User Manual

3-Heights®
PDF Analysis & Repair API

Version 6.27.6

pdftools

Contents

1 Introduction

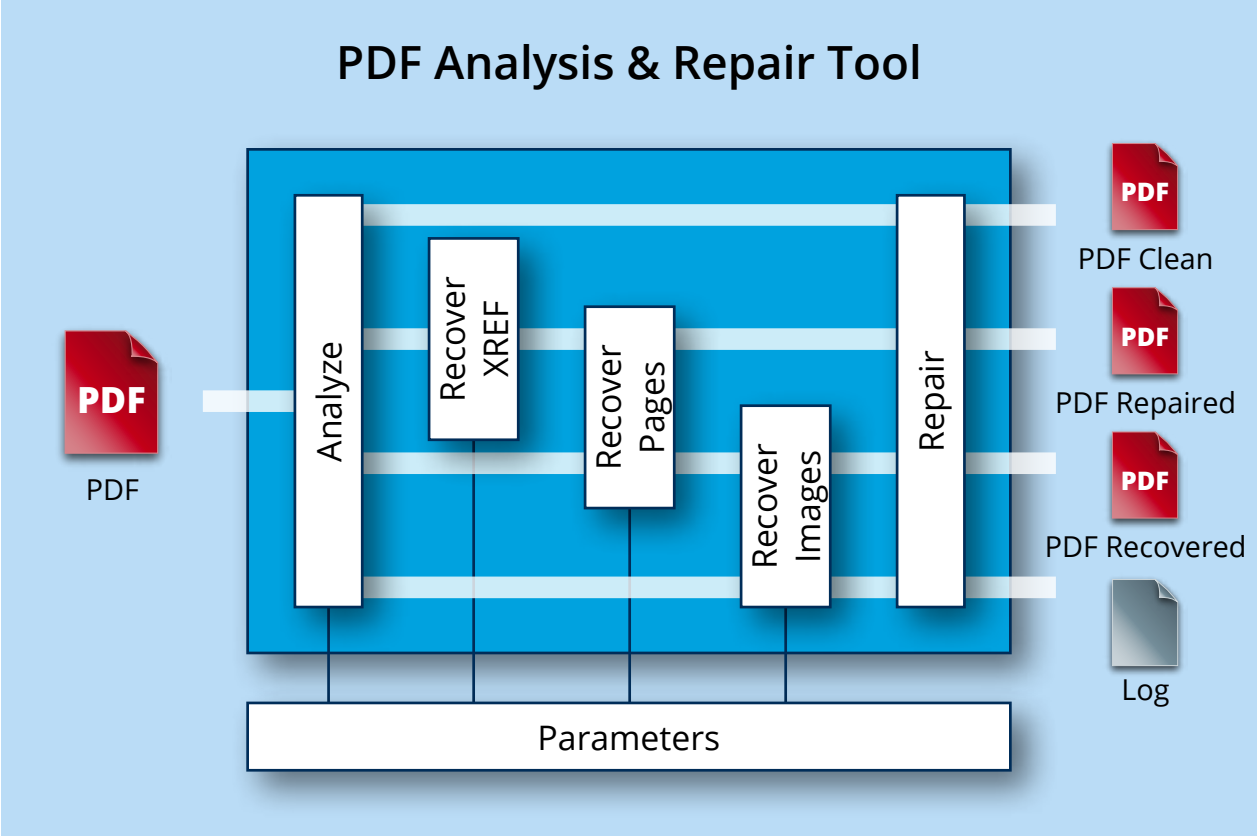
1.1 Description

The 3-Heights® PDF Analysis & Repair API tool is used to analyze, repair, and restore the content of corrupt PDF documents.

Unfortunately, the number of corrupt PDF documents is incredibly huge. The cause is usually down to defective generating tools, converters, and other influences such as attempts at manual editing, copying via FTP without correct settings, system crashes during PDF creation, network interruptions, and defective copying on optical media.

The result leads to an enormous loss of important information and to production downtimes caused by corrupt PDF documents.

The 3-Heights® PDF Analysis & Repair API analyzes PDF documents with regard to PDF specifications. Defective files are automatically repaired as far as possible and unreadable data is restored.



1.2 Functions

PDF Analysis & Repair API is used to check and, where indicated, repair PDF documents. Users can determine customized profiles from a broad range of analysis and repair options. An exact and detailed description is issued for each reported error. The tool is also capable of reading and processing encrypted PDF files without any problems.

1.2.1 Features

- Analyze and/or repair one or more PDF Documents
- Set analysis options, including:

    - Objects
    - Page tree
    - Content stream
- Set repair options, including:
    - Restore data streams
    - Restore fonts
    - Restore XRef table
    - Restore pages
    - Restore images, if pages cannot be restored
- Display error description for every message, including:
    - Type (errors, warnings, information)
    - Error code
    - Text-based description
    - Page number
    - Number of events
- Write error messages to log file
- Read encrypted PDF files
- Read input from and write output document to file or memory
- Encrypt restored file and set permission flags
- Set error level to identify whether errors, warnings or merely information occur
- Set reporting level to determine the messages to be issued (errors, warnings, information)
- Differentiate between “Repair” (corrects the errors in the document) and “Restore” (recreates the document based on the remaining legible information)

1.2.2 Formats

Input formats

- PDF 1.x (PDF 1.0, …, PDF 1.7)
- PDF 2.0
- PDF/A-1, PDF/A-2, PDF/A-3

Output formats

- PDF 1.x (PDF 1.0, …, PDF 1.7)
- PDF 2.0

1.2.3 Conformance

Standards:

- ISO 32000-1 (PDF 1.7)
- ISO 32000-2 (PDF 2.0)

1.3 Interfaces

The following interfaces are available:

- C
- Java

- .NET Framework
- .NET Core[1]
- COM

1.4 Operating systems

The 3-Heights® PDF Analysis & Repair API is available for the following operating systems:

- Windows Client 7+ | x86 and x64
- Windows Server 2008, 2008 R2, 2012, 2012 R2, 2016, 2019, 2022 | x86 and x64
- Linux:
  - Red Hat, CentOS, Oracle Linux 7+ | x64
  - Fedora 29+ | x64
  - Debian 8+ | x64
  - Other: Linux kernel 2.6+, GCC toolset 4.8+ | x64
- macOS 10.10+ | x64

'+' indicates the minimum supported version.

1.5 How to best read this manual

If you are reading this manual for the first time and would like to evaluate the software, the following steps are suggested:

1. Read the Introduction chapter to verify this product meets your requirements.
2. Identify what interface your programming language uses.
3. Read and follow the instructions in Installation and deployment.
4. In Programming interfaces, find your programming language. Please note that not every language is covered in this manual.
   For most programming languages, there is sample code available. To start, it is generally best to refer to these samples rather than writing code from scratch.
5. (Optional) Read the User guide for general information about the API. Read the Interface reference for specific information about the functions of the API.

[1] Limited supported OS versions. Operating systems

2 Installation and deployment

2.1 Windows

The 3-Heights® PDF Analysis & Repair API comes as a ZIP archive or as a NuGet package.

