Certabo Chessboard as UCI Engine

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Abstract

The idea is to play with the Certabo chessboard with all chess GUI's that support UCI chess engines. The Certabo UCI chess engine accepts UCI commands from the GUI and send the chess moves on the board back to the GUI.

I am a professional programmer and write the software in my spare time and it is free. I am not an employee of Inventhio Srl trading (Certabo). If something does not work, Certabo is not responsible for it. On the other hand I cannot guarantee that everything always works, but I try to fix bugs as soon as possible.

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1   Introduction

There are a some limitations, some of which result from the UCI protocol.

1. Some GUIs make their moves from an opening book and inform the engine for the first time for all moves at once when book moves are no longer available. In this case, the GUI must be configured so that at least the Certabo engine uses its own book.

2. To play against a real chess engine the GUI must start an engine match where one of the engines is the Certabo engine.

3. The communication runs over a device driver witch maps the USB port to a serial port. You have to install the device driver first. The driver is part of the Certabo software package.

1.1   Difference between the two zip files

- CertaboUci.zip
  This engine based on .NET Framework 4.7.1

- CertaboUciCore.zip
  This engine based on .NET Core 3.1.0

You only need one of them. Both implement the same functionality. There are some technical reasons in communicating with the hosting GUI to provide two versions. If you use HIARCS Chess Explorer, you must use the file CertaboUciCore.zip.
Because the .NET Core 3.1.0 is still very new, I also provide the other version. You can download .NET Core 3.1.0 runtime on:
https://dotnet.microsoft.com/download/dotnet-core/3.1

2   Quick start

- Simply unzip **one** of the two zip files into a folder. The zip files contain several files.

    - CertaboUci.zip
        1. CertaboUci.exe
        2. ChessBoard.dll
        3. BearChessBase.dll

    - CertaboUciCore.zip
        1. CertaboUciCore.exe
        2. CertaboUciCore.dll
        3. CertaboUciCore.deps.json
        4. CertaboUciCore.runtimeconfig.json
        5. System.IO.Ports.dll
        6. ChessBoard.dll
        7. BearChessBase.dll
        8. runtimes

- Connect your Certabo chessboard to your computer.

- Set all chessmen to their start position.

- Start a GUI (e.g. Fritz, HIARCS Chess Explorer or Arena) and install the Certabo engine as an UCI engine.

- Start an engine match and use Certabo engine as one of them. Make sure that the GUI configuration allows the engine to use its own opening book.

3   Directories

After the first start, the engine creates some directories:

1. `C:\Users\YOURUSERS\AppData\Local\CertaboUci`

2. `C:\Users\YOURUSERS\AppData\Local\CertaboUci\log`

3. `C:\Users\YOURUSERS\AppData\Local\CertaboUci\engines`

4. `C:\Users\YOURUSERS\AppData\Local\CertaboUci\books`

   YOURUSERS is a placeholder for your Windows user name.

The first directory contains the calibration data and a configuration file. The second directory contains log files.
Copy UCI engines into the engines subdirectory to use them in the configuration dialog.
Copy Polyglot and Arena opening book files into the books subdirectory to use them in the configuration dialog.

4 Calibration

At the the first start, the engine needs a calibration to identify your chessmen. When a calibration is running, you will see the chessboard LEDs flashing each row. Please wait until all LEDs are off.
A new calibration is only required if you use another set of chessmen.
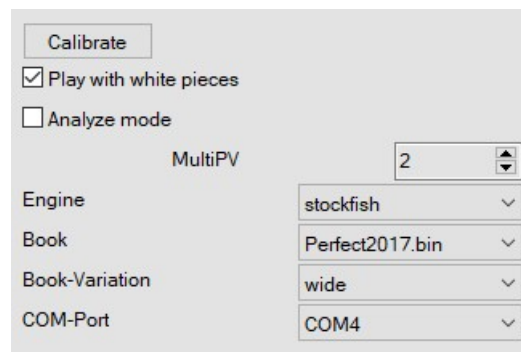
5 Configuration

Figure 1: Configuration

- **Calibrate** Initiate a new calibration. Please ensure that all chessmen are on the right place.

