NEW TRENDS OF 3D TECHNOLOGIES AND COPYRIGHT PROTECTION

Vito Cappellini
University of Florence
and INN-3D
Italy
vito.cappellini@unifi.it

Francesca Uccheddu
Department of Industrial Engineering-
University of Florence and INN-3D
Italy
francesca.uccheddu@unifi.it

SUMMARY

In the last years, in the manufacturing sector, there has been an increasing diffusion of digital technologies, so that the term *Digital Manufacturing* emerged. These technologies have entailed an impact at the corporate level, through the necessary reengineering process, and socially, making the customer the protagonist in the production of their purchases and enhancing their creativity. This change occurred in response to the reduction of the life cycle of products and to the need to meet the requirements of its customers in the best way.

3D printing is an innovation which, together with digital technologies, has enabled the diffusion of digital manufacturing, facilitating the transition from the paradigm of *mass standardization* to that of *mass customization*. The expiration of some *patents* related to print has encouraged the diffusion of additive manufacturing; now it is increasingly used by consumers and enterprises. Since its birth, it has been applied for *prototyping*, while in recent years also for the production of products and spare parts. The sectors where it is most widespread are the rail and automative transportation, the aerospace, the medical and the artistic ones, with relevant feedback in the Cultural Heritage field.

3D printing is considered a *disruptive* innovation because, encouraging the sale of files instead of a sale of items, it can optimally solve economic and social problems that have been emerging in recent years. It is considered a technology with strong growth, but it may encounter obstacles in its expansion due to the problems concerning the *protection* of *intellectual property*: file sharing can encourage the spread of non checked 3D files and then it leads to the free *duplication* of digital objects and the consequent violation of *intellectual property*. A natural consequence may be the failure to control the authenticity of the files, and then the risk is reflected in the spread of *counterfeit* and uncontrolled goods. The lack of

specific legislation to protect file properties further aggravates the threat of the *illegal us*e of the same.#Currently the use of *3D watermarking* and e*ncryption* of data is an used solution to this problem, although an action at national and European level which protects the dissemination of unauthorized files is still desirable and new more *robust* and *safe protection tools* are required.

Let us consider in more details the 3D printing with protection of 3D data (3D Digital Models) activating them at local or remote sites.
Indeed when objects are copied without permission, there is a distinct possibility of *infringing* third party rights.
Unauthorised commercial production of products by 3D printing may constitute an act of *legality infringement* by the user of the printer.

Whilst it seems clear that the manufacture of a whole patented product, for instance by a plastic laboratory equipment, will constitute *patent infringement*, the position regarding the manufacture spare parts and their incorporation into patented products, regardless of whether they were produced by 3D printing or by traditional manufacturing methods, is not as clear-cut.

Copyright gives a bundle of rights to the *rights owner* (usually the *creator* or the *creator's employer*) to prevent other people from copying (*anti counterfeiting*), using or exploiting their works (works which involved *intellectual creation*).
In response to the growing emergence of 3D file sharing and the intellectual property risks therein, the research community are developing methods to *protect* digital data from being mistreated.
These include, for example, mechanisms such as *Technological Protection Measures* and *encryption software*. There are a range of access control technologies used by those (manufacturers, publishers, rights holders) who wish to protect an asset through limiting the use of the information or digital device. This protects rights holders from having their intellectual property or digital assets copied or converted without permission and is typically applied to music and films. These technologies have to be developed however in conjunction with all printer manufacturers under a mandate that ensures printers to have the *correct decryption protocols* and software to stream legitimate 3D files. It also allows for enforceable liability warranties to be created, giving consumers the confidence that content of high quality or providence can be 3D printed.

On this line applied research activities are developed by a new START-UP INN-3D, created in the framework of the large Firm SESA GROUP in Empoli (Florence), to define and implement new *Software Tools* enabling the Protection of 3D Products and in particular of 3D Digital Models. A *prototype* has been developed and tested, using digital marking and special security *tools* to ensure the *safe transfer* of the 3D Digital Model from the *Creator* (*Owner*) to the final *User* (at local and remote sites). A new *Patent* has been proposed.

These new developments of 3D Data Protection will have a big increase in the near future, in connection also with a reduction of prize of 3D printers (which is expected as a result of *patent expiries* and technological progress).