To install the software, proceed as follows:

1. You need administrator rights to install this software.
2. Log in to your download account at https://www.pdf-tools.com. Select the product "PDF Analysis & Repair API". If you have no active downloads available or cannot log in, please contact pdfsales@pdf-tools.com for assistance.
   You can find different versions of the product available. Download the version that is selected by default. You can select a different version.
   The product comes as a ZIP archive containing all files, or as a NuGet package containing all files for development in .NET.
   There is a 32 and a 64-bit version of the product available. While the 32-bit version runs on both 32 and 64-bit platforms, the 64-bit version runs on 64-bit platforms only. The ZIP archive as well as the NuGet package contain both the 32-bit and the 64-bit version of the product.
3. If you are using the ZIP archive, uU nzip the archive to a local folder, e.g. `C:\Program Files\PDF Tools AG\`.
   This creates the following subdirectories (see also ZIP archive):

Subdirectory	Description
`bin`	Runtime executable binaries
`doc`	Documentation
`include`	Header files to include in your C/C++ project
`jar`	Java archive files for Java components
`lib`	Object file library to include in your C/C++ project
`samples`	Sample programs in various programming languages

4. The usage of the NuGet package is described in section NuGet package.
5. (Optional) Register your license key using the License management.
6. Identify the interface you are using. Perform the specific installation steps for that interface described in Interface-specific installation steps.

2.2 Linux and macOS

This section describes installation steps required on Linux or macOS.

The Linux and macOS version of the 3-Heights® PDF Analysis & Repair API provides two interfaces:

- Java interface
- Native C interface

Here is an overview of the files that come with the 3-Heights® PDF Analysis & Repair API:

File description

Name	Description
bin/x64/libPdfRepairAPI.so	Shared library that contains the main functionality. The file's extension differs on macOS, (.dylib instead of .so).
doc/*.*	Documentation
include/*.h	Header files to include in your C/C++ project
jar/REPA.jar	Java API archive
samples	Example code

2.2.1 Linux

1. Unpack the archive in an installation directory, e.g. /opt/pdf-tools.com/
2. Verify that the GNU shared libraries required by the product are available on your system:

```
ldd libPdfRepairAPI.so
```

   If the previous step reports any missing libraries, you have two options:
   a. Download an archive that is linked to a different version of the GNU shared libraries and verify whether they are available on your system. Use any version whose requirements are met. Note that this option is not available for all platforms.
   b. Use your system's package manager to install the missing libraries. It usually suffices to install the package libstdc++6.
3. Create a link to the shared library from one of the standard library directories, e.g.

```
ln -s /opt/pdf-tools.com/bin/x64/libPdfRepairAPI.so /usr/lib
```

4. Optionally, register your license key using the license manager.
5. Identify the interface you are using. Perform the specific installation steps for that interface described in Interface-specific installation steps.

2.2.2 macOS

The shared library must have the extension .jnilib for use with Java. Create a file link for this purpose by using the following command:

```
ln libPdfRepairAPI.dylib libPdfRepairAPI.jnilib
```

2.3 ZIP archive

The 3-Heights® PDF Analysis & Repair API provides four different interfaces. The installation and deployment of the software depend on the interface you are using. The table below shows the supported interfaces and some of the programming languages that can be used.

Interface	Programming languages
.NET	The MS software platform .NET can be used with any .NET capable programming language such as: ■ C# ■ VB .NET ■ J# ■ others For a convenient way to use this interface, see NuGet package.
Java	The Java interface is available on all platforms.
COM	The component object model (COM) interface can be used with any COM-capable programming language, such as: ■ MS Visual Basic ■ MS Office Products such as Access or Excel (VBA) ■ C++ ■ VBScript ■ others This interface is available in the Windows version only.
C	The native C interface is for use with C and C++. This interface is available on all platforms.

2.3.1 Development

The software development kit (SDK) contains all files that are used for developing the software. The role of each file in each of the four different interfaces is shown in table Files for development. The files are split in four categories:

Req. The file is required for this interface.

Opt. The file is optional. See also the File description table to identify the files are required for your application.

Doc. The file is for documentation only.

Empty field An empty field indicates this file is not used for this particular interface.

Files for development

Name	.NET	Java	COM	C
bin\‹platform›\PdfRepairAPI.dll	Req.	Req.	Req.	Req.
bin*NET.dll	Req.			
bin*NET.xml	Doc.			
doc*.pdf	Doc.	Doc.	Doc.	Doc.
doc\PdfRepairAPI.idl			Doc.	
doc\javadoc*.*		Doc.		

Files for development

Name	.NET	Java	COM	C
include\pdfrepairapi_c.h				Req.
include*.*				Opt.
jar\REPA.jar		Req.		
lib\‹platform›\PdfRepairAPI.lib				Req.[2]
samples*.*	Doc.	Doc.	Doc.	Doc.

The purpose of the most important distributed files is described in the File description table.

File description

Name	Description
bin\‹platform›\PdfRepairAPI.dll	DLL that contains the main functionality (required), where ‹platform› is either Win32 or x64 for the 23-bit or the 64-bit library, respectively.
bin*NET.dll	.NET assemblies are required when using the .NET interface. The files bin*NET.xml contain the corresponding XML documentation for MS Visual Studio.
doc*.*	Documentation
include*.*	Files to include in your C / C++ project
lib\‹platform›\PdfRepairAPI.lib	On Windows operating systems, the object file library needs to be linked to the C/C++ project.
jar\REPA.jar	Java API archive
samples*.*	Sample programs in different programming languages

2.3.2 Deployment

For the deployment of the software, only a subset of the files are required. The table below shows the files that are required (Req.), optional (Opt.) or not used (empty field) for the four different interfaces.

Files for deployment

Name	.NET	Java	COM	C
bin\‹platform›\PdfRepairAPI.dll	Req.	Req.	Req.	Req.

[2] Not required for Linux or macOS.
[3] These files must reside in the same directory as PdfRepairAPI.dll.

Files for deployment

`bin\*NET.dll`	Req.
`jar\REPA.jar`	Req.

The deployment of an application works as described below:

1. Identify the required files from your developed application (this may also include color profiles).
2. Identify all files that are required by your developed application.
3. Include all these files in an installation routine such as an MSI file or a simple batch script.
4. Perform any interface-specific actions (e.g. registering when using the COM interface).

Example: This is a very simple example of how a COM application written in Visual Basic 6 could be deployed.

1. The developed and compiled application consists of the file `application.exe`. Color profiles are not used.
2. The application uses the COM interface and is distributed on Windows only.
   - The main DLL `PdfRepairAPI.dll` must be distributed.
3. All files are copied to the target location using a batch script. This script contains the following commands:

```
copy application.exe %targetlocation%\.
copy PdfRepairAPI.dll %targetlocation%\.
```

4. For COM, the main DLL needs to be registered in silent mode (`/s`) on the target system. This step requires PowerUser privileges and is added to the batch script.

```
regsvr32 /s %targetlocation%\PdfRepairAPI.dll.
```

2.4 NuGet package

NuGet is a package manager that lets you integrate libraries for software development in .NET. The NuGet package for the 3-Heights® PDF Analysis & Repair API contains all the libraries needed, both managed and native.

