of the status indication. They contain information on the current status of the deletion process.

Status	Meaning
Sectors processed	Absolute number of sectors already deleted.
Lauf	Number of runs started at this point.
Write errors	Number of the write errors occurred up to this point. This number can also decrease if errors can be fixed.
Verification errors	This indication is only used if the selected deletion method contains verification runs. Since read errors can only occur in verification runs, they are counted as verification errors, too.
Running time	Time passed by since the start of the deletion process.
Time remaining	Estimated (!) time remaining for the whole deletion process (incl. all necessary runs) on the basis of the deletion speed attained up to here. Note: The rest time can strongly increase in case of occurring read or write errors.
Data rate	Average data rate which has been attained up to this point of time. The indicated value refers to the amount of deleted data, i.e. the actually achieved throughput.

5.10.4. Percentage indication

The percentage indication (→ *fig. 6*) is below the erasure animation. It shows how many percent of the current run (→ 5.10.6. *Course of the process*) are already finished.

5.10.5. Progress bar

The progress bar (→ *fig. 6*) below the percentage indication visualizes the progress of the current run. Which run (→ 5.10.6. *Course of the process*) is currently processed is shown on the left above the progress bar.

5.10.6. Course of the process

The whole procedure consists of several runs according to the selected → **Fehler! Verweisquelle konnte nicht gefunden werden.** 6.2. *Deletion methods*: First of all a normal deletion run with an optional verification run. Furthermore, each deletion run can be followed by a complementary run with inverted deletion pattern as well as by an optional verification run, too. This sequence can be repeated up to 99 times. Further on, according to the deletion method, a final run with random numbers as well as an optional verification run can be performed. The *Custom* mode thus allows up to 398 runs. Additionally, the same number of troubleshooting runs can follow with the option *SmartDefectSkip* (→ 5.9.2. *General options*) However, the time required cannot be concluded therefrom. The option *SmartDefectSkip*, for instance, particularly serves to reduce the time required even though more runs are necessary. Therefore, the value indicated as *Time remaining* is always crucial for the time required.

Note: This instruction uses the term *deletion process* to describe the complete procedure with all corresponding runs (deletion, verification, troubleshooting).

5.10.7. Interrupting the running process

You can interrupt the running deletion process at any time by clicking [Stop]. A dialog window then appears (→ *fig. 13*) where you have the choice to either continue the process (click on [Continue deleting]) or to abort it completely (click on [Abort deleting], → 5.11.1. *User abort*). As long as you select neither option, the current deletion process remains interrupted.

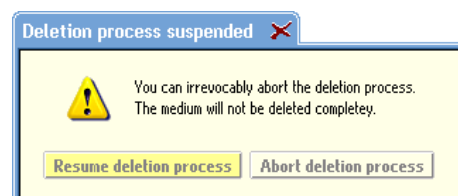


Fig. 13: Abort dialog deletion process

5.11. Termination of the deletion process

5.11.1. User abort

When aborting an deletion process using *[Stop]* (→ 5.10.7. *Interrupting the running process*), you can finally abort the process by clicking *[Abort deleting]* in the following dialog window (→ ill. 13). You then obtain a → 5.11.3. *Final report* concerning the prematurely aborted deletion process.

Note: The activation of the option *SmartDefectSkip* ensures that also in case of a premature abortion of the deletion process the highest security level possible at this point is achieved. **Example:** if a deletion process with seven runs is aborted after the third run, the security level of a deletion process with three runs is already achieved at that point of time.

5.11.2. Regular termination

After finishing all runs (→ 5.10.6. *Course of the process*) without a premature abort, the deletion process is regularly ended. You then obtain a final report upon the complete deletion process in a dialog window (→ 5.11.3. *Final report*).

5.11.3. Final report

After regular termination (→ fig. 15) or premature abort (→ fig. 16) of a deletion process, you obtain a final report in a dialog window with the following information.

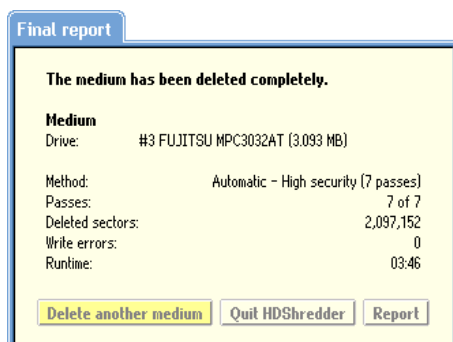


Fig. 15: Final report after a successful deletion run

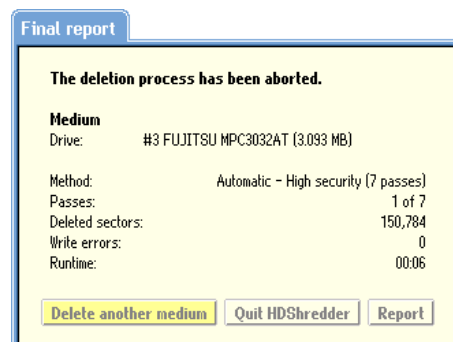


Fig. 16: Final report after abort of the deletion run

- **The medium has been completely erased:** in case the deletion process has been finished without an abort (even if sector errors occurred).
- **The deletion process has been aborted:** in case the deletion process has been aborted before its regular termination.

