

# Compiling Zemax User defined surfaces with GCC

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## 1 Introduction

This document briefly describes how to compile a dynamic link library for Zemax using the FREE compiler available from [GNU](#). The compiler is normally a unix beast (as is most of the GNU software) but has been ported to windows. Two flavours exist in windows: Cygwin and Mingw32. I've got both installed on my computer, and they seem to coexist happily, but the one that I normally use is the Mingw32 version, primarily since it can be run from a dos window.

Why use gcc? Because it's free: you don't need to buy the microsoft compiler and mess around with the development environment.

## 2 Installation

Installation of GCC: both cygwin and mingw are pretty straightforward to install. Either download the cygwin installation file from [Cygwin](#) or get the Mingw installation executable from [Mingw](#). Download the latest *stable* version and the installation should be quite straightforward.

I would recommend that you use the Mingw installation for a number of reasons:

1. It's a smaller installation than Cygwin
2. You'll probably be more familiar with a dos box than a unix shell
3. It's what I'm using and the following makefiles will work for it!

## 3 Compilation

To check that your compiler is installed, type in the following command:

```
gcc -v
```

The response should be something like:

Reading specs from c:/mingw/bin/./lib/gcc-lib/mingw32/2.95.3-4/specs  
gcc version 2.95.3-4 (mingw special)

If this doesn't work then the most likely cause is that your path isn't set. Either set it temporarily in the dos box with (I installed it in c:\mingw - amend appropriately):

```
path=%path%;c:\mingw\bin\;
```

or set it permanently (under NT/2000 at least) by right clicking on 'My computer', select properties→advanced→environment variables. Select 'Path', click edit and then add the path given above.

The next thing to do is to check with a very simple 'hello world' program that the compiler's working, so cut/paste the following program into a text file called test.c. Then compile with the following command:

```
gcc -o test.exe test.c

#include <stdio.h>

void main{void}
{
printf('Hello world\n');
}
```

Execute the program and the immortal words of Kernighan and Ritchie should appear on the screen.

## 4 Zemax DLL compilation

This, of course, is the bit you've been waiting for. DLL creation is a pain and it took me a while to figure out the correct syntax for the compiler. Here it is then:

Copy a zemax dll source code such as us\_stand.c to a working directory. Also copy USERSURF.DEF and usersurf.h to the same directory. Both of these files live in c:\zemax\DLL.

The zemax code should compile without any alteration, so try:

```
gcc -c -mrtd -g -O2 -o us_stand.o us_stand.c
dllwrap -s -export-all -def usersurf.def -driver-name gcc -o us_stand2.dll
us_stand.o
copy us_stand2.dll c:\zemax\dll
```

The first line compiles the c-code to an object file. The second line does some dllwrapping magic and creates the dll that you want. The third line merely copies the created dll into the Zemax DLL directory. All this fits into a

batch file, so you can smoothly compile files by executing it. One point to note is that Zemax can't be running if you are overwriting an existing DLL. So that's it, you should have a working zemax user defined surface. All it needs now is to change the supplied ones to match your own requirements. It's also worth noting that gcc will also compile fortran with a command something like:

```
g77 -c -o abc.o abc.f
```

So, with a lot of luck, fortran subroutines could be included. I haven't done this yet with a DLL, but it works with a simple executable!

## 5 Thanks

Thanks to the MingW list serve group who frequently answer questions I hadn't thought to ask yet, in particular Lloyd Dupont who helped me with compiler options when I was particularly stuck.

Any errors/comments: email me at [simon.m.prince@hotmail.com](mailto:simon.m.prince@hotmail.com)

## 6 Bibliography

[Focus Software](#)  
[Optima - Focus' European distributor](#)  
[Mingw homepage](#)  
[Colin Peter's Mingw compiler page](#)