Installation

The package `PdfTools.PdfRepair 6.27.6` is available on nuget.org. Right-click on your .NET project in Visual Studio and select “Manage NuGet Packages...”. Finally, select the package source “nuget.org” and navigate to the package `PdfTools.PdfRepair 6.27.6`.

Development

The package `PdfTools.PdfRepair 6.27.6` contains .NET libraries with versions .NET Standard 1.1, .NET Standard 2.0, and .NET Framework 2.0, and native libraries for Windows, macOS, and Linux.

The required native libraries are loaded automatically. All project platforms are supported, including “AnyCPU”.

To use the software, you must first install a license key for the 3-Heights® PDF Analysis & Repair API. To do this, you have to download the product kit and use the license manager in it. See also License management.

Note: This NuGet package is only supported on a subset of the operating systems supported by .NET Core. See also Operating systems.

2.5 Interface-specific installation steps

2.5.1 COM interface

Registration

Before you can use the 3-Heights® PDF Analysis & Repair API component in your COM application program, you have to register the component using the `regsvr32.exe` program that is provided with the Windows operating system. The following command shows how to register the PdfRepairAPI.dll. In Windows Vista and later, the command needs to be executed from an administrator shell.

```
regsvr32 "C:\Program Files\PDF Tools AG\bin\‹platform›\PdfRepairAPI.dll"
```

Where `‹platform›` is `Win32` for the 32-bit and `x64` for the 64-bit version.

If you are using a 64-bit operating system and would like to register the 32-bit version of the 3-Heights® PDF Analysis & Repair API, you need to use the `regsvr32` from the directory `%SystemRoot%\SysWOW64` instead of `%SystemRoot%\System32`.[4]

If the registration process succeeds, a corresponding dialog window is displayed. The registration can also be done silently (e.g. for deployment) using the switch `/s`.

Other files

The other DLLs do not need to be registered, but for simplicity, it is suggested that they reside in the same directory as the `PdfRepairAPI.dll`.

2.5.2 Java interface

The 3-Heights® PDF Analysis & Repair API requires Java version 7 or higher.

For compilation and execution

When using the Java interface, the Java wrapper `jar\REPA.jar` needs to be on the CLASSPATH. You can do this by either adding it to the environment variable CLASSPATH, or by specifying it using the switch `-classpath`:

```
javac -classpath ".;C:\Program Files\PDF Tools AG\jar\REPA.jar" ^
 sampleApplication.java
```

For execution

Additionally, the library `PdfRepairAPI.dll` needs be in one of the system's library directories[5] or added to the Java system property `java.library.path`. You can add the library by either adding it dynamically at program startup before using the API, or by specifying it using the switch `-Djava.library.path` when starting the Java VM. Choose the correct subdirectory (`x64` or `Win32` on Windows) depending on the platform of the Java VM[6].

[4] Otherwise, you get the following message: `LoadLibrary("PdfRepairAPI.dll") failed - The specified module could not be found.`

[5] On Windows defined by the environment variable PATH, and on Linux defined by LD_LIBRARY_PATH.

[6] If the wrong data model is used, there is an error message similar to this: "`Can't load IA 32-bit .dll on a AMD 64-bit platform`"

```
java -classpath ".;C:\Program Files\PDF Tools AG\REPA.jar" ^
 "-Djava.library.path=C:\Program Files\PDF Tools AG\bin\x64" sampleApplication
```

On Linux or macOS, the path separator usually is a colon and hence the above changes to something like:

```
... -classpath ".:/path/to/REPA.jar" ...
```

2.5.3 .NET interface

The 3-Heights® PDF Analysis & Repair API does not provide a pure .NET solution. Instead, it consists of a native library and .NET assemblies, which call the native library. This has to be accounted for when installing and deploying the tool.

It is recommended that you use the NuGet package. This ensures the correct handling of both the .NET assemblies and the native library.

Alternatively, the files in the ZIP archive can be used directly in a Visual Studio project targeting .NET Framework 2.0 or later. To achieve this, proceed as follows:

The .NET assemblies (`*NET.dll`) are added as references to the project; they are needed at compile time. `PdfRepairAPI.dll` is not a .NET assembly, but a native library. It is not added as a reference to the project. Instead, it is loaded during execution of the application.

For the operating system to find and successfully load the native library `PdfRepairAPI.dll`, it must match the executing application's bitness (32-bit versus 64-bit) and it must reside in either of the following directories:

- In the same directory as the application that uses the library
- In a subdirectory `win-x86` or `win-x64` for 32-bit or 64-bit applications, respectively
- In a directory that is listed in the PATH environment variable

In Visual Studio, when using the platforms "x86" or "x64", you can do this by adding the 32-bit or 64-bit `PdfRepairAPI.dll`, respectively, as an "existing item" to the project, and setting its property "Copy to output directory" to true. When using the "AnyCPU" platform, make sure, by some other means, that both the 32-bit and the 64-bit `PdfRepairAPI.dll` are copied to subdirectories `win-x86` and `win-x46` of the output directory, respectively.

2.5.4 C interface

- The header file `pdfrepairapi_c.h` needs to be included in the C/C++ program.
- On Windows operating systems, the library `PdfRepairAPI.lib` needs to be linked to the project.
- The dynamic link library `PdfRepairAPI.dll` needs to be in a path of executables (e.g. on the environment variable `%PATH%`).

2.6 Uninstall, Install a new version

If you have used the ZIP file for the installation, undo all the steps done during installation, e.g. de-register using `regsvr32.exe /u`, delete all files, etc.

Installing a new version does not require you to previously uninstall the old version. The files of the old version can directly be overwritten with the new version.

2.7 Note about the evaluation license

With the evaluation license, the 3-Heights® PDF Analysis & Repair API automatically adds a watermark to the output files.

3 License management

The 3-Heights® PDF Analysis & Repair API requires a valid license in order to run correctly. If no license key is set or the license is not valid, then most of the interface elements documented in Interface reference fail with an error code and error message indicating the reason.

More information about license management is available in the license key technote.

4 Programming interfaces

4.1 Visual Basic 6

After installing the 3-Heights® PDF Analysis & Repair API and registering the COM interface (see COM interface), you find a Visual Basic example `repair.vbp` in the directory `samples\VB\`. You can either use this sample as a base for an application or you can start from scratch.

The 3-Heights® PDF Analysis & Repair API is very easy to use.

Example: A Visual Basic 6 sample looks as simple as this

```
Private Sub repair_Click()
    Dim repair As New PDFREPAIRAPILib.PDFRepair
    repair.repair "C:\input.pdf", "C:\output.pdf", "C:\log.txt"
End Sub
```

If a PDF document cannot be repaired and contains images, it is possible to recover the images by setting the property:

```
repair.RecoveryOptions = repair.RecoveryOptions or eRecoverImages
```

4.2 ASP VBScript

The class name to be used is `"PDFREPAIRAPI.PDFRepair"`.