- **Play with white pieces** If not checked, you play with the black chessmen and place the black chessmen on the base row (reversed chessboard).

- **MultiPV** Set the number of multiple analyses. This option is only available if there files in the engines directory. This option is ignored on engine matches. With most GUIs this option is not displayed, except for example with Arena.

- **Engine** Select one UCI engine located in the engines directory. This option is only available if there files in the engines directory.

- **Analyze mode** Use the selected UCI engine to analyze your moves. This option is only available if there files in the engines directory.

- **Book** Use the selected opening book if you play against an engine. This option is only available if there files in the engines and books directory.

- **Book-Variation** Determine the usage of the book.

  - **best move** Always plays the best move.
  - **flexible** Plays the move considering the weighting or priority.
  - **wide** Play every move from the book.

- **COM-port** Select an available COM port if automatic detection fails. You can determine or change the correct COM port for the COM device driver in your Windows Device Manager.

5.1 Intention of 'Analyze mode', 'UCI engine' and 'Opening book'

In most cases you do not need or it make sense to select an UCI engine or opening book in the configuration dialog. Especially **not** when you are playing an engine match, because you will select your opponent by the GUI. The idea behind configuring an UCI engine within the Certabo engine is to use it in parallel to analyze your moves during the game. For this, select an UCI engine and check the "Analyze mode" box. Not to be confused with a post-game analysis, which is provided by most GUI's.
Some GUI's allow you to allow an engine to play against itself without initiating a complete engine match. With Arena, for example, you can do this by simply pressing the "Demo" button. Now, you can use the Certabo engine to play against another human being and the GUI is just recording your moves. Or, you configure an UCI engine and play against them in the same simple way. In this case uncheck the "Analyze mode" box. To make such a game more variable, you can select an opening book for the UCI engine.

6   Use Cases

The following chapter describes some scenarios and how to manage them in different GUI's. Please understand that not all GUIs can be considered and some examples are only described for one GUI. I cannot guarantee that all scenarios will work smoothly under all GUI's.