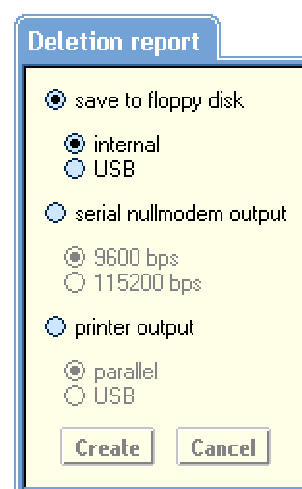
Furthermore, the final report contains the following information:

Information field	Meaning
Medium	Deleted drive or deleted partition.
Method	Applied deletion method.
Passes	Number of runs started.
Deleted sectors	Total number of deleted sectors.
Write errors	Total number of write errors occurred during the deletion process. Write errors, which occur during a verification run, are exclusively counted as verification errors.
Verification errors	Total number of errors occurred during a verification run. This includes read errors as well as non-identical data during comparison. This field is not shown, if no verification run was started.
Runtime	Time required for the whole process, i.e. for all deletion and verification runs (if executed).

With [Report] you can create a complete deletion report of the preceding deletion process (QV). You can also start another deletion process by clicking [*Delete another medium*] or end the program by clicking [*Quit HDS shredder*] (→ 5.12.2. Good-bye screen).

5.11.4. Deletion report

You can generate a complete deletion report from the dialog window containing the final report (→ 5.11.3. Final report). The deletion report contains a complete and comprehensive description of the previous erasure procedure and can serve as proof of the completed deletion towards the client, for instance. There are three possibilities to output the report:



III. 16: Generation of a deletion report

5.11.4.1. Storing on floppy disk

To store the report on a floppy disk, select *[Save to floppy disk]*. You can use an internal floppy disk drive (option *[internal]*) or a USB floppy disk drive (option *[USB]*). If possible, do not use the program floppy disk in order not to stress it unnecessarily. Remove any write protection from the floppy disk. Click on *[Create]* to save the deletion report on the floppy disk. The report will be written in the file SHREDxxx.LOG ("xxx" stands for a consecutive three-digit number). If you save several deletion reports on the same floppy disk, each report has its own number. This makes it possible to uniquely identify the different reports. The floppy disk must have at least one file entry in the main directory (max. 224) as well as about 5 KB of free memory (or more according to the erasure method used and the number of errors occurred). Finally, a message is displayed to indicate whether the report has been successfully saved. If you click on *[Abort]*, the deletion report will not be saved.

Note: Long file names need several file entries at once. Even if less than 224 files are listed in the main directory of the floppy disk, HDS shredder may issue the message "No free memory in the file system". In case of problems, you should generally use an empty or newly formatted floppy disk to save the deletion report.

5.11.4.2. Transmission via null modem connection

Select *[Serial null modem output]* to transmit the deletion report to another computer (destination device) via a serial cable. HDS shredder automatically uses the respective serial interface for the transmission; the interface does not have to be separately selected. You only need to indicate the speed according to the transmission speed set on the destination device (option *[9600 bps]* or *[115200 bps]*). Furthermore, the following transmission parameters should be set on the destination device before the transmission starts:

- Data bits: **8**
- Parity: **none**
- Stop bits: **1**

Click on *[Create]* to transmit the deletion report to the destination device via the serial interface. If you click *[Abort]*, you can terminate without outputting a deletion report.

5.11.4.3. Output to a printer

To output the deletion report to a printer, select *[Printer output]*. You can choose between the output to a parallel connected printer (option *[parallel]*) or to a USB connected printer (option *[USB]*). Click on *[Create]* to print out the deletion report. The report is automatically sent on the connected printer. If you click *[Abort]*, you can terminate without outputting a deletion report.

5.12. Ending the program

5.12.1. End dialog

You can end HDSHredder at any time. Possibly open dialog windows must be closed before. Click then the end symbol (→ 5.3.2. *Operating field*) in the upper right corner of the operating field (→ fig. 5) or press <ESC>. The end dialog appears (→ fig. 17) where you can cancel HDSHredder by clicking *[Yes]* and return to the program by clicking *[No]*. Furthermore, you can cancel HDSHredder directly after a terminated deletion process (→ 5.11.3. *Final report*).

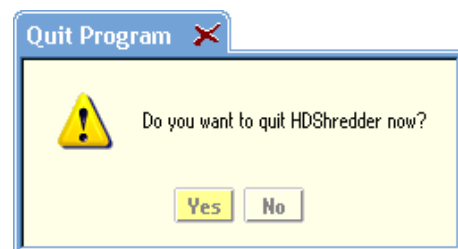


Fig. 17: End dialog

5.12.2. Good-bye screen

After the termination of HDSHredder, either via the end dialog (→ 5.12.1. *End dialog*) or via the dialog window with the final report (→ 5.11.3. *Final report*), a good-bye screen appears (→ fig. 18). You can then shut down the computer or reboot it.