Simplified example:

```
<%@ Language=VBScript %>
<%
    option explicit
    dim repair
    set repair = Server.CreateObject("PDFREPAIRAPI.PDFRepair")
    repair.Open("path\file_to_be_repaired.pdf")
    repair.AnalyzeAndRepair()
    repair.SaveAs("path\output_file.pdf")
    repair.Close
%>
```

4.3 .NET

There should be at least one .NET sample for MS Visual Studio available in the ZIP archive of the Windows version of the 3-Heights® PDF Analysis & Repair API. The easiest to quickly start is to refer to this sample.

To create a new project from scratch, perform the following steps:

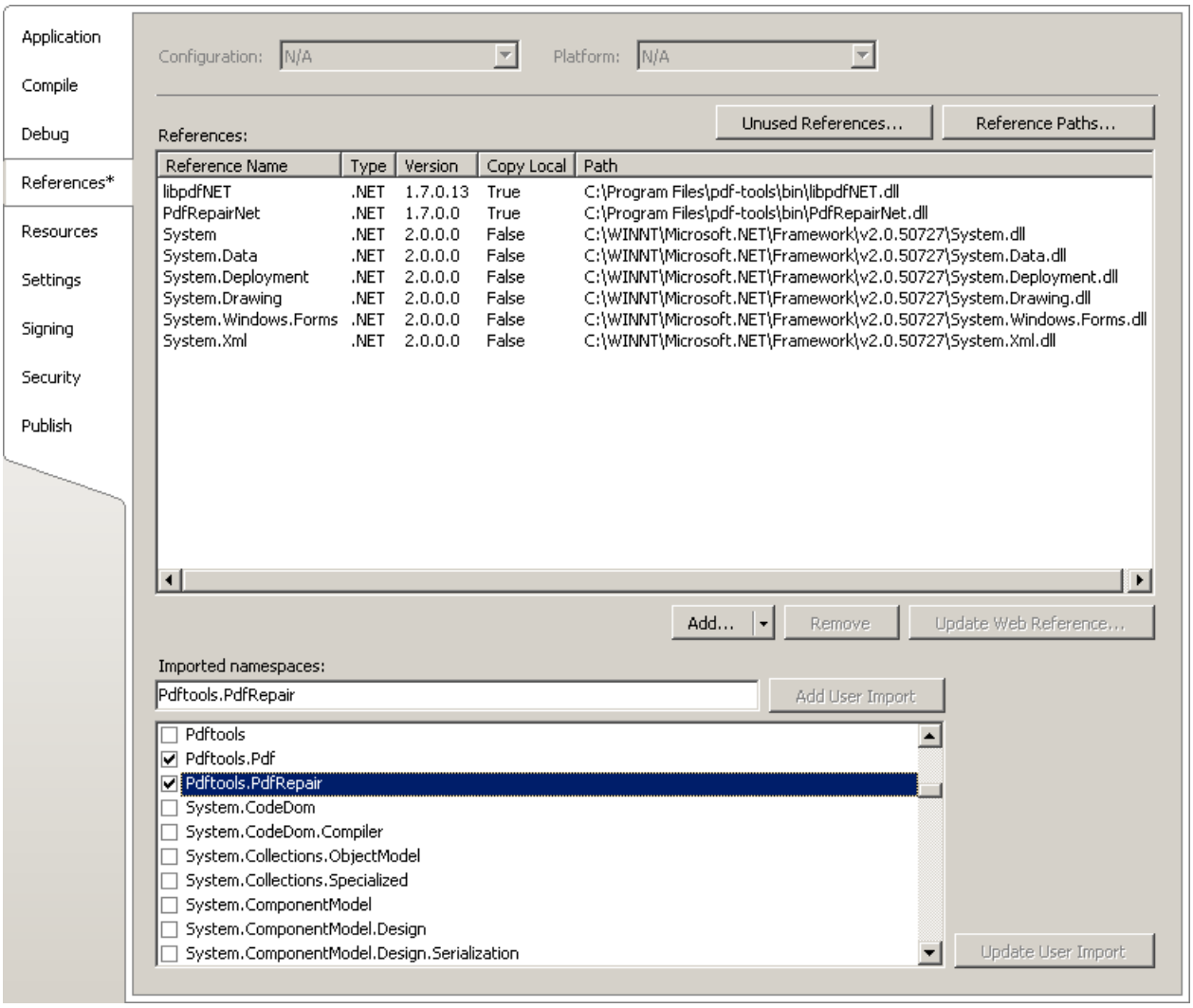
1. Start Visual Studio and create a new C# or VB project.
2. Add references to the NuGet package `PdfTools.PdfRepair 6.27.6`, as described in NuGet package.

3. Import namespaces (Note: This step is optional, but useful.)
4. Write your code.

Steps 3 and 4 are shown separately for C# and Visual Basic.

4.3.1 Visual Basic

3. Double-click "My Project" to view its properties. On the left hand side, select the menu "References". The .NET assemblies you added before should show up in the upper window. In the lower window, import the namespaces `Pdftools.Pdf`, and `Pdftools.PdfRepair`.
   You should now have settings similar as in the screenshot below:



4. The .NET interface can now be used as shown below:

Example:

```
Dim doc As New Pdftools.PdfRepair.Repair
' Or if the namespace Pdftools.PdfRepair is imported:
' Dim doc As New Repair
doc.Open(...)
...
```

4.3.2 C#

3. Add the following namespaces:

Example:

```
using Pdftools.Pdf;
using Pdftools.PdfRepair;
```

4. The .NET interface can now be used as shown below:

Example:

```
using (Repair doc = new Repair())
{
    doc.Open(...)
    ...
}
```

4.3.3 Deployment

This is a guideline on how to distribute a .NET project that uses the 3-Heights® PDF Analysis & Repair API:

1. The project must be compiled using Microsoft Visual Studio. See also .NET interface.
2. For deployment, all items in the project's output directory (e.g. `bin\Release`) must be copied to the target computer. This includes the 3-Heights® PDF Analysis & Repair API's .NET assemblies (`*NET.dll`), as well as the native library (`PdfRepairAPI.dll`) in its 32 bit or 64 bit version or both. The native library can alternatively be copied to a directory listed in the PATH environment variable, e.g. `%SystemRoot%\System32`.
3. It is crucial that the native library `PdfRepairAPI.dll` is found at execution time, and that the native library's format (32 bit versus 64 bit) matches the operating system.
4. The output directory may contain multiple versions of the native library, e.g. for Windows 32 bit, Windows 64 bit, MacOS 64 bit, and Linux 64 bit. Only the versions that match the target computer's operating system need be deployed.
5. If required by the application, optional DLLs must be copied to the same folder. See Deployment for a list and description of optional DLLs.

4.3.4 Troubleshooting: TypeInitializationException

The most common issue when using the .NET interface is that the correct native DLL `PdfRepairAPI.dll` is not found at execution time. This normally manifests when the constructor is called for the first time and an exception of type `System.TypeInitializationException` is thrown.

This exception can have two possible causes, which you distinguish by the inner exception (property `InnerException`):

`System.DllNotFoundException` Unable to load DLL `PdfRepairAPI.dll`: The specified module could not be found.

`System.BadImageFormatException` An attempt was made to load a program with an incorrect format.

The following sections describe in more detail how to resolve these issues.

Troubleshooting: DllNotFoundException

This means that the native DLL `PdfRepairAPI.dll` could not be found at execution time.