6.1   Play against another UCI engine

6.1.1   Fritz

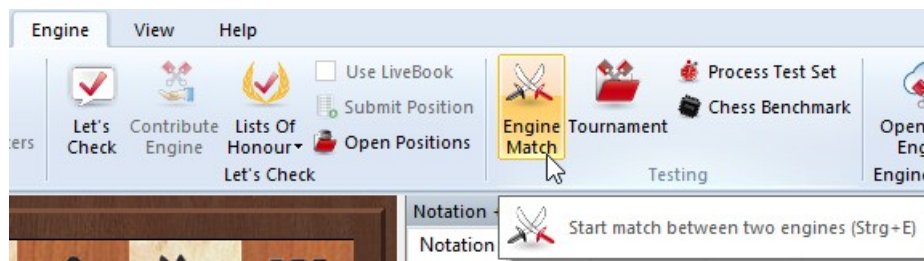#### 6.1.1.1   Engine Match

1. Start a new engine match.

Figure 2: Fritz Engine Match

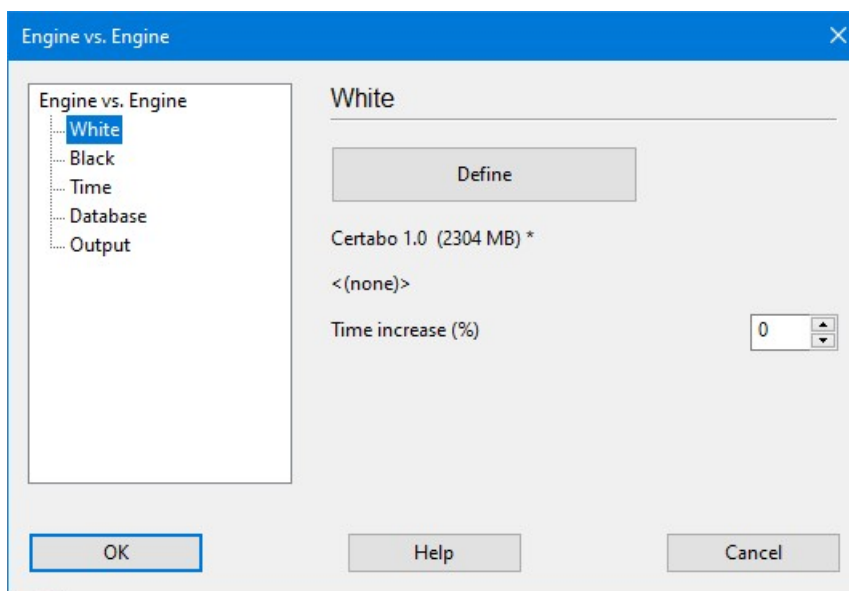2. Select Certabo engine for white.

Figure 3: Define Engine for White

3. Open the engine configuration dialog and uncheck "Analyze mode"
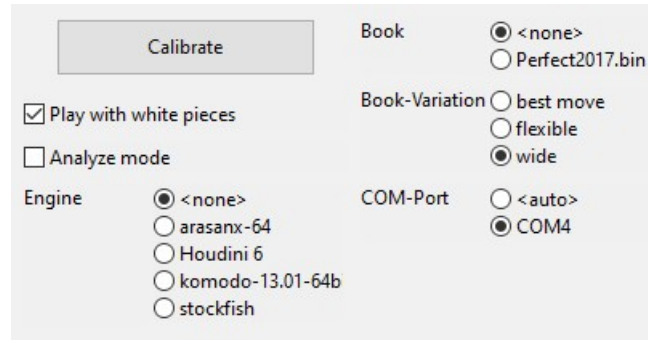   and select "$< none >$" as UCI engine.

Figure 4: Configure Certabo Engine

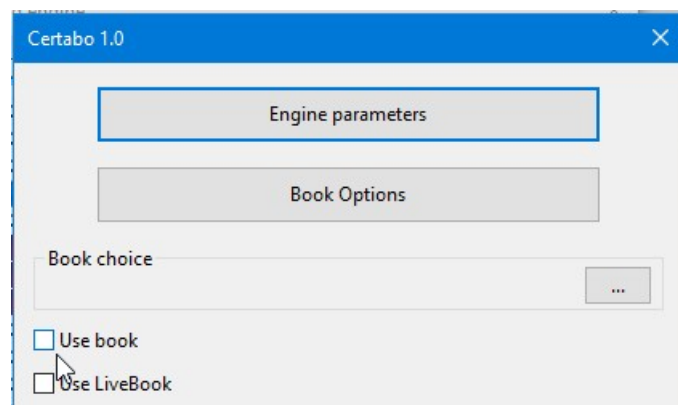4. Ensure the checkbox for "Use book" is unchecked.

Figure 5: Use Book

5. Select an engine installed in Fritz for black.

6. Set your preferred time settings and start the match.

6.1.2   Arena

Arena allows different ways to play against another UCI engine. Common
is that the Certabo UCI engine must not use the Arena opening book.
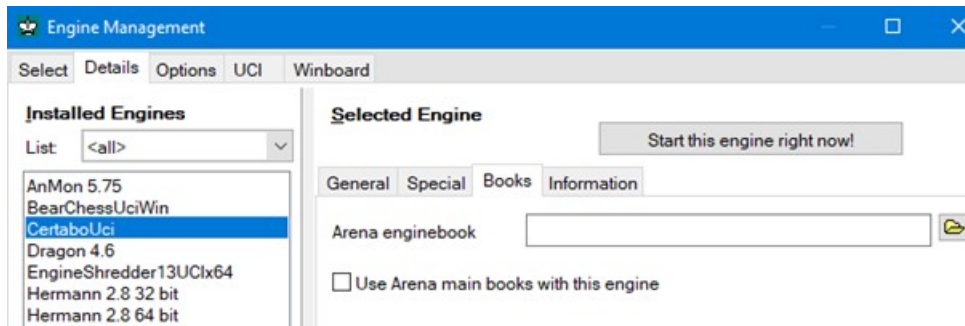Deactivate the option "Use Arena general main books with this engine".