Note: If you do not want to start HDSHredder when you start the computer the next time, remove the HDSHredder boot medium from the boot drive.



Fig. 18: Good-bye screen

6. OPERATING PRINCIPLES

This paragraph gives you detailed descriptions of the operating principles of the different deletion methods and modes and of the operation of HDShredder in case of defective media.

6.1. Area of erasure

HDShredder can handle both, complete hard disks and individual partitions. It can also delete sector-exact subareas (→ 6.1.5. *Erasing a sector area*). The meaning, effect, and areas of application of different deletion areas are described in the following sub-chapters. The different deletion areas allow you to determine which areas or which data are to be deleted (“What is deleted?”). Regardless of that, different deletion methods can be applied on the respective area (“How is deleted?”), see also → 6.2. *Deletion methods*.

6.1.1. Preliminary remark

Defining a deletion area with HDShredder allows you to determine exactly which data are to be deleted. This might also strongly influence the time required for the deletion. That time results from the amount of the sectors to be erased multiplied by the number of runs (according to the deletion method used, see → 6.2. *Deletion methods*).

Important: In case of doubt, you should always erase the complete medium. Only if you are entirely sure that only a part, e.g. an individual partition, is to be erased, you should limit the area of deletion by selecting the corresponding deletion area.

Tip: If you want to limit the area of deletion for reasons of time (e.g. complex deletion method), but you are not entirely sure whether the remaining areas are free of sensitive data, perform a simple deletion (→ 6.2.1.1. *Fast – 1 run*) of the entire medium at first. Afterwards, erase the limited area with the desired and more complex deletion method.

6.1.2. Physical deletion

In contrast to the “normal” deletion of files with the “delete” command or the trash or by formatting the medium, HDShredder does not only delete the file references from the

file directory (or the administration table) but also completely overwrites the contents of files and directories. This also applies for files which have already been deleted in the conventional manner. However, any medium or its sensitive areas should generally be overwritten once at least. This prevents the data thereon from being recovered using conventional data recovery software.

Warning: After the physical deletion, the entire deleted data can only be recovered with great technical expenditure – if possible at all – depending on the deletion method used (see → 6.2. *Deletion methods*). This also applies, of course, for an unintentional deletion. Before starting the deletion process, please make sure you only erase the desired medium. **A recovery of the data – also in case of an unintentional deletion – is generally impossible.**

6.1.3. Erasing an entire hard disk

This area of erasure physically deletes an entire drive. Each sector of the drive is overwritten once at least or even several times with a certain deletion pattern, both according to the deletion method selected (see → 6.2. *Deletion methods*). After the successful completion of the deletion process, all data and files previously stored on the drive are ultimately deleted, as well their names as their contents.



III. 19: Erasing a complete hard disk

Note: The physical deletion of entire drives overwrites all sectors on the drive. This destroys actually all data on the drive, including data which are not stored in files (e.g. hidden operating system data, boot sector viruses, etc.). HDS shredder also allows you to securely delete proprietary file systems (e.g. of industrial or medical systems).

This deletion area is particularly useful for the following areas of application:

- Secure deletion of drives with unknown data, e.g. as a service provider.
- Deletion of data outside the file system (e.g. hidden operating system data, viruses, etc.)
- Secure deletion of proprietary file systems and hard disk formats (e.g. of industrial or medical systems).

6.1.4. Erasing a single partition

This deletion area functions quite similarly to the previously described mode (→ 6.1.3. *Erasing an entire hard disk*). However, in this case, only the contents of a single partition is physically deleted and not the entire drive. The deletion is done by overwriting the partition once or several times with a certain deletion pattern, both depending on the deletion method selected (see → 6.2. *Deletion methods*).



III. 20: Erasing an individual partition

This deletion area is particularly useful for the following areas of application:

- Secure erasure of single partitions containing sensitive data.
- Selective erasure of data partitions, e.g. in case of a further use of the system installation.
- Reduction of the time required for the deletion by limiting the area to be deleted.
- Use of different deletion methods for different partitions.

6.1.5. Erasing a sector area

HDS shredder also allows you to only erase a particular area of sectors. For this reason the “Options” screen (→ 5.9. *Selecting the options*) offers you the point “sector area”. Here, you can specify the desired sector area exactly. Enter the first sector to be deleted in the input field “from” and the last sector to be deleted in the input field “to”. The preset value in the field “to” is the last sector of the selected medium or partition.

Important: The sectors specified for the sector area always refer to the initially selected deletion area (→ 5.6. *Selecting the deletion area*) and are indicated in relation to it. **Example:** If you have selected a partition as deletion area and specified the sector area from 0 to 9, the first 10 sectors of the partition will be erased, even if these sectors have another absolute number on the medium.

