Tekniker Generación y aplicación de la tecnología y el conocimiento
ik4 research alliance

# SPECIALISATION

## Identification and control of systems

## PRESENTATION

**Identification and control of systems** at TEKNIKER is a line of research demanding the command of different technologies to achieve realistic models of the behaviour of physical systems.

On the one hand, an **understanding of the systems to be designed**, as well as of the development of modelling techniques and strategies that allow valid models to be obtained, both from the point of view of their reliable behaviour with regard to the real system and from the point of view of the usability of the same.

The next step is **simulation**, meaning the use of these models to study the behaviour of the same in the different operating scenarios required. Equally important is the **validation of the models**, normally by comparing the results of simulations with tests specifically designed for them and the updating of the theoretical models.

Despite being obvious, this is extremely difficult, both in carrying out the tests themselves (specific sensors and actuators) and in the difficulty of correlating the theoretical models generated. One of the most important applications n this sense is the development of optimum controllers that guarantee the correct behaviour of the system being studied.

In general terms, we can state that the systems identification and control line at the TEKNIKER technological centre demands considerable knowledge of sensors, actuators, data acquisition and signal processing, modelling and multi-domain simulation techniques, control algorithms and systems regulation.

## INDUSTRIAL SECTORS

- Machine Tools
- Capital Goods
- Automotive
- Energy

# MAJOR PROJECTS

## Cenit Fagor

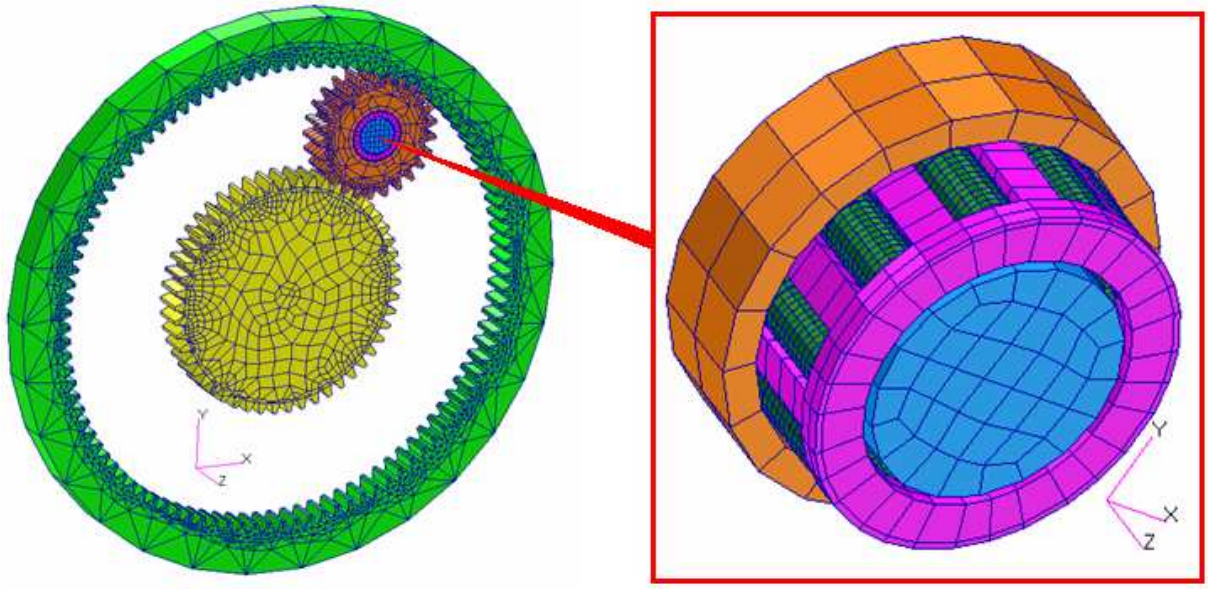
With machine tools, the use of machines with optimised drives improves both product quality and machining time. The drives must be designed in optimum fashion and their control adjusted correctly.

In this context, the problem encountered by users when adjusting a CNC (Computer Numerical Control) is the fact that they do not know the optimum settings. In addition, in order to adjust the CNC as well as possible, the dynamic characteristics of the drive need to be known.

TEKNIKER, In order to make the adjustment process easier, the TEKNIKER foundation has collaborated on the CENIT project to develop a new utility incorporating the Fagor family of controls. Controls that will carry adjust the CNC parameters automatically or semi-automatically according to the priorities and knowledge of the user. This auto-adjustment process is divided into two stages: the first consisting of the identification of the dynamic operating characteristics by in-machine measurements. The second stage consists of the optimum adjustment of the control link parameters.

### Methodology for calculating cages using finite elements

We have developed a methodology for the numerical simulation of epicycloidal and planetary gear cages.



This is a highly complex non-linear calculation involving multiple contacts between different solids, suffering complex inertial forces due to the accelerations of each solid and those produced by the relative movement between the same.

Nowadays, a dynamic simulation such as this, using explicit calculations, would involve unacceptable computing costs, leading us to develop a methodology to simplify it to an implicit static non-linear calculation.