Figure 6: Certabo Arena Book

6.1.2.1   With one Certabo engine and one UCI Engine

1. Load Certabo engine as "Engine 1" and the opponent UCI engine as "Engine 2".
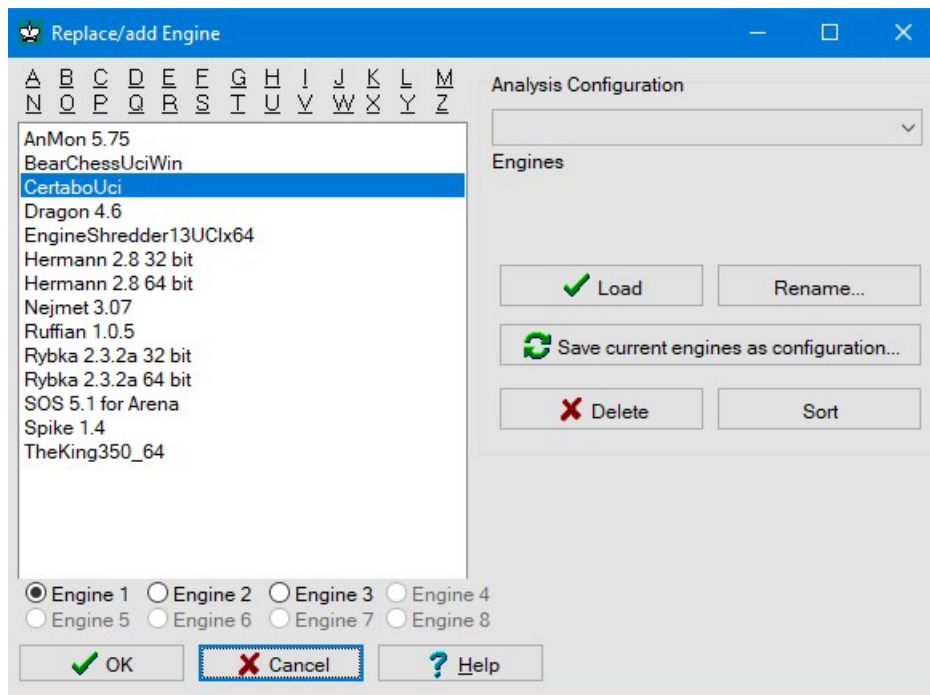

Figure 7: Certabo UCI as Engine 1

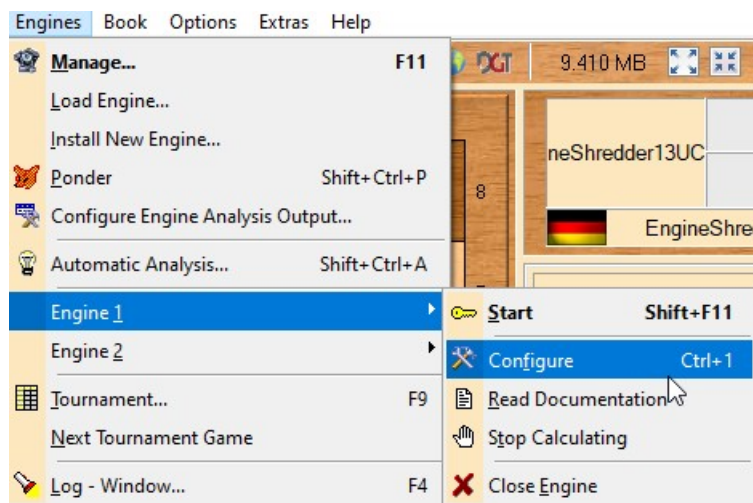2. Configure Engine 1 (Certabo engine)