6.2. Deletion methods

HDS shredder offers the respective deletion methods adequate for different areas of application. They are grouped into three categories.

6.2.1. Automatic

This category is designed for a simple and secure deletion. It allows you to start the deletion procedure fast and easily without further detailed technical knowledge simply according to the criteria of time and security. The category therefore provides three deletion methods.

6.2.1.1. Fast – 1 run

This deletion method offers the highest possible deletion speed with one run only. This method already prevents the data from being easily readout or recovered with conventional data recovery software.

6.2.1.2. Medium – 3 runs

For technical reasons, the security against recovering the data in a laboratory increases with the number of deletion passes performed. This deletion method combines high security with a reasonable duration of the deletion process.

6.2.1.3. High security – 7 runs

This deletion method provides internationally approved security against recovering deleted data – even in a special data recovery laboratory. That is why its 7 runs require a certain period of time to perform the deletion.

6.2.2. Standards

This category allows you to perform the deletion according to one of the international standards. This category is particularly designed for users having to or wanting to fulfil a certain deletion standard for themselves or for their clients. Simply select the desired standard and the deletion will be performed according to the parameters required by this standard.

6.2.2.1. VSITR

Country: Germany
Origin: Bundesministerium des Innern (BMI) – German department of the interior
Passes: 1

6.2.2.2. BSI-GSB

Country: Germany

Origin: Bundesamt für Sicherheit in der Informationstechnik
Passes: 3

6.2.2.3. ACSI 33

Country: Australia
Origin: Communications-Electronic Security Instruction
Passes: 16

6.2.2.4. AFSSI 5020

Country: USA
Origin: Air Force System Security Instruction
Passes: 4

6.2.2.5. AR380-19

Country: USA
Origin: Army Regulation – Information Systems Security
Passes: 3

6.2.2.6. DoD5200.28M

Country: USA
Origin: Department of Defense – ADP Security Manual
Passes: 3

6.2.2.7. DoD5220.22M

Country: USA
Origin: Department of Defense – National Industrial Security Program Operating Manual (NISPOM)
Passes: 4

6.2.2.8. NCSC-TG-025

Country: USA
Origin: National Computer Security Center – Technical Guideline
Passes: 3

6.2.3. Custom

This category allows you to define the deletion method in all details (→ 5.8.3. *Custom*). Only few steps are necessary to define your own deletion method in order to customize the deletion to your individual requirements.

6.3. Troubleshooting

In case of occurring errors, HDS shredder tries to troubleshoot them the best possible. If this is not possible, the errors will be mentioned in a corresponding error statistic. The following chapters give you more detailed information on the troubleshooting and error statistic in HDS shredder.

6.3.1. Intensive reading/writing

In case of read or write errors, HDS shredder uses different strategies in order to still be able to read or write this data, if possible. The time used for defective areas depends to a large extent on the respective medium. According to the medium and its state, several seconds up to minutes can be needed for the recovery trials. Therefore, it is recommended to always activate the option *SmartDefectSkip* (→ 5.9.2. *General options*) because then handling defective sectors takes place after the deletion of all intact areas has been finished. The process can then be aborted if it takes too long without affecting deletion of the remaining data within the same pass.

6.3.2. Read errors

Read errors can only occur during verification runs. HDS shredder then tries to read the defective areas immediately after finishing of the current pass (with the option *SmartDefectSkip*, → 5.9.2. *General options*) with the help of special data recovery strategies within a separate error handling run (→ 5.10.6. *Course of the process*). During the error handling run, the number of the indicated read errors can decrease according to the areas on the medium, which could be recovered.

Note: With HDS shredder, read errors can only occur in verification runs, that occur during the verification run, since HDS shredder accesses the medium with write commands in all other cases. Therefore, read errors are counted as verification errors (→ 5.10.3. *Status indication*).

6.3.3. Write errors

Write errors can only occur during a deletion run. HDShredder then tries to write the defective areas immediately or after finishing the deletion process (with the option *SafeRescue*, → 5.9.2. *General options*) with the help of special data recovery strategies within a separate error handling run (→ 5.10.6. *Course of the process*). During the error handling run, the number of write errors indicated can decrease according to the areas on the medium, which finally could be written.

6.3.4. Verification errors

If it is required by the selected deletion method, HDShredder performs one or several verification runs at certain stages of the entire deletion process. A verification error is counted if the data in a sector do not correspond to the deletion pattern, which is actually supposed to be in this sector. Further on, reading errors, which occur during the verification run, are also counted as verification errors. The number of verification errors thus gives you absolute information on how many sectors could not be successfully overwritten during the deletion process. That is why in case of a clean deletion process, HDShredder should not indicate any verification errors at all and signalize 100% overwritten sectors.

7. TROUBLESHOOTING

This paragraph describes possible problems when using HDS shredder and offers proposals for solution. If there should be no proposal for solution for a problem, you can gladly contact our Support (→ 8.5. *Support*).