Resolve this by performing one of these actions:

- Use the NuGet package.
- Add `PdfRepairAPI.dll` as an existing item to your project and set its property "Copy to output directory" to "Copy if newer", or
- Add the directory where `PdfRepairAPI.dll` resides to the environment variable `%Path%`, or
- Manually copy `PdfRepairAPI.dll` to the output directory of your project.

Troubleshooting: BadImageFormatException

The exception means that the native DLL `PdfRepairAPI.dll` has the incorrect "bitness" (i.e. platform 32 vs. 64 bit). There are two versions of `PdfRepairAPI.dll` available in the ZIP archive: one is 32-bit (directory `bin\Win32`) and the other 64-bit (directory `bin\x64`). It is crucial that the platform of the native DLL matches the platform of the application's process.

(Using the NuGet package normally ensures that the matching native DLL is loaded at execution time.)

The platform of the application's process is defined by the project's platform configuration for which there are three possibilities:

AnyCPU This means that the application runs as a 32-bit process on 32-bit Windows and as 64-bit process on 64-bit Windows. When using AnyCPU, then the correct native DLL must be used, depending on the Windows platform. You can perform this either when installing the application by installing the matching native DLL, or at application start-up by determining the application's platform and ensuring the matching native DLL is loaded. The latter can be achieved by placing both the 32 bit and the 64 bit native DLL in subdirectories `win-x86` and `win-x64` of the application's directory, respectively.

x86 This means that the application always runs as 32-bit process, regardless of the platform of the Windows installation. The 32-bit DLL runs on all systems.

x64 This means that the application always runs as 64-bit process. As a consequence, the application will not run on a 32-bit Windows system.

5 User guide

5.1 Overview of the API

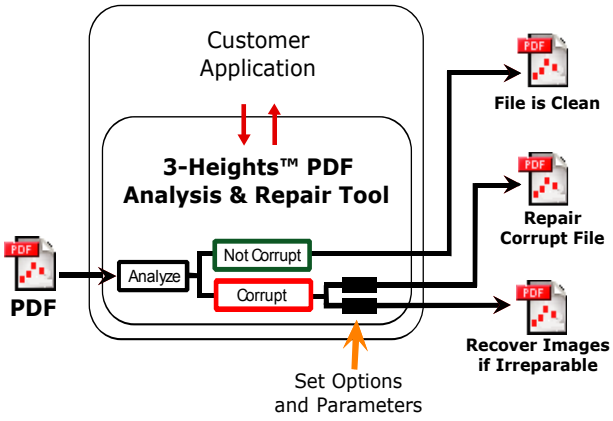
5.1.1 About 3-Heights® PDF Analysis & Repair API

The API provides two main functionalities as its name indicates:

1. Analyze PDF documents, detect and report corrupt parts.
2. Repair or recover the detected corrupt parts and save the result in a new PDF document.

5.2 About the API

The API requires a PDF document as input. The graphic shows the PDF input document on the left hand side.



1. In a first step, the input document is opened for reading. This is done using the `Open` function.
2. In the next step, analysis options are set using the `AnalysisOptions` property. The more analysis options set, the deeper the analysis goes and the longer it takes.
3. If the document is going to be repaired later on, the recovery options can be set at this point using the `RecoveryOptions` property.
   Recovery options can also be set after the analysis and before the repair step. However, these two steps can be combined. Therefore, it make sense to set them previously.
4. The document is analyzed using either the `Analyze` or `AnalyzeAndRepair` functions. As a result of the analysis, the document is qualified valid or corrupt.
5. For corrupt documents, all corrupted parts are listed in an error report. For an analysis-only process, the input document can now be closed and the process is done.
6. If the process is also to repair the document, it is saved as a new PDF document using the `SaveAs` function. If the user chooses to repair the PDF document, a new PDF document is created. This document is referred to as output document. The output document is completely rebuilt from scratch using all readable information from the input document. This means if a valid PDF document is repaired, a new document is created.
   If a PDF document is corrupt, the PDF can either be repaired or recovered depending on the level of corruption. See What is the difference between repair and recover?.
7. The input document is closed using `Close`.

See also Concepts.

5.3 Corrupt PDF documents

5.3.1 How do PDF documents become corrupt?

Reason 1: Incorrect PDF creators PDF is a complex format. Its specification is more than 1000 pages. Within PDF, there are embedded objects such as different types of fonts, images, or compressions, which have their own complexity and specifications that are even more extensive than the PDF specification itself.

There are uncountable different PDF products available. Virtually none of them are capable to support everything PDF offers. Only few of them create actually valid PDF. Most freeware or homemade PDF creators have flaws. These flaws are often not detected initially, simply because the widely used PDF viewer applications detect and repair these errors on the fly. The creator of the PDF doesn't even notice the PDF is corrupt, because the PDF viewer application fixes or ignores the problem silently. A creator often does not have the goal to create a valid PDF, but just a PDF that can be viewed.

Reason 2: Binary file is damaged PDF is a binary format. Most of its content is compressed. Editing a PDF file with a text editor, or transmitting a PDF in text mode instead of binary mode (e.g. FTP) corrupts the PDF. Partially transmitting a PDF file cuts off part of the document. This loss of information is not recoverable.

There are further reasons, but the two reasons mentioned are certainly the most common.

5.3.2 How do I detect corrupt parts in a PDF?

The most obvious way to detect a problem with a PDF document is if it doesn't open in a PDF viewer application, there is an error message when opening the document, or part of the document cannot be displayed correctly. For most users, this is the only situation where they actually are aware the document is corrupt. Any other corruption that has no direct impact to viewing the document is often ignored.

If documents are being archived or must be of good quality for other reasons, they can be analyzed using a PDF analysis tool.

The 3-Heights® PDF Analysis & Repair API analyzes documents and detects whether they are valid according to the PDF specification.

A simpler test to see whether a document is valid or not is to open it in Adobe Acrobat Professional and close it again. If you are asked to save the document, it can be an indication that the original document is corrupt and has been repaired, and the repaired document is now displayed to the user. This test does not provide any information about what was corrupt, i.e. what was repaired. The save prompt could also be unrelated to corruption, but be of another nature, such as a JavaScript.

5.3.3 What is the difference between repair and recover?

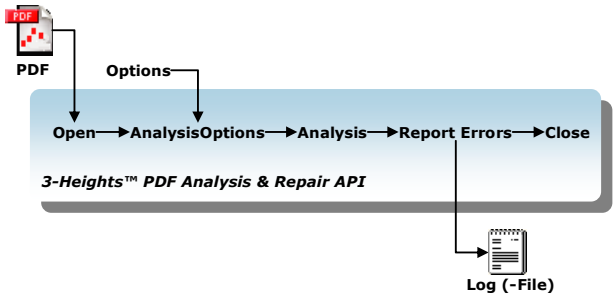
The 3-Heights® PDF Analysis & Repair API can repair virtually everything it can detect. However, it cannot recover lost information. For example, if a PDF document was sent via email attachment and only half of the attachment was sent before the connection was cut, the information is lost. If the information is lost, a document cannot be transformed back to its original state. In this case, the document can only be recovered, meaning all the remaining information contained in the PDF document is recovered and used to create a new, valid PDF. However, the new PDF is different from the original.