Figure 8: Configure Engine 1

3. Open the engine configuration dialog and uncheck "Analyze mode"
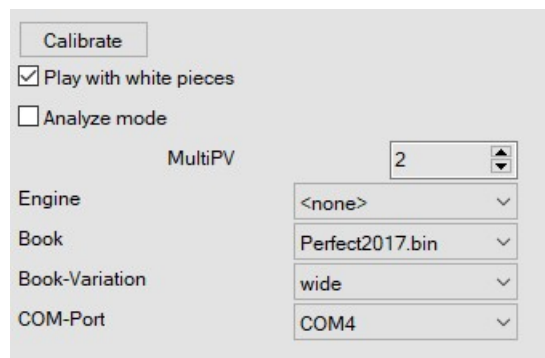   and select "$< none >$" as UCI engine.

Figure 9: Configure Certabo Engine
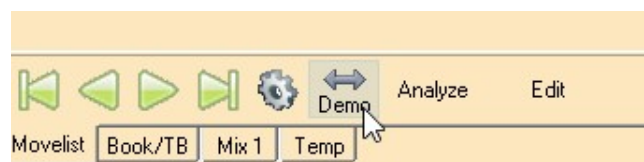
4. Press "Demo" to start the game.

Figure 10: Run Demo

6.1.2.2   With one Certabo engine

If you have copied an UCI engine into the engine subfolder, you can use them as opponent.
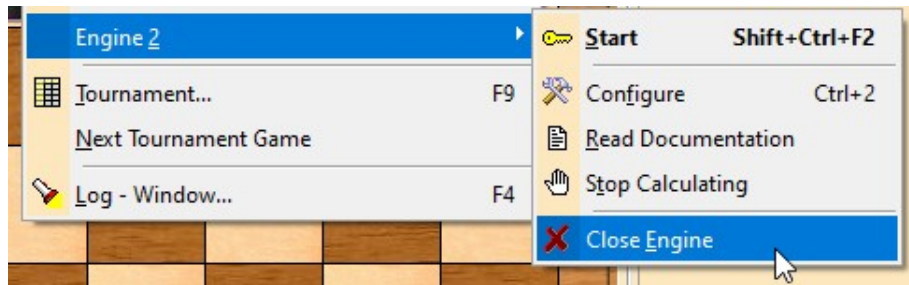
1. Close "Engine 2" if loaded.

Figure 11: Close Engine 2

2. Open the Certabo engine configuration dialog and uncheck "Analyze mode" and select an UCI engine and an opening book if available.
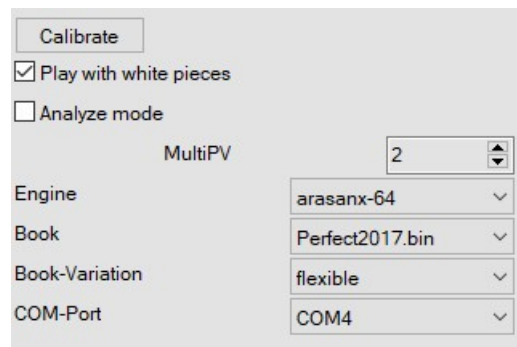