7.1. Load errors

During the start of the program, before HDS shredder is loaded itself, a message and a progress bar will appear on the boot screen. In case of an error, one of the following error codes will be indicated here.

7.1.1. Error #5002 and 'Disk error'

This error will be displayed if the boot medium is not readable when booting the program. The error is reported by the BIOS of the computer and points to a defective data carrier or a problem with the used boot drive. In many cases, in particular when booting from a floppy disk, an incompatibility between drive and data carrier is the cause. Principally this problem can be fixed. Please try the following steps, at best in the indicated order:

- Try again to boot the program, perhaps with/without cold start.
- Create once again a bootable disk (→ 4. *Installation*).
- **Floppy disk:** format the floppy disk (*no* quick format) before creating a new one.
- **Floppy disk:** use another floppy disk.
- Use (if possible) another boot drive.

Note: If you didn't receive HDS shredder as an installation package but on a bootable disk and if a disk shows this problems also after multiple trials on different devices, please contact our Support (→ 8.5. *Support*) and indicate your license number.

7.1.2. Other errors

If other errors in the form of #(number) should occur when loading the program, please contact our Support (→ 8.5. *Support*).

7.2. Keyboard and mouse

HDS shredder supports DIN and PS/2 keyboards as well as serial and PS/2 mice (→ 3. *Supported hardware*). If keyboard or mouse (or both) do not function with HDS shredder, this is usually because the concerned computer has only a USB keyboard or USB mouse. On most of the computers, you can fix this problem by activating the emulation for PS/2 devices in the BIOS setup. Please consult your computer manual on how to change this setting because modifying this option is different according to the respective BIOS. In most of the cases, you can find it under the name '*USB Legacy Support*' or '*USB Keyboard Support*' (often under '*Integrated Peripherals*' or '*Advanced Options*'). As an alternative, you can temporarily connect a PS/2 keyboard or mouse for running HDS shredder.

Note: In some of the cases, problems with the PS/2 keyboard and/or mouse occurred with an activated emulation for PS/2 devices. If you do not use any USB input devices, please switch off the PS/2 emulation in the BIOS setup.

7.3. General problems

7.3.1. Slowed down system

If you think the speed of the total system or the deletion speed – also with IDE and SCSI devices – is too slow, a USB controller can be the cause, even if it is not used (→ 7.6.4. *Speed loss*).

7.3.2. Read, write and verification errors

If HDS shredder reports errors, these are usually defective areas on the respective medium. However, general problems with the hardware can possibly also cause (putative) read and write errors. This is mostly noticeable by a very high number of displayed errors. First of all, try to fix the problem via the help instructions for the respective hardware types (IDE, SCSI, USB) because the causes are usually found there. If the problems cannot be fixed this way either, deactivate step by step the following options, at best in the indicated order:

- *CachedMemory*
- *Read cache and write cache*

- *DMA*
- *SharedMemory*

If the problem does not occur any more after having deactivated a certain option, the previously deactivated options can be reactivated as a test.

7.4. IDE/ATA/SATA

7.4.1. Hard disk not recognized

If HDS shredder does not recognize a hard disk, there can be several reasons. Perhaps the controller which the disk is connected to has not been found (→ 7.4.2. *IDE controller not found*). A further possible reason can be a non-standardly connected hard disk. This is for example the case if a hard disk is configured as slave and if a CD/DVD drive or no drive at all is connected at the same IDE channel as master. Normally, HDS shredder can handle that, too.

Note: If an SATA hard disk is not recognized, this can also be due to the used SATA controller (→ 3.3.2. *SATA/SATA II controller*).

7.4.2. IDE controller not found

There are the following three reasons why HDS shredder has not automatically recognized an IDE controller:

- The IDE controller/channel is deactivated, e.g. on an onboard IDE controller. Activate the IDE controller/channel via the BIOS setup.
- Standard IDE controllers (ISA) are not taken into account if PCI IDE controllers are available. Connect the respective hard disk to a PCI IDE controller in this case or deactivate the PCI IDE controller or controllers.
- The used controller does not correspond to the PCI IDE standard. Although most controllers support this standardized programming interface, there are some controllers which have only a proprietary programming interface. More detailed information can be found in → 3.3.1. *IDE/ATA controller*. Connect the corresponding drives to another controller (PCI IDE controller).

7.4.3. Problems with DMA

The following principal problems can occur with (Ultra) DMA:

- The achieved speed is too slow despite DMA. Please consider that the achievable speed (→ 3.3.5. *Speed*) depends on many factors and that this is not absolutely due to a problem with DMA.
- The DMA mode is not available. When selecting the options (→ 5.9.3. *Options for the medium*), the option DMA is deactivated and locked in this case.
- Read, write or verification errors occur when using DMA.

In all cases, the problems can be due to the same reasons. When having problems with DMA, you can principally use the PIO mode at any time. Deactivate the option *DMA* of the concerned drive when selecting the options (→ 5.9.3. *Options for the medium*). Since the PIO mode is usually much slower than DMA, we recommend to try first of all the following hints and help instructions to possibly be able to use the DMA mode. Please consider the notes in the subchapter → 7.4.4. *BIOS settings* as well.