If a document contains syntactic or semantic faults that can be detected and fixed, the document can be repaired. A trivial example for such a case is image that contains image data with a length of 100 bits. However, the Length attribute of the image object states a different, incorrect value. Then this value can be corrected and the document can be repaired.

5.4 Concepts

5.4.1 Analysis only

The analysis only process is the most simple process that can be implemented by the API. The steps in this process are shown in the graphic below:



- A new PDFRepair object is created.
- A PDF input document is opened using the `Open` function.
- Analysis options are set using the `AnalysisOptions` property. This step is optional.
- The analysis of the input document is performed using the `Analyze` function.
- A list of error objects can be retrieved using the `GetFirstError` function and consecutive calls to the `GetNextError` function until no more errors are returned. An error objects provides information about a corruption error, such as an error code or an error message.
- The input document is then closed again using the `Close` function.

Call sequence for analysis only

- Create object
- `Open`
- `AnalysisOptions`
- `Analysis`
- Report errors
- `Close`

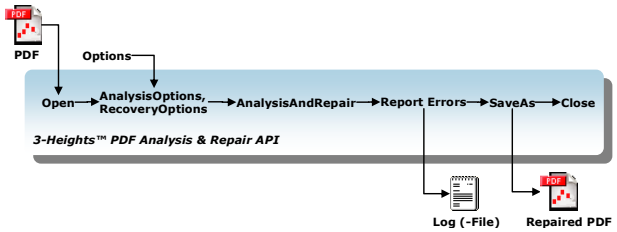
Example: A simplified Visual Basic 6 program with the above call sequence looks about as shown below:

```
Dim repair As New PDFREPAIRAPILib.PDFRepair
repair.Open(...)
repair.AnalysisOptions = ...
repair.Analysis()
' Report Errors
Dim Err As PDFREPAIRAPILib.PdfError
Set Err = repair.GetFirstError
While (Not Err Is Nothing)
' Do something with the error, e.g.\ output Err.Message
...
Set Err = repair.GetNextError
Wend
repair.Close()
```

A more detailed and executable Visual Basic 6 sample is provided with the release as well as with the evaluation version.

5.4.2 Analysis & repair

Often corrupt documents not only need to be detected, but also repaired or recovered. As opposed to the analysis only process, here the file is analyzed and repaired in one step using the `AnalyzeAndRepair` function. The repaired document is saved as a new document using the `SaveAs` function.

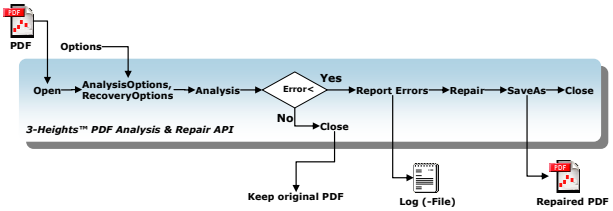


Call sequence for analysis and repair

- Create Object
- `Open`
- Set `AnalysisOptions` and `RecoveryOptions`
- `AnalysisAndRepair`
- `SaveAs`
- Report Errors
- `Close`

5.4.3 Analysis & conditional repair

In the Analysis & Repair process using `AnalyzeAndRepair`, every document is repaired, regardless of the analysis. A more sophisticated approach is to separate these two steps to first analyze the document and only repair it if corruptions are actually detected.



Call sequence for analysis and conditional repair

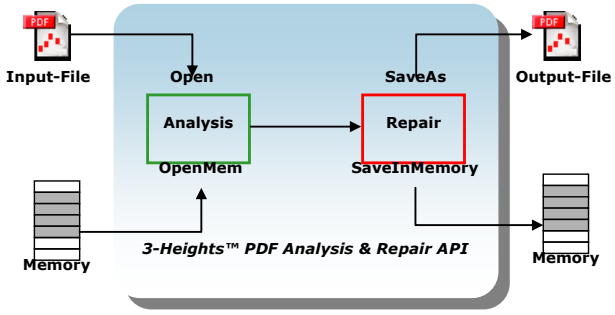
- Create Object
- `Open`
- Set `AnalysisOptions` and `RecoveryOptions`
- `Analysis`
- If errors
  - Report Errors
  - `Repair`
  - `SaveAs`
- `Close`

5.4.4 Using the in-memory functions

The 3-Heights® PDF Analysis & Repair API always requires a PDF input document from which it reads and optionally, a PDF output document to where the result is saved to.

To open and save files, the Open and SaveAs functions are used.

Instead of accessing files, the PDF documents can be read and written to in-memory. The corresponding functions are OpenMem and SaveInMemory.



Once the output document is saved to memory using SaveInMemory, The memory block can be accessed using the GetPdf function.

A call sequence to create a first PDFRepair Object that opens a PDF from file and stores its output in-memory and then a second object, which reads that in-memory document and saves it back to a file looks like this:

```
PDFRepair1.Open(InputFile)
PDFRepair1.SaveInMemory()
PDFRepair1.Close()
PDFRepair2.OpenMem(PDFRepair1.GetPdf())
PDFRepair2.SaveAs(OutputFile)
PDFRepair2.Close()
```

This call sequence does not make much sense. It's merely used to illustrate how to use of the in-memory functions. In a real application, the in-memory document is read from another application or a database.

5.5 Error handling

Most methods of the 3-Heights® PDF Analysis & Repair API can either succeed or fail depending on user input, the state of the PDF Analysis & Repair API, or the state of the underlying system. It is important to detect and handle these errors to get accurate information about the nature and source of the issue at hand.

Methods communicate their level of success or failure using their return value. The return values to be interpreted as failures are documented in the Interface reference. To identify the error on a programmatic level, check the ErrorCode property. The ErrorMessage property provides a human readable error message, which describes the error.

Example:

```
public Boolean Open(string file, string password)
{
  if (!doc.Open(file, password))
  {
    if (doc.ErrorCode == PDFErrorCode.PDF_E_PASSWORD)
    {
```

```
      password = InputBox.Show("Password incorrect. Enter correct password:");
      return Open(file, password);
    }
    else
    {
      MessageBox.Show(String.Format(
        "Error {0}: {1}", doc.ErrorCode, doc.ErrorMessage));
      return false;
    }
  }
  [...]
}
```

6 Interface reference

Note: This manual describes the COM interface only. Other interfaces (C, Java, .NET) work similarly, i.e. they have calls with similar names and the call sequence to be used is the same as with COM.

6.1 PDFRepair Interface

6.1.1 AnalysisOptions

Property (get, set): `TPDFAnalysisOption AnalysisOptions`
Default: `eAnalyzeObjects + eAnalyzePageTree + eAnalyzeContentStreams`

This property sets the analysis options. Options can be turned off to increase the speed of the analysis.

See enumeration `TPDFAnalysisOption`.

6.1.2 Analyze

Method: `Boolean Analyze()`

This method analyzes the input document for errors.

Returns:

`True` The document was successfully analyzed and no errors or warnings were issued.

`False` Either the document could not be analyzed (`PDF_E_STOPPED`) or the analysis has reported errors or warnings. Use the `GetFirstError` and `GetNextError` methods for more information on the kind of problems encountered.