Figure 12: Select an UCI Engine

3. Press "Demo" to start the game.
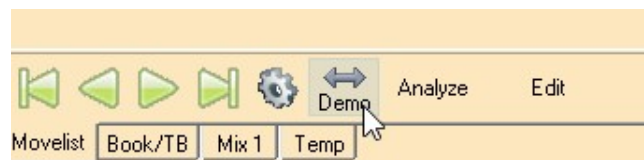
Figure 13: Run Demo

6.1.2.3 Engine Tournament

1. Start an Engine Tournament
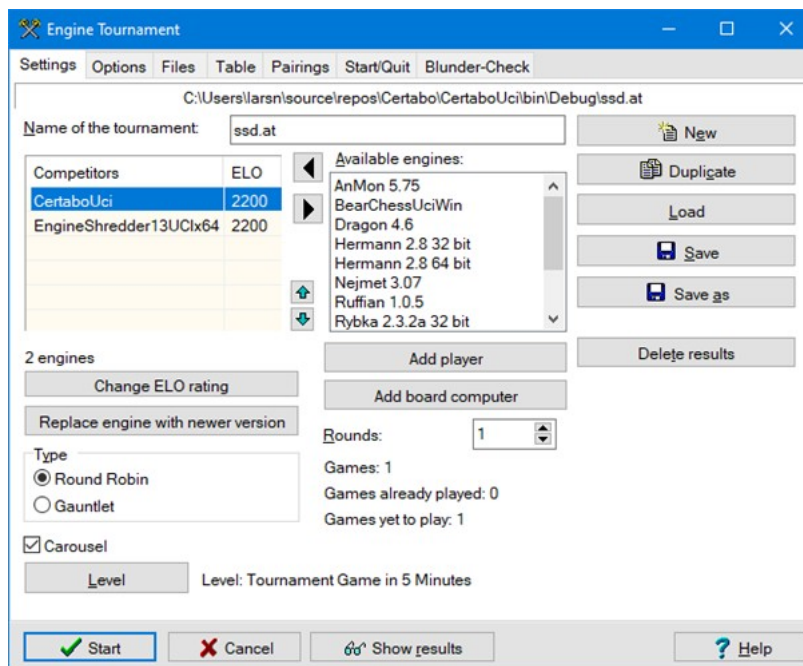
Figure 14: Arena Engine Tournament

2. For the Certabo engine make sure that "Analyze mode" is unchecked and "$< none >$" as the selected UCI engine.

You can add the Certabo engine twice with different names. So, you can play a tournament against yourself with different configurations, e.g. different UCI engines for analysis.

6.2   Use an UCI engine for analysis

In this case, the UCI engine shows you the analysis for your moves during the game. Opening books will be ignored.