- Check if the concerned drive really supports DMA. Some older hard disks and especially CompactFlash media do not support DMA.
- Make sure that from *Ultra DMA Mode 3* on an 80-wire data cable is used to connect the hard disk(s).
- Please note that when two hard disks are connected via the same cable, the DMA mode of the slower hard disk is also used for the faster drive. Remove the slower drive temporarily, if possible, or connect the drives via separate channels or cables.
- Try both connections of the data cable (center connection and connection to ground) in case of a single connected hard disk to eliminate possible problems with damping (center connection) and reflection (connection to ground).
- Switch the used UDMA mode to a lower value in the BIOS setup (→ 7.4.4.1. *Switch to a lower/higher UDMA mode*) or deactivate UDMA (→ 7.4.4.2. *Activate/deactivate UDMA*). The multi-word DMA mode will be (automatically) still available, which offers about a twice to four times higher speed than the PIO mode.
- On the other hand, you can also try to activate UDMA or to switch to a higher UDMA mode if the corresponding default settings in your BIOS setup are too low.

Note: Our tests showed that some chipsets and hard disks do not collaborate optimally. This can lead to the fact that the UDMA mode (putatively correctly) recognized and set in the BIOS is too high.

7.4.4. BIOS settings

The following notes refer to settings which you should possibly make in the BIOS setup of your computer if problems occur during the use of DMA. Since the settings offered by the BIOS setup are manufacturer- and model-specific, these notes can only be given in a general form. Consult your BIOS manual on how exactly to make these settings in your BIOS setup and which settings are available. You normally find the DMA settings under '*Integrated Peripherals*' or '*Chipset Setup*' in the BIOS setup.

Note: Please execute the automatic hard disk recognition in the BIOS after every modification of the DMA and hard disk settings so that the modifications for the corresponding drives become effective. Make sure to save the modifications via '*Save and Exit*' when leaving the BIOS setup.

7.4.4.1. Switch to a lower/higher UDMA mode

In many BIOS setups the (highest) used UDMA mode can be selected manually. If you have problems with DMA, try to switch the used mode step by step to a lower level at the corresponding IDE channel. Only if this does not solve the problem, deactivate UDMA completely. The controller then mostly (automatically) uses multi-word DMA, which is at least faster than PIO. You can switch the UDMA mode step by step to a higher level of course, if you think that you have not selected the best possible UDMA mode.

7.4.4.2. Activate/deactivate UDMA

Some BIOS setups do not offer a free selection of the UDMA mode but only an automatic recognition or deactivation. If this is the case with your BIOS or if you have already switched to the lowest UDMA mode and problems keep occurring, deactivate UDMA. Usually, multi-word DMA is (automatically) available then, which is often faster than PIO. Only if this doesn't function either, you should completely switch off the DMA mode in HDS shredder (→ 5.9.3. *Options for the medium*). If UDMA is deactivated in your BIOS setup, you can activate it as a test, of course, in order to attain a higher speed, if possible.

7.4.4.3. Deactivate IO caching

If there are problems in the PIO mode as well, you should deactivate IO caches and buffers. In particular the setting '*Dataport Postwrite*', if available, should be switched to '*Disable*' if there are problems.

7.4.4.4. Setting BIOS defaults

If HDS shredder should not work as desired despite all the above mentioned instructions, you can try to set standard values via the option '*Load BIOS/Setup Defaults*'. This setting tries to avoid possible hardware conflicts.

7.5. SCSI

When using SCSI devices, please make sure that they are correctly configured and connected to the SCSI controller. In particular SCSI controllers with SCSI BIOS must show a hard disk during the system start, so that HDS shredder can then address this hard disk. Furthermore, HDS shredder must support the controller you use. You find a list of the supported SCSI controllers in chapter → 3.4.2. *Compatibility*.

Note: Even if an SCSI controller shows the desired drives during the system start, this is no guarantee that they are correctly configured or connected. In principle, the BIOS of the SCSI controller works on a lower level than the SCSI drivers used by HDS shredder and can thus possibly recognize hard disk drives which are not recognized by HDS shredder itself.

HDS shredder has been tested on a range of SCSI controllers. Sporadically encountered problems are bypassed by the software as far as possible. The following subchapters contain useful hints on how to solve further random or sporadic problems. These hints should be applied in the described order to minimize the effort, if possible. The following problems occurred during the tests and could be bypassed with the hints from the following subchapters:

- HDS shredder stops during the device recognition (→ 5.6. *Selecting the deletion area*)
- no SCSI hard disks are recognized
- not all SCSI hard disks are recognized

7.5.1. Restart

If HDS shredder stops during the start procedure or does not show the desired SCSI drives, try a restart in form of a warm boot (reset button). Only if this does not fix the problem, you should try a cold start (switch off the PC and leave it switched off for about 30 seconds). Both forms of the restart can counter signal and status problems of SCSI controllers.

