Neocraft modular lamp system

Home 3D printed objects were expected to become a practical daily reality, enabling a new way of producing customised functional objects beyond the traditional manufacturing channels. Even though the arrival of this production disruption was announced as imminent, sometimes under eloquent titles such as the new industrial revolution, in reality home 3D printing output has been mostly dedicated to replacement parts and collectible figurines.

This does not mean though that more inspiring applications of home 3D printers are not possible. It only requires better design.

The Neocraft modular lamp is a customisable system of DIY lamps designed to be produced with desktop 3D printers and to be assembled with basic hardware store parts, optimising flexibility and minimising waste. The guidelines for the design are the following:

- Parts are designed to fit desktop FDM 3D printers and standard 3D printing materials.
- 3D model algorithm produces a new shape every time. Unless wanted, every part will be unique.
- In spite of every part being unique, all parts fit all parts in several ways, maximising customisation possibilities.
- Parts are designed for self-sustaining 3D printing. No building support structures are needed, minimising waste.
- The design delivers robust lamps for everyday use while optimising material usage.
- No glue is required at any point. Only screws and lock-in mechanisms are necessary for assembly, maximising recycling, reassemble, and reuse possibilities.
- Only basic standard hardware store parts (light bulbs, light bulb holders, electric cable, plug, screws and wooden rods) are needed beyond the 3D printed elements.
- Parts can be recombined and reused according to need, even after assembly.
- After the product use cycle all parts can be either reused or recycled.

The Neocraft lamp system is designed with 3 different modules: bottom, middle, and top. The bottom module has lock-in holes for 3 wooden legs. The bottom and the middle modules have support structures for a successive module. Modules can be freely combined, both in terms of the vertical sequence and the three horizontal rotations which are possible for each of them. A fourth type of module, with leg holes and no support structure for a successive layer, can also be produced for single-stock lamps.

The resulting design provides a very high optimisation of the possibilities of desktop 3D printers and material usage. Average middle parts of the lamp have a volume of 4,15 litres while their density is as low as 0,026 gr./cm3 when printed in PLA. For the top part of the design (which require less internal structure) the density goes down to 0,020 gr./cm3.

The 3D model script also includes a small random horizontal tilt between the bottom and the top of each model, which adds movement and creative possibilities to the design. In case an iteration of the script does not satisfy the expectations of the user a new version can be generated with a single click. The design's concept is to make both the script (which runs under Grasshopper) and a library of ready-to-print and tested STL files open source for the DIY community to enjoy.

All parts shown were produced with an Ultimaker 2+ 3D printer and standard PLA filament.

Description of the images

1. Single, two storey, and three storey assembled Neocraft lamps.
2. Five storey Neocraft lamp next to chair.
3. Single and two storey assembled neocraft lamps.
4. 12 iterations of the 3D model script.
5. 3 assemblies of the same 4 parts (out of the 54 possible combinations)
6. Bottom, middle, and top parts.
7. Internal support structure of a middle part.
8. Everything needed to assemble a two storey Neocraft lamp.
9. Self-sustaining 3D printing process.