6.2.1   Fritz

6.2.1.1   Engine Match

1. Start a new engine match.

Figure 15: Fritz Engine Match

2. Select Certabo engine for white.
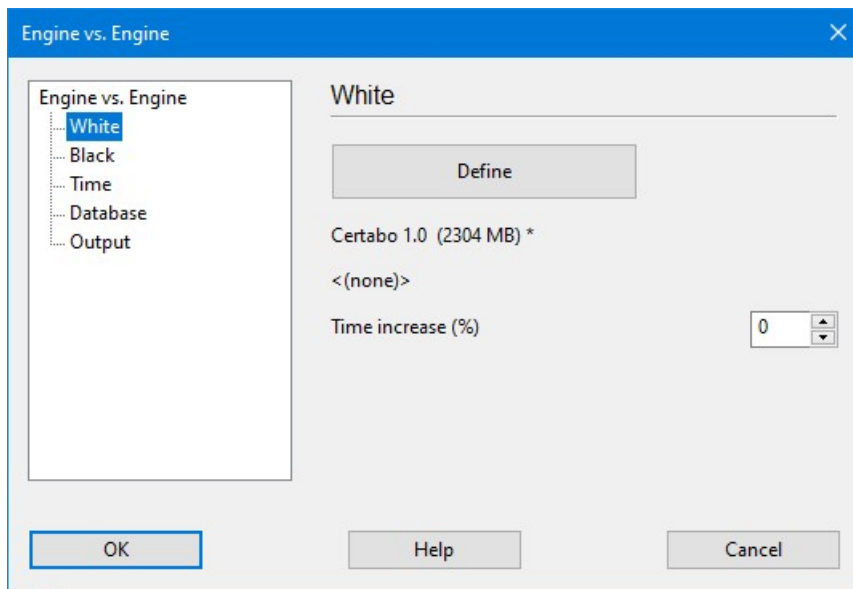
Figure 16: Define Engine for White

3. Open the engine configuration dialog and check "Analyze mode" and select an UCI engine.

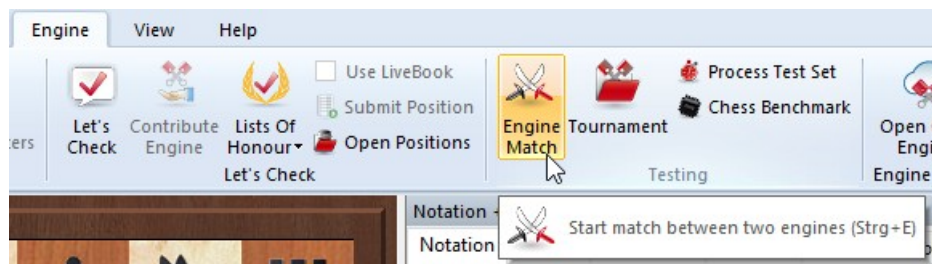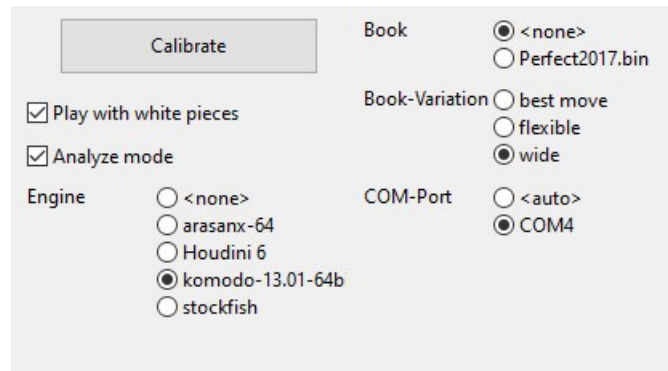Figure 17: Configure Certabo Engine

4. Ensure the checkbox for "Use book" is unchecked.
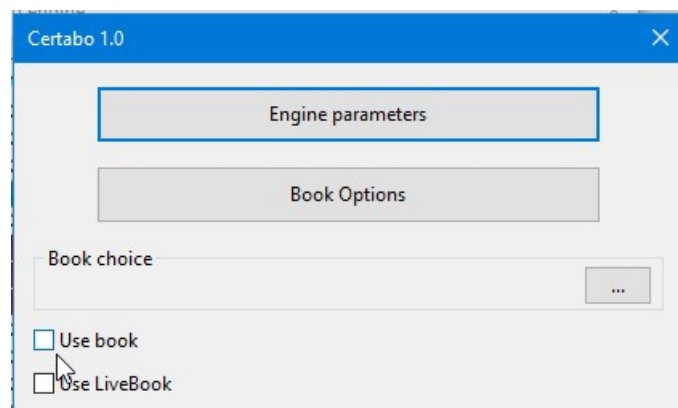
Figure 18: Use Book

5. Select an engine installed in Fritz for black.

6. Set your preferred time settings and start the match.

6.2.2   Arena

You can play an engine match like described above with Fritz but you can use the "Demo" mode, too. In Arena you can install the same engine with different parameters under a new name. So, you can play an engine match with two Certabo engines as opponent with different UCi engines for analysis. Arena allows you, a little bit aside by the UCI protocol definition, configure the MultiPV-Parameter for an engine match. This gives you the possibility to display several analysis lines during the games.

6.3   Start from a position

You can start from any chess position specified by the GUI. It is best to place the chessmen first on your Certabo chessboard and then use the setup position functionality of your GUI.

6.3.1   Arena

1. Open the Set-up Position dialog and place the chessmen.

2. Close the dialog and press the demo button. The chessboard LED indicate incorrectly placed or missing chessmen.

7   Important To Know

7.1   Log files

The Certabo engine writes at least two log files into the log directory:

1. certaboUci_1.log

2. certabo_1.log

If the GUI starts a second instance of the engine, e.g. you start an engine match against two Certabo UCI engines, the log files for the second engine are named certaboUCi_2.log and certabo_2.log.

