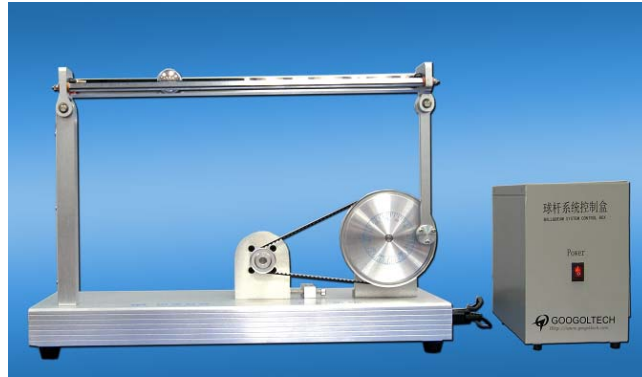




## Ball & Beam Control System

### Overview

The ball & beam control system is a kind of education and experiment equipment, specially designed for courses in automatic control principle, modern control engineering, and electrical motor control. The control system designed with this experiment equipment is able to control the position of a stainless steel ball on the track by adjusting the rotating angle of a beam.



The Ball & Beam control system consists of two parts, namely the Ball & Beam body and the control system. The Ball & Beam body consists of a v-grooved steel bar and a free rolling ball. The linear sensor measures the position of the ball on the track by measuring the output voltage from the stainless steel bar. A DC motor is connected to a reducer, which controls the angle of beam, accordingly realize the position control of the ball.

### Main Feature

The digital control system consists of an intelligent control module, which is a high precision, fully digital servo drive, with embedded intelligence and built-in 100W power amplifier. The drive is used for brushless motors with sinusoidal or trapezoidal commutation, or DC brush motors. Programmable with the high-level Motion Language, the intelligent control module embeds on one board advanced motion control and PLC-specific functionality. Combined with a high-level Motion Language, a graphical platform for quick configuration, tuning and motion programming, the Intelligent Control module represents a flexible and easy way to implement solution for a wide range of applications. A user-friendly graphical control interface can visually shows the results of the controller and all of the operating data.

Real-Time control interface are provided in MATLAB Simulink and LabVIEW, making it convenient to implement basic experiments and arithmetic studied.

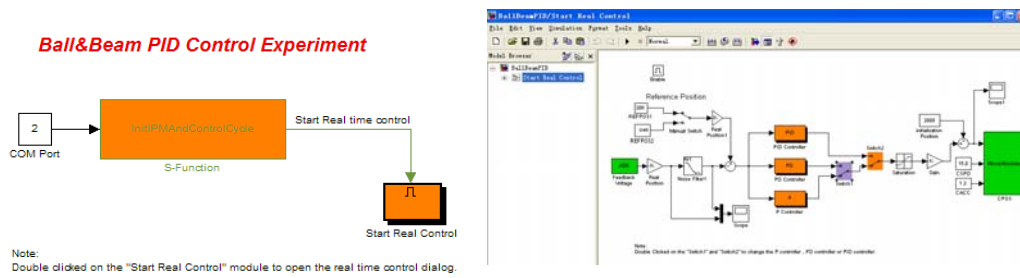
### Control Interface

Three type of software interfaces are provided for the system real time control:

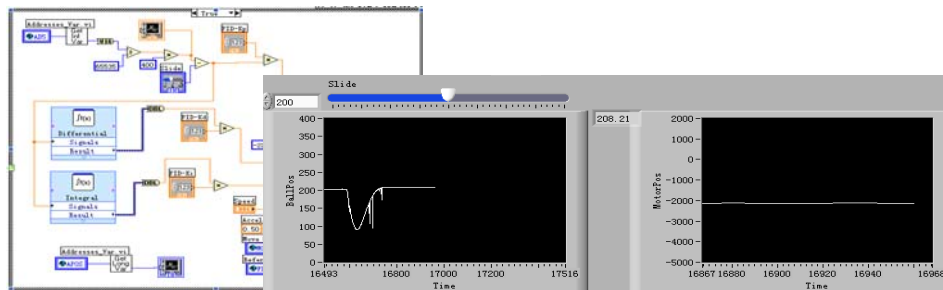
- Control interface in IPM Motion Studio:



➤ Control interface in MATLAB Simulink:



➤ Control interface in LabVIEW



**Technical Specification**

<b>Moving Range</b>	400mm	<b>Ball Diameter</b>	30mm
<b>Control Accuracy</b>	±1mm	<b>Motor</b>	DC Servo Brush 35W
<b>Reducer Ratio</b>	4	<b>Power Supply</b>	AC220V 50HZ 1A (Or AC110V)
<b>Weight (overall)</b>	<10Kg	<b>Dimension</b>	600mm×300mm×400mm



## Suggested Experiments

1. System modeling;
2. Design of feedback controller;
3. P, PD and PID control system design;
4. Design controllers using root locus methods.
5. Design controllers using frequency response methods.
6. Design controllers using user define arithmetic.

## Ordering Guide

Model Code	Model Name	Description
GBB1004	Ball & Beam digital control system	<ul style="list-style-type: none"><li>• Ball &amp; Beam mechanical body equipped with DC servo motor and drive</li><li>• Electric control box with motion controller and DC power supply inside</li><li>• Intelligent motion control platform</li><li>• MATLAB toolbox</li><li>• User Guide and Experiment Manual</li></ul>