6.1.3 AnalyzeAndRepair

Method: `Boolean AnalyzeAndRepair()`

This method analyzes the input document and creates a repaired output document.

Returns:

`True` The document was successfully analyzed and a repaired document could be created.

False The document could not be analyzed or repaired (PDF_E_FATAL).

6.1.4 Close

Method: Boolean Close()

Close an opened input file. If the document is already closed, the method does nothing.

Returns:

True The file was closed successfully.

False Otherwise.

6.1.5 Diagnosis

Property (get): TPDFDiagnosis Diagnosis

This property returns the diagnosis flags. See also TPDFDiagnosis.

6.1.6 ErrorCode

Property (get): TPDFErrorCode ErrorCode

This property can be accessed to receive the latest error code. This value should only be read if a function call on the PDF Analysis & Repair API has returned a value, which signales a failure of the function (see Error handling). See also enumeration TPDFErrorCode. Pdftools error codes are listed in the header file bseerror.h. Please note that only few of them are relevant for the 3-Heights® PDF Analysis & Repair API.

6.1.7 ErrorLevel

Property (get): Integer ErrorLevel

This property can be accessed to check whether no errors (0), warnings only (1), or errors (2) were found during the analysis.

You should get this property after Analyze.

6.1.8 ErrorMessage

Property (get): `String ErrorMessage`

Return the error message text associated with the last error (see property `ErrorCode`). This message can be used to inform the user about the error that has occurred. This value should only be read if a function call on the PDF Analysis & Repair API has returned a value, which signals a failure of the function (see Error handling)

> **Note:** Reading this property if no error has occurred can yield `Nothing` if no message is available.

.

6.1.9 GetFirstError

Method: `PdfError GetFirstError()`

This method returns the first error. It can also be a warning.

Returns:

The first error if there are any. Nothing otherwise.

6.1.10 GetNextError

Method: `PdfError GetNextError()`

This method returns the next error. It can also be a warning.

Returns:

The next error if there is any. Nothing otherwise.

6.1.11 GetPdf

Method: `Variant GetPdf()`

Get the output file from memory. See also method `SaveInMemory`.

Returns:

A byte array containing the output PDF. In certain programming languages, such as Visual Basic 6, the type of the byte array must explicitly be Variant.

6.1.12 LicenseIsValid

Property (get): `Boolean LicenseIsValid`

Check if the license is valid.

6.1.13 Open

Method: `Boolean Open(String Filename, String Password)`

Open a PDF file, i.e. make the objects contained in the document accessible. If another document is already open, it is closed first.

Parameters:

`Filename` [`String`] The file name and optionally, the file path, drive or server string according to the operating systems file name specification rules.

`Password` [`String`] (optional) The user or the owner password of the encrypted PDF document. If this parameter is left out, an empty string is used as a default.

Returns:

`True` The file could be successfully opened.

`False` The file does not exist, it is corrupt, or the password is not valid. Use the ErrorCode and ErrorMessage properties for additional information.

6.1.14 OpenMem

Method: `Boolean OpenMem(Variant MemBlock, String Password)`

Open a PDF file, i.e. make the objects contained in the document accessible. If a document is already open, it is closed first.

Parameters:

`MemBlock` [`Variant`] The memory block containing the PDF file given as a one-dimensional byte array.

`Password` [`String`] (optional) The user or the owner password of the encrypted PDF document. If this parameter is left out, an empty string is used as a default.

Returns:

`True` The document could be successfully opened.

`False` The document could not be opened, it is corrupt, or the password is not valid.

6.1.15 ProductVersion

Property (get): `String ProductVersion`

Get the version of the 3-Heights® PDF Analysis & Repair API in the format "A.C.D.E".

6.1.16 RebuildOptions

Property (get, set): `TPDFRebuildOption RebuildOptions`
Default: `0`

This property can be used to get or set the rebuild options.

See TPDFRebuildOption.

6.1.17 RecoveryOptions

Property (get, set): `TPDFRecoveryOption RecoveryOptions`
Default: `eRecoverXREF + eRecoverPages`

This property can be used to get or set the recovery options.

See TPDFRecoveryOption.

6.1.18 Repair

Method: `Boolean Repair(InputFile String, OutputFile String, LogFile String)`

This method opens a PDF file, analyzes, and repairs it. The repaired file is saved with a new file name. Optionally, a log file can be generated.

Parameters:

`String [InputFile]` The file name and optionally, the file path, drive or server string according to the operating systems file name specification rules of the input file.

`String [OutputFile]` The file name and optionally, the file path, drive or server string of the output file (the repaired file).

`String` [`LogFile`] (optional) The path to the log file.

Returns:

`True` The file could successfully be processed.

`False` The file could not be processed and therefore not be repaired.

6.1.19 ReportingLevel

Property (get, set): `Integer ReportingLevel`
Default: `3`

Get or set the reporting level. The supported levels are:

`0`	None	Nothing is reported
`1`	Errors	Errors are reported
`2`	Warnings	Errors and warnings are reported
`3`	Information	Error, warnings and information are reported

The `ReportingLevel` property must be set before the `Open` method to be applied.

6.1.20 SaveAs

Method: `Boolean SaveAs(String FileName, String UserPw, String OwnerPw, TPDFPermission PermissionFlags)`

Save the currently opened document.

Parameters:

`FileName` [`String`] The file name and optionally the file path, drive or server string according to the operating systems file name specification rules.

`UserPw` [`String`] (optional) Set the user password of the PDF document. If this parameter is omitted, the default password is used. Use `""` to set no password.

`OwnerPw` [`String`] (optional) Set the owner password of the PDF document. If this parameter is omitted, the default password is used. Use `""` to set no password.

`PermissionFlags` [`TPDFPermission`] (optional) The permission flags.

By default no encryption is used (`-1`). The permissions that can be granted are listed at the enumeration `TPDFPermission`. To not encrypt the output document, set PermissionFlags to `ePermNoEncryption`, user and

owner password to "". In order to allow high quality printing, flags ePermPrint and ePermDigitalPrint need to be set.

Returns:

True The opened document could successfully be saved to file.

False Otherwise. One of the following occurred[7]:

- The output file cannot be created.
- PDF_E_FILECREATE: Failed to create the file.

6.1.21 SaveInMemory

Method: Boolean SaveInMemory()

Save the output PDF in memory. After the Close call, it can be accessed using the GetPdf method.

Returns:

True The document could be saved in memory successfully.

False Otherwise.

6.1.22 SetLicenseKey

Method: Boolean SetLicenseKey(String LicenseKey)

Sets the license key.

6.2 PdfError Interface

6.2.1 Count

Property (get): Long Count

This property returns how many times the error occurs on the page.

[7] This is not a complete list. If SaveAs returns False, it is recommended to abort the processing of the file and log the error code and error message.

6.2.2 ErrorCode

Property (get): `TPDFErrorCode ErrorCode`

This property can be accessed to receive the latest error code. This value should only be read if a function call on the PDF Analysis & Repair API has returned a value, which signales a failure of the function (see Error handling). See also enumeration `TPDFErrorCode`. Pdftools error codes are listed in the header file `bseerror.h`. Please note that only few of them are relevant for the 3-Heights® PDF Analysis & Repair API.

