Study of the movement of a micro-mechanical platform

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Abstract: This work shows a design and study of the movement of a micro-mechanical platform. The mechanical system gives original contribution guide to tasks of the micro-assembles.

Keywords: Micro-mechanical system, Micro-mechanical platform, Closed system, Micromechanics, Microassemble, Micromachine-making

1. Introduction

This work shows design of a micro-mechanic platform and study its movement. It has a specific dimension and characteristics in each one of its components [1-11]. The micro-platform is symmetrical and is made up of three identical links which connect the platform bases with the mobile platform (Fig 1).

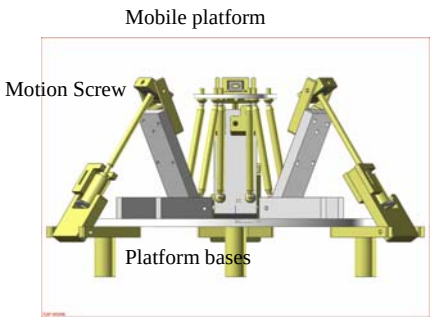

Fig 1. Micro-platform

The system is a set of levers. These levers are connected through spherical joints. The motion screw is connected through cardan joint. Motion screw is one of these components. The motion screw introduces the mechanical movement to the system. The movement of the platform occurs in the same way. This happens when the screws turn simultaneously (Fig 2).

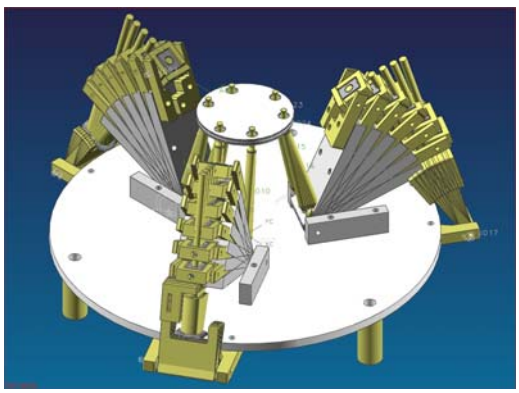

Fig 2. Micro-platform

In our case, the screw is formed by 58 threads (Fig. 3).

Fig. 3. Motion screw

The micromechanical platform gives original contributions guide to tasks of the microassembles and micromachine-making of high precision [6].

2. Design

The configuration designed for this micro-mechanical platform considers the integration of basic components for the conformation of the different subassemblies as well as for the final assembly. These components were designed with the purpose of being able to be made of simple way and by means of the conventional processes of manufacture from common structural members like wall-plates and plates of commercial thicknesses. Similarly the assembly process of this mechanical platform is a simple task, because it requires the application of elements of standard union such as screws and small bullets.

The system is symmetrical, which allows us to predict the movement of the three levers from the analysis of anyone of them. In this work we show that each arm moves with its proper degree of freedom (DOF), associated to the drive of the motion screw, so in this way three degrees of freedom for this system are archieved (Fig. 4).

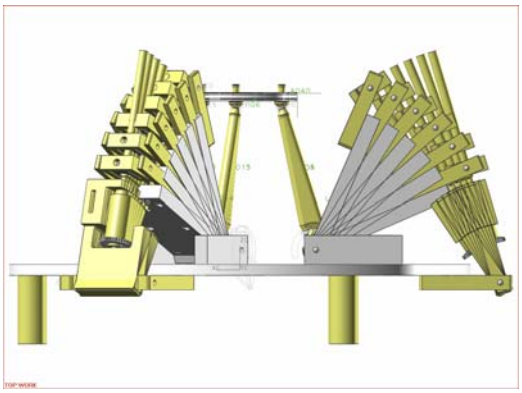

Fig. 4. Front View

3 COMPUTER SIMULATIONS

Computer Aided Design (CAD)
A virtual prototype of the micromanipulator was modelled in a parallel way for the development of this system.
The geometric model of each one of the components was generated and later all components of this model were integrated in the final assembly of the manipulator
The micromanipulator and plataform was designed by *Unigraphics*.

Computer Aided Engineering (CAE)
Once concluded the virtual assembly of the micromanipulator simulation of the movement of the system was generated. In this simulation different schemes of movement of the motion screws were evaluated and repercussion in the displacement of the movable platform was observed. These simulations confirm that the model was developed with the correct geometric proportions [5].

CONCLUSIONS

In this paper, we presented a model of a mechanical system. By developing a model with an application of CAD tools it is possible to save time at the moment of the integration of the entire system. Virtual models helps to have an excellent pre-visualization of the project to be developed so every mistake can be corrected before the beginning of the assembling processes.

Acknowledgments This work was supported by CCADET-UNAM, and PAPIIT UNAM projects: PAPIIT IN114007, PFAMU PI100606 PAPIIT IN108606-3.

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