7.5.2. Deactivate unused controllers

If a restart does not lead to the desired result, you should, if your system disposes of several SCSI controllers, deactivate unused controllers. This is also recommended if a controller is principally used, but the hard disks connected to it are not needed for using HDS shredder.

7.5.3. Deactivate unused hard disks

In some cases, SCSI hard disks, which are connected to the same controller, can interfere with each other or even with the controller itself. Deactivate individual hard disks as a test or connect them step by step after one another to find out which hard disk possibly causes an interference. Make sure that the last SCSI device is always terminated also during the tests.

7.5.4. Minimum configuration of the controller

The configuration of the SCSI controller over its BIOS setup or the BIOS setup of the PC in case of onboard controllers can also solve the problem. Set the lowest resp. the securest values for the SCSI bus (e.g. transmission in the narrow mode of a wide controller).

7.5.5. Minimum configuration of the system

Try to connect the SCSI hard disks used in the system in a different way, especially if you use several SCSI controllers. Proceed as follows, if possible: deactivate all SCSI controllers except one. This controller should have one SCSI channel only, if possible, and be part of the controllers listed in → 3.4.3. *Manufacturer information*. Connect then the needed drive or drives only. Apart from defective drives, this strategy mostly allowed us to find a functioning configuration during our tests to execute the planned job.

7.6. USB

Despite the vast support of USB controllers and storage devices (→ 3.5. *USB*), there are some cases where these controllers and devices do not function as expected. The following subchapters provide you with hints and solution possibilities.

Note: Please check first of all in chapter → 1.4. *Edition overview* whether your HDS shredder edition supports USB. Otherwise, you need a higher edition of HDS shredder to use USB.

7.6.1. Storage device not recognized

Mostly, there are four possible reasons why a USB storage device supported by HDS shredder (→ 3.1. *Overview*) is not recognized:

- The USB storage device has been connected too late or exchanged afterwards. USB storage devices should be connected to the computer before starting HDS shredder (→ 5.1. *Preparing steps*).
- The USB storage device is not directly connected to the USB controller but via a hub (e.g. at the monitor). Always connect the USB devices, you wish to use with HDS shredder, directly to the USB controller or to the computer.
- The used device is no standard-conform *USB mass storage device* and does therefore not belong to the supported devices (→ 3.5.1. *Mass-Storage-Class*).
- The USB storage device is defective or works faultily. You should then test its functionality by using it with another PC or another operating system.

Note: If no USB storage device is recognized and if the above mentioned possibilities are excluded, the corresponding USB controller has probably not been recognized (→ 7.6.3. *Controller not found*).

7.6.2. Other device problems

Some devices, especially USB sticks, can show malfunctions in case of temperature rise or continuous operation, i.e. in case of continuous reading or writing big amounts of data. With HDS shredder, these problems manifest in read or write errors on the respective USB storage device, which do not always occur at the same location but after a certain operating time. Sometimes these hardware problems also lead to very long breaks during the deletion process, which can be up to several minutes. When selecting the options (→ 5.9.2. *General options*), try to deactivate the option *Cooling*

ing the options (→ 5.9.2. *General options*), try to deactivate the option *Cooling phase* for the concerned device. The deletion process takes a bit longer then, but in most of the cases the data transfer functions better.

Note: The described problems are mostly due to deficient hardware and also occur under other operating systems. We recommend you to exchange the concerned device at your manufacturer.

7.6.3. Controller not found

HDS shredder should recognize all current USB controllers which offer one of the USB standard interfaces (→ 3.5.2. *UHCI, OHCI and EHCI*). If HDS shredder recognizes USB devices on one PC but not on another PC or on another controller, the USB controller can have one of the following problems:

- The USB controller does not correspond to the UHCI, OHCI or EHCI standard. In this case, use another compatible (→ 3.5.2. *UHCI, OHCI and EHCI*) USB controller.
- The USB controller is deactivated, e.g. in case of an onboard USB controller. Activate the USB controller via the BIOS setup.
- The USB controller does not function correctly or is defective. Use another USB controller or another PC for the deletion process.

7.6.4. Speed loss

USB controllers can have a negative effect on the speed of the whole system. This particularly affects the deletion speed of *all* device types (also IDE and SCSI), even if no USB storage device is connected. Remove the corresponding USB controller if it is not needed during the use of HDS shredder. Otherwise, there are no negative effects apart from the speed loss.

Note: In our tests, this problem showed up with only one USB controller (VIA VT6212) and also persisted on other computers and operating systems with this controller. The measured speed loss on the PCI bus was at about 40% (!).

7.6.5. Other controller problems

Another problem is an incompatibility with certain USB storage devices caused by the USB controller. Especially older USB devices do not function flawlessly in such USB controllers. Use another USB controller, if possible.

Note: In our tests, this problem showed up with only one USB controller (*Acer ALi M5273*) and was also reproducible on other computers and operating systems.