7.2   Calibration

For the first time, the engine assumes that all chessmen are on their initial position and starts a calibration. The result is written into the file calibrate.xml in the directory

`C:\Users\YOURUSERS\AppData\Local\CertaboUci`

To recalibrate, just delete the file calibrate.xml or press the "Calibrate" button in the configuration dialog. Not all GUI's may supports buttons in the configuration dialog, e.g. HIARCS Chess Explorer v1.9.4 for Windows. In this case, you have to delete the file.

7.3   Pawn conversion to a second queen

The first time you perform a pawn conversion with a second queen on your board after calibration, the engine needs a few seconds to identify the new piece. Please wait until the LEDs are off. The new piece code is saved. There is no delay next time.

7.4   COM port

The engine detects all available COM ports and uses the first one found. If you set another COM port on the configuration, may you have to restart the engine to activate it.

7.5   Opening books

The engine supports Polyglot and Arena opening books. The internal data structure of both are very different. In simple words, Polyglot is position oriented and Arena move oriented. You can use a Polyglot opening book for normal game or from any starting position. If you use an Arena opening book, the engine will not find the next move unless you start from the beginning of a game.

8   Trouble shooting

8.1   The chess moves are not or not correctly displayed

- Check the correct COM port in the configuration dialog.

- Check the position of the chessmen. Moves are only accepted if the chessmen are on the correct square. Fields with missing or wrong figure light up.

- Try the engine from the CertaboUciCore.zip file.

- Finally, the UCI protocol is well defined but not every GUI send the commands in the same way. I test the engine with the common used GUI's but may some are different.

8.2   The engine makes the moves itself

- If you are playing an engine match, open the configuration dialog and select the option "Analyze mode" or set the UCI engine to "¡none¿ ".

- Make sure that the GUI does not make the moves by using an opening book.

9   Known Issues

- When no more moves are found in the opening book for the first time, the system no longer looks in the book for that game.

10   Next Steps

- Error correction.

- Try to develop a version for Linux.

11   Changelog

11.1   Version 1.4.0 =>1.4.1

- Important bug fix for long castling. The rook was internally set to an invalid square.

11.2   Version 1.3.0 =>1.4.0

- The configuration type for "Calibrate" is changed from "checkbox" to "button".

- Support for Polyglot and Arena opening books.

- Automatic reconnection if the connection to the board is lost, e.g. if the cable is removed.

- Correction of output when using an UCI engine in analysis mode.

- Correction if two Certabo engines run simultaneously.

11.3   Version 1.2.2 =>1.3.0

- Support pawn conversion to a second queen.

- Allow to set the number of multiple analyses.

11.4   Version 1.2.1 =>1.2.2

- Bug fixing on run analyze mode with UCI engine in Fritz.

11.5   Version 1.2.0 =>1.2.1

- Bug fixing on configure COM port.

- Additional configuration file.

- Additional version based on .NET Core 3.1.0. Is mandatory if you use HIARCS Chess Explorer v1.9.4.

11.6   Version 1.1.1 =>1.2.0

- Allow to play from any starting position.

- Allow to configure the COM port.

- Improvements in calibration.

- Bug fixing on play with black.

- Bug fixing pawn conversion.

- New calibration data file format and content.

11.7   Version 1.1 =>1.1.1

- New configuration setting "Play with white pieces". If not checked, you play with the black pieces and place the black pieces on the base row (reversed chessboard).

11.8   Version 1.0 =>1.1

- The working directories are changed to

    1. `C:\Users\YOURUSERS\AppData\Local\CertaboUci`
    2. `C:\Users\YOURUSERS\AppData\Local\CertaboUci\log`
    3. `C:\Users\YOURUSERS\AppData\Local\CertaboUci\engines`

- You can use an UCI engine for analysis or playing against them.

- The GUI can start two instances of a Certabo UCI engine without conflict on access to the Certabo chessboard (serial port).