6.2.3 Message

Property (get): `String Message`

This property returns an explaining error message.

6.2.4 ObjectNo

Property (get): `Long ObjectNo`

This property returns the object number at which the error occurs. If the error is not related to a particular object, `0` is returned.

6.2.5 PageNo

Property (get): `Long PageNo`

This property returns the page number on which the error occurs. If the error is not related to a particular page number, `0` is returned.

6.3 Enumerations

Note: Depending on the interface, enumerations may have `TPDF` as prefix (COM, C), `PDF` as prefix (.NET), or no prefix at all (Java).

6.3.1 TPDFAnalysisOption Enumeration

`eAnalyzeObjects` Analyze objects

`eAnalyzePageTree` Analyze page tree

`eAnalyzeContentStreams` Analyze content streams

6.3.2 TPDFDiagnosis Enumeration

eDiagnosisOpen Diagnose opening

eDiagnosisObjects Diagnose objects

eDiagnosisPages Diagnose pages

6.3.3 TPDFErrorCode Enumeration

All TPDFErrorCode enumerations start with a prefix, such as PDF_, followed by a single letter which is one of S, E, W or I, an underscore, and a descriptive text.

The single letter gives an indication of the severity of the error. These are: Success, Error, Warning, and Information. In general, an error is returned if an operation could not be completed, e.g. no valid output file was created. A warning is returned if the operation was completed, but problems occurred in the process.

A list of all error codes is available in the C API header file bseerror.h, the javadoc documentation of com.pdftools.NativeLibrary.ERRORCODE, and the .NET documentation of Pdftools.Pdf.PDFErrorCode. Note that only a few are relevant for the 3-Heights® PDF Analysis & Repair API, most of which are listed here:

TPDFErrorCode table

TPDFErrorCode	Description
PDF_S_SUCCESS	The operation was completed successfully.
LIC_E_NOTINIT, … LIC_E_LEVEL	Various license management related errors.
PDF_E_FILEOPEN	Failed to open the file.
PDF_E_FILECREATE	Failed to create the file.
PDF_W_NOENCRYPTION	The file is PDF/A and must not be encrypted.

6.3.4 TPDFPermission Enumeration

An enumeration for permission flags. If a flag is set, the permission is granted.

TPDFPermission table

TPDFPermissionFlag	Description
ePermPrint	Low resolution printing
ePermModify	Changing the document
ePermCopy	Content copying or extraction
ePermAnnotate	Annotations
ePermFillForms	Filling of form fields

TPDFPermission table

ePermSupportDisabilities	Support for disabilities
ePermAssemble	Document assembly
ePermDigitalPrint	High resolution printing

Changing permissions or combining multiple permissions is done using a bitwise "or" operator.

Changing the current permissions in Visual Basic should be done like this:

Allow Printing

```
Permission = Permission Or ePermPrint
```

Prohibit Printing

```
Permission = Permission And Not ePermPrint
```

6.3.5 TPDFRebuildOption Enumeration

eRebuildStreams Recompress all streams.
This setting is recommended for files with corrupt streams.

eRebuildFonts Rebuild fonts.

eRebuildFontsAsType1 Convert Compact font format (CFF) simple fonts to Type1.
This property may be used together with eRebuildFonts only.

6.3.6 TPDFRecoveryOption Enumeration

eRecoverXREF Recover the XREF table. Disabling this option may be useful if processing a document takes too long, since repairing the cross-reference table is very time-consuming.

eRecoverPages If pages are not part of the page tree (loose pages), they are recovered and added to the end of the document. If they should not be recovered, these pages are removed from the document.

eRecoverImages Deprecated in Version 4.7. This option has no effect and will be removed in future versions.

7 Version history

Some of the documented changes below may be preceded by a marker that specifies the interface technologies the change applies to. For example, [C, Java] applies to the C and the Java interface.

7.1 Changes in versions 6.19–6.27

- **Update** license agreement to version 2.9

7.2 Changes in versions 6.13–6.18

No functional changes.

7.3 Changes in versions 6.1–6.12

- [Java] **Changed** minimal supported Java language version to 7 [previously 6].
- [PHP] **Removed** all versions of the PHP interface.
- [.NET] **New** availability of this product as NuGet package for Windows, macOS and Linux.
- [.NET] **New** support for .NET Core versions 1.0 and higher. The support is restricted to a subset of the operating systems supported by .NET Core, see Operating systems.
- [.NET] **Changed** platform support for NuGet packages: The platform "AnyCPU" is now supported for .NET Framework projects.

7.4 Changes in version 5

- **Changed** error reporting behavior: Errors in the XMP metadata are no longer reported when saving a recovered document.
- **New** additional supported operating system: Windows Server 2019.
- [PHP] **New** extension PHP 7.3 (non thread safe) for Linux.

7.5 Changes in version 4.12

- **New** HTTP proxy setting in the GUI license manager.

7.6 Changes in version 4.11

- **New** support for reading and writing PDF 2.0 documents.
- **New** support for the creation of output files larger than 10GB (not PDF/A-1).
- **New** treatment of the `DocumentID`. In contrast to the `InstanceID` the `DocumentID` of the output document is inherited from the input document.

- [PHP] **New** Interface for Windows and Linux. Supported versions are PHP 5.6 & 7.0 (Non Thread Safe). The `PdfRepairAPI` PHP Interface is contained in the 3-Heights® PDF Tools PHP5.6 Extension and the 3-Heights® PDF Tools PHP7.0 Extension.
- [C] **Changed** 32-bit binaries on Windows that link to the API need to be recompiled due to a change of the used mangling scheme.

7.7 Changes in version 4.10

- **Improved** robustness against corrupt embedded font files.
- **Improved** robustness against corrupt input PDF documents.
- [C] **Clarified** Error handling of `TPdfStreamDescriptor` functions.

7.8 Changes in version 4.9

- **Improved** support for recovering certain corruption types.
- **Improved** support for and robustness against corrupt input PDF documents.
- **Improved** repair of embedded font programs that are corrupt.
- **New** support for OpenType font collections in installed font collection.
- **Improved** metadata generation for standard PDF properties.
- [C] **Changed** return value `pfGetLength` of `TPDFStreamDescriptor` to `pos_t`[8].

7.9 Changes in version 4.8

- **Added** repair functionality for TrueType font programs whose glyphs are not ordered correctly.
- [.NET, C, COM, Java] **New** property `ProductVersion` to identify the product version.
- [.NET] **Deprecated** method `GetLicenseIsValid`.
- [.NET] **New** property `LicenseIsValid`.

[8] This has no effect on neither the .NET, Java, nor COM API

8 Licensing, copyright, and contact

Pdftools (PDF Tools AG) is a world leader in PDF software, delivering reliable PDF products to international customers in all market segments.

Pdftools provides server-based software products designed specifically for developers, integrators, consultants, customizing specialists, and IT departments. Thousands of companies worldwide use our products directly and hundreds of thousands of users benefit from the technology indirectly via a global network of OEM partners. The tools can be easily embedded into application programs and are available for a multitude of operating system platforms.

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