8. MISCELLANEOUS

8.1. Terms of license

HDS shredder is designed to offer you the highest possible technical flexibility, and also the HDS shredder license conditions are designed not to limit your flexibility when using HDS shredder. Since you usually don't know at the beginning on how many computers and how often you will use the software, we offer you a very simple and cost-effective license model, which restricts you the least possible.

8.1.1. License model

The following table shows you the minimum number of licenses necessary for the respective area of use.

Edition	Private users	Companies/Institutions	Service providers
Free	sufficient	insufficient	insufficient
Basic	1 license	insufficient	insufficient
Standard	1 license	1 license per branch office ¹⁾ 1 license per 5 PCs ²⁾	insufficient
Professional	1 license	1 license per branch office ¹⁾ 1 license per dedicated PC ⁴⁾ 1 license per 25 PCs ²⁾	1 license per technician ³⁾
Enterprise	1 license	1 license per branch office ¹⁾ 1 license per dedicated PC ⁴⁾ 1 license per 100 PCs ²⁾	1 license per technician ³⁾

¹⁾ License is given for the respective other indicated criteria.

²⁾ The existing PC work stations, regardless of a use with HDS shredder.

³⁾ Technicians are all employees who use HDS shredder simultaneously or in the field service.

⁴⁾ PC which is exclusively used for HDS shredder, e.g. as a deletion station.

In practice, the use of HDS shredder can involve a different number of PCs according to the area of use, despite a similar use. Either the program is permanently used on one single or several few computers, which the media to be copied is connected to when needed. Or HDS shredder is always used directly on the respective computers, which

the media to be copied is connected to; mostly with only one usage per computer. To find a fair regulation for all use cases, you can choose between a license per dedicated PC and a license for a lump number of work station PCs where HDShredder could be used. Furthermore, you need additional licenses if you use HDShredder (potentially) in parallel on several PCs, e.g. if several service employees use HDShredder independently from each other. That is why you need at least one license per branch office because this also represents a (potentially) parallel use.

8.1.2. Examples

The following examples refer to more frequent license situations.

- A company with 50 PC work stations needs two licenses of the Professional Edition, whereof each covers 25 PC work stations.
- A company with 100 PC work stations needs four licenses of the Professional Edition, one for 25 PCs each.
- A service provider with two PCs that serve as HDShredder deletion station needs two licenses of the Professional Edition, one for each deletion station.
- A service provider with two field service employees who use HDShredder needs two licenses of the Professional Edition, one for each independently working technician.

8.1.3. Validity

A license is unlimited concerning the number of usages and the period of validity. It can be used as often as desired and without a time limit. However, the license is limited with regard to the (also potentially) parallel use on several computers and the size of the company or the institution concerning the number of existing PC work stations.

8.1.4. Consultancy

If you have questions concerning the license situation in your specific case, please contact us at products@miray.de. Miray Software gladly consults you on multiple licenses or more complex cases and offers you, according to the individual case, attractive discounts. We are pleased to make you an individual offer.

8.2. Certificate of authenticity

The following notes exclusively refer to the boxed versions of HDS shredder, that means *not* to the versions available as download or via email.

8.2.1. Security hologram

For the protection against bootleg copies, our software is equipped with a security hologram, among others. Each of the original data carriers you received bears a security hologram. Please keep the data carriers with the security hologram in any case because this is your license proof.

8.2.2. Valid product license

The condition to have a valid product license is that the number printed on the security hologram corresponds to the number shown within the program. If this should not be the case for your software package, please email us at products@miray.de. Please indicate the number displayed by the program, the number on the security hologram and where you acquired the software package. If there is no security hologram on the data carriers or if the security hologram is damaged, please contact us as well and indicate the above mentioned data. We will try to find a simple solution so that you obtain a valid license.

Note: Make sure that each data carrier you received bears its own security hologram with its own registration number and that this number has to correspond to the number of the program which has been started from this data carrier. That means if you start the program from a floppy disk, the displayed number has to correspond to the number of the security hologram on the floppy disk and not to the number of the security hologram on the CD.

8.3. Disclaimer

Although HDS shredder was programmed with the largest possible caution and was tested on a large scale of different systems, we hope you understand that we cannot assume any liability for the proper functionality of the program and that we are not liable for damages resulting from its usage, subject to gross negligence and intention.

8.4. Feedback

We are highly interested in your feedback. If you encounter any program errors or if you have any improvement ideas, we will always try to fix the errors and implement or integrate your ideas. If you only want to tell us your opinions on this software, we are looking forward to receive such information from you.

Internet	http://www.miray.de/
Email	feedback@miray.de
Fax	+49 (0)89 72013-647
Postal address	Miray Software Gaissacher Str. 18 81371 Munich Germany

8.5. Support

If you should have any problems with one of our products, our support team is gladly at your disposal. Please send us your inquiry at our homepage at <http://www.miray.de/support/> or email us at support@miray.de. Please note that inquiries sent directly per email and not over our homepage take a bit longer to be answered due to the system.