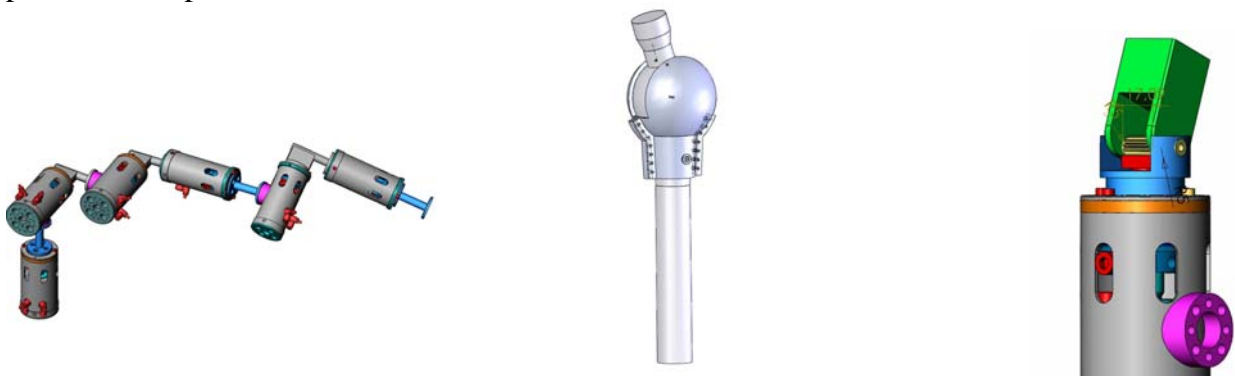
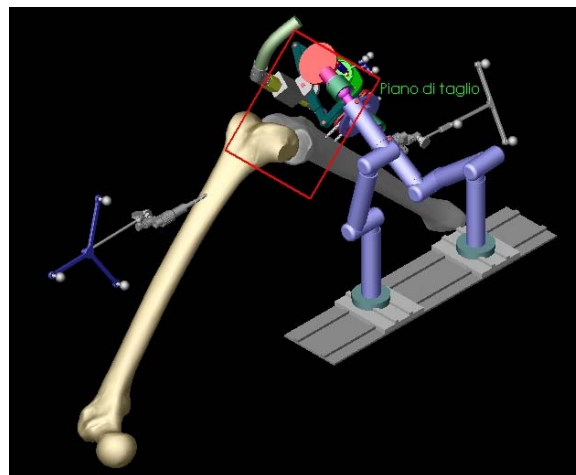


## Robotic Arm System

The robotic arm is a new kind of passive to realize surgical operation with the same precision of robotic systems without the problems connected with the use of this device. Existing robotic systems are extremely expensive and also complex to use so they are employed only in that kind of surgical operation that requires high precision (for ex. spine surgery) by a limited number of skilful specialist. On the contrary, this tool has to be used in routine surgery such as hip and knee prosthesis, in which an higher precision can support a longer period of the implant and a fast and correct resume of movements. For these reasons we decided to realize a tool completely mechanical, so easy to use, and also light and a bit cumbersome to be easy moved manually and not disturb usual movements of assistants in surgery room. Besides, we try to realize a versatile device; for this reason we designed some sub-system with open interface which can be put together in different ways. At the beginning we carried on a solution with joints at one degree of freedom with pneumatic stop.



The arm was formed by a chain of six joints connected alternately by straight link and angular link which allow rotation around perpendicular axis, but in this way the arm resulted difficult to move and hard to manage. Thinking to catch only the last joint, we couldn't manage very good all the other segments of the arm. For this reason cinematic of tool was reviewed and we thought to realize a joint with more degrees of freedom to reduce number of segments and to make robotic arm more easily moving. We are analyzing two different solution: realize another arm with joints at three degrees of freedom stop with a eccentric lever, and modify actual joints with realization of some parts with allow another rotation around a perpendicular axis that use for stopping the same motor which stops the first rotation. These two solution are going to be realized and we also work for reducing flexion displacement and some mechanical jokes noticed on prototype.



At the same time we have realized the moving system; it is formed by two ball bearing slides perpendicular which allow to pose tool near the knee and to move toward patient, a rapid hooking/realise system which fix the leg of patient and finally a fixing system of cutting tool which fix pneumatic cutter to the second arm of robotic arm system.

