RP Coating V4

a software product of
RP Photonics Consulting GmbH

www rp-photonics com/coating html
Why is a Powerful Multilayer Design Software so Important?

- Multilayer designs are used to produce structures on expensive machinery and possibly in large volumes.

- It is therefore highly desirable
  - to find the best possible designs (for maximum performance, without excessive growth error sensitivities, etc.)
  - to do that efficiently, not leaving expensive infrastructure unused over longer times than necessary

It would be stupid to save a little money on software while wasting not only time, but also expensive resources.

- You want a high degree of flexibility of such software in order to
  - conveniently implement all sorts of design ideas
  - quickly get a comprehensive characterization of any design
  - generate any plots which may be helpful in your case
What is Special about the RP Coating software?

- You can define coating structures, additional calculations or optimizations, graphical diagrams etc. in text form – i.e., as **script code**.

- This approach is **far more flexible** than working with forms or pop-up menus:
  - can easily **parametrize designs**: for example, generate chirped-mirror structures with automatically calculated layer thickness values, or produce certain layer sequences automatically
  - can **freely define detailed optimization goals** in the form of a figure-of-merit function (not just enter parameters of a given function!)
  - can **define your own diagrams**, containing any curves and additional elements – no limitation to predefined types of diagrams!

- Note: flexibility is not just nice to have, but essential for sophisticated design tasks!
Scripting is Easy!

Example 1: definition of a Bragg mirror:

```plaintext
d_units: nm
l_units: nm

l_Bragg := 1000  { Bragg wavelength }
N_Bragg := 8  { number of layer pairs }

beam from superstrate
substrate: BK7
for j := 1 to N_Bragg do
begin
  * SiO2, 1/4 at l_Bragg
  * TiO2, 1/4 at l_Bragg
end
superstrate: air
```

It's quite obvious what that code does, isn't it? And it is easy to add more layers, introduce a chirp, etc.
Scripting is Easy!

Example 2: get the reflectivity profile plotted:

```plaintext
diagram 1:

"Reflectivity Profile"
x: 600, 1400
"wavelength (nm)" , @x
y: 0, 100
"reflectivity (%)" , @y
frame
hx
hy
legpos 420, 150

f: 100 * R(x),
"normal incidence",
color = red,
width = 3

f: 100 * R_s(x, 20 deg),
"20 deg s-polarized",
color = red,
width = 1,
style = dashed
```
Scripting is Enormously Flexible!

Many tasks can easily be accomplished with a few lines of script code – for example:

- Generate tailored **graphical diagrams** for visualizing properties of your coating or whatever else.

- Define a **figure-of-merit function** as a precise definition of your optimization target, and do a numerical optimization such that the value of that function becomes minimal. The optimization may be applied to a few design parameters only or to all layer thickness values. Where necessary, employ a Monte-Carlo algorithm.

- Save any calculated data in a **text file or binary file** – essentially any file format can be generated, e.g. for your coating machine.

You don’t depend on which details the software developer has anticipated: put together yourself what you need! You can even do full-blown programming for most sophisticated calculations.
How to Get Scripts Developed?

There are different approaches:

- Copy one of the **demo scripts** and modify it according to your needs.
- Adapt a **previously developed script** to the new requirements.
- Use the **code snippets library** for getting frequently used parts of script code. (Also add your own code snippets to that!)
- Get help within the **technical support**. Describe your needs, and we send you a script as a starting point for your development.
The User Interface (1)

Powerful script editors and editing tools:

- **Code snippet library** for frequently used parts of code
- **Parameter hints** for predefined functions
- **Multilevel undo/redo**
- **Syntax highlighting** for good readability of code
- **Integrated syntax checker**
- **Automatic code formatting** for consistent formats
- **Setting of breakpoints** for easy debugging
The User Interface (2)

**Custom forms: get any tailored forms you need!**

- Such forms **can be made for any simulation!**

- **Very easy to use:** just fill out the input fields and execute to see the output values as well as created graphical diagrams. (See the example on the next page.)

- You can either **make such forms yourself or get them made** within the technical support. (A custom form is defined quite simply in text form within a script.)

- Ideal combination of flexibility and ease of use!

- Consequently, **RP Coating** becomes more suitable also for those who need to get certain designs recalculated **without spending much time on technical details.**
The User Interface (3)

Simple example for *custom* forms:

Bragg mirror model, where one can simply enter a few parameters and select some of the offered diagrams.
The User Interface (4)

Graphical output windows

- high-quality graphics, directly usable for publications: copy to clipboard or save to file
- can make animated graphics
- adjustable resolution
- markers for doing measurements
- export numerical data

Also have flexible options for generating output in text form!
Put that into diagrams or files as you like.
Documentation

- comprehensive PDF manual
- detailed online help system
- comprehensive explanations of the used physical model, details of the script language, etc.
- various demo files, demonstrating many different possibilities
Technical Support

Any remaining technical issues can be addressed with the technical support:

The price for a **commercial user license** contains **8 support hours** (non-commercial licenses: 4 hours).

The support is done by Dr. Paschotta himself, who is a distinguished expert in this area and has developed **RP Coating**. He will make sure that you become another very satisfied user of the software!

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Dr. Rüdiger Paschotta, founder and managing director of RP Photonics, developer of RP Coating

Note that RP Photonics also offers consultancy on laser technology.
Can I Afford This Software?

Sure, a high-quality software product including competent support from a top expert costs some money.

Anyway, the better question is:

Can I afford not to have a powerful software tool, i.e.,

- to muddle through with insufficient tools?
- to use trial & error, wasting time and materials?
- to let customers wait while my competitors sell their products?

The **RP Coating** software will give a boost to your productivity! Also, your employees or students will become productive sooner when they acquire a deep understanding by playing with this software.
Other Software from RP Photonics

RP Fiber Power:

► design of fiber amplifiers, fiber amplifiers, double-clad fibers, multi-core fibers, fiber couplers, etc.

► powerful script language for an enormous flexibility

► can do most sophisticated analysis and optimizations

See a detailed description: [www.rp-photonics.com/fiberpower.html](http://www.rp-photonics.com/fiberpower.html)
Other Software from RP Photonics

**RP ProPulse:**

- simulates the propagation of ultrashort pulses e.g. in mode-locked lasers or sync-pumped OPOs
- can include laser gain, parametric gain, SHG, Kerr and Raman effect, chromatic dispersion, etc.
- pulse display window
- can do most sophisticated analysis and optimizations

See a detailed description: [www.rp-photonics.com/propulse.html](http://www.rp-photonics.com/propulse.html)
Other Software from RP Photonics

**RP Resonator:**

- design of optical resonators for lasers, OPOs, filters, etc.
- can fully parameterize the designs
- powerful script language for an enormous flexibility
- can do most sophisticated analysis and optimizations

See a detailed description: [www.rp-photonics.com/resonator.html](http://www.rp-photonics.com/resonator.html)