SERVO-SYSTEMS & PROCESS CONTROL

DidaRadar: ERD 200

SPEED/POSITION SERVO-SYSTEM

The ERD200B package is a complete **training system** for the **detailed study** of servo systems. It illustrates the speed or position control of an approach radar. As an optional extra, you would get a LiDAR (Light Detection And Ranging), an instrument that measures the distances between the sensor and the surrounding obstacles, thanks to a 360° scan. By repeating this process several times, the instrument establishes a map composed of all the points that the LiDAR has collected.

TRAINING PURPOSES

It allows the system behavior analysis in different possible configurations, its characterization and control synthesis according to the required specifications.

A complete **training manual** proposes many topics: study of transducers, characterization of a mechanical load, study of speed and/or position in open loop, study of speed and/or position in closed loop, selection and adjustment of the corrector, selection and adjustment of the control parameters etc…

POSSIBLE CONFIGURATIONS

- **Selection of the structure**: open loop, closed loop controlled in speed, closed loop controlled in position.
- **Selection of the control signal**: constant step, ramp, trapezoid, sine, external control.
- **Selection of the corrector**: P/PI/PID, 3rd order digital « Z » transform, ON/OFF, state feedback.
- **Selection of input on which the derivate action is applied**: on bias, on measurement (PID).
- **Selection of the driven mechanical load**: inertia (with a 500-g weight).
- **Selection of the motor power interface**: in current (torque), in voltage (speed).
- **Selection of the « system » different parameters**: sampling periods, transducer gain etc …
- **Optional Extra d_Scil**: creation of real time correctors with Scilab / Xcos (fast prototyping)

TRAINING IN

- Electrical engineering
- Mechanical engineering
- Physics
- Universities
- Vocational schools
- Military schools

MADE IN FRANCE
FABRICATION FRANÇAISE

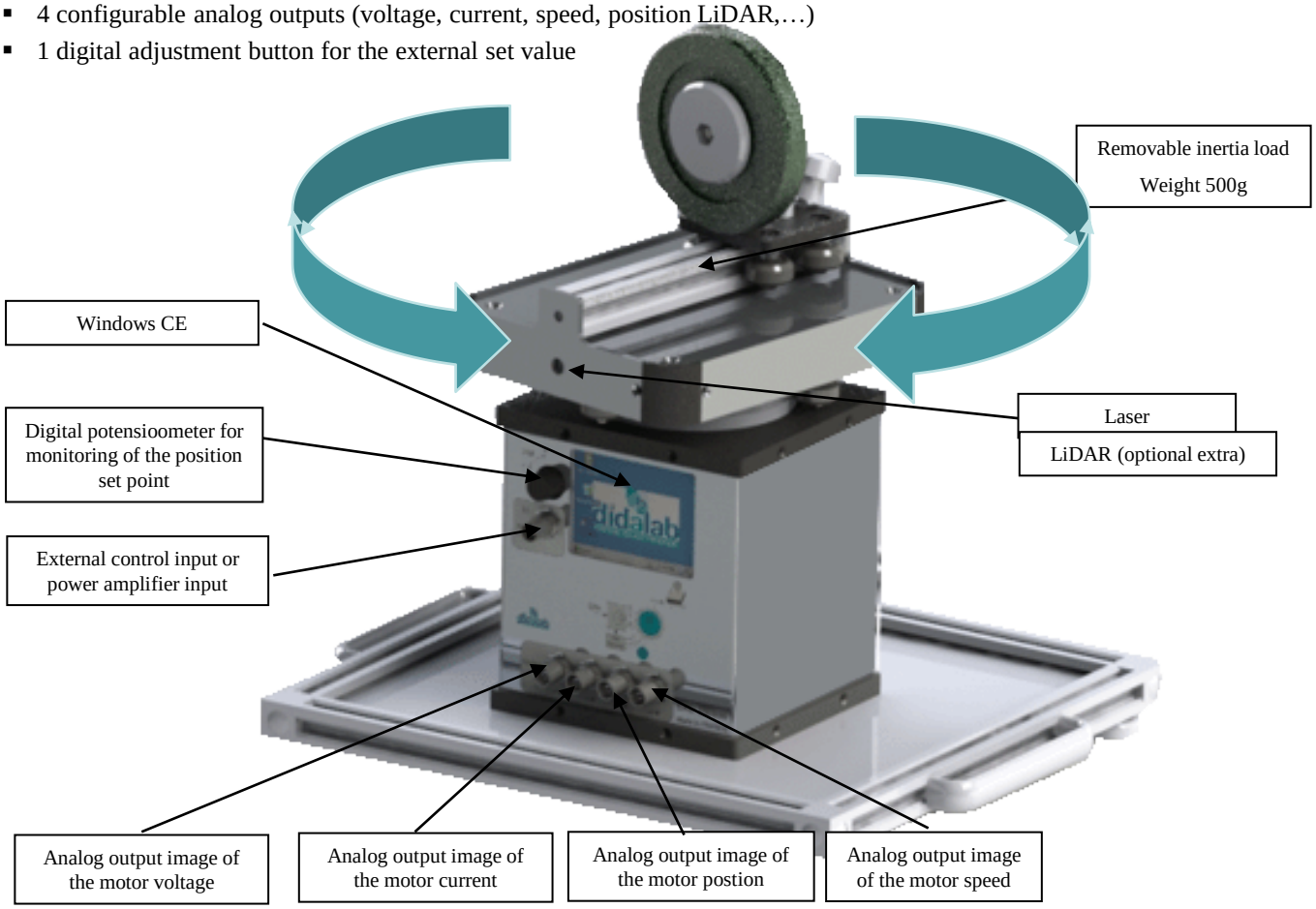
ERD200000 : Operating unit

The ERD200000 electromechanical device is available on table-top dibon baseframe, with external power supply. It is proposed in 2 operating regimes:

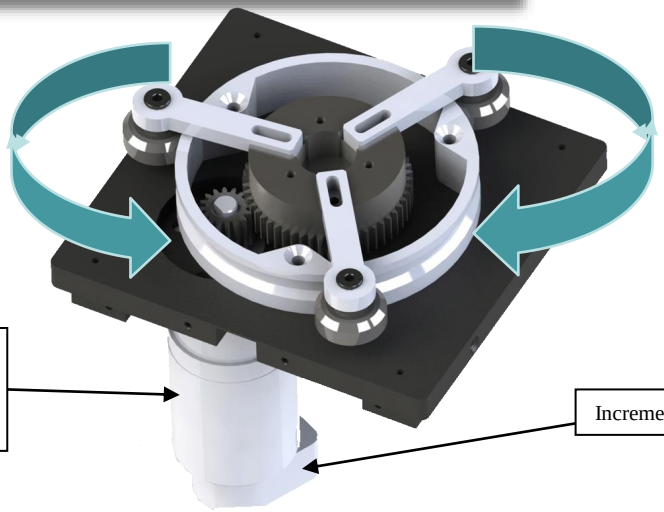
- Control with the software *D_Syn* (refer to the following pages), optional: rapid protoyping *D_Scil* (cf the documentation)
- Rapid prototyping using Matlab Simulink®, (interface board not supplied) ; in the latter case, the analog inputs enable to directly control the power interfaces.

It includes:

- 1 electronic board with a high-level of power microprocessor enabling the monitoring and control of the system in real-time and the communication with a PC *via* Ethernet link
- 1 power electronics board to carry out the power interfaces of the motor (current or voltage),
- Measuring points are available in the front panel by BNC (speed/position images, motor voltage and current).
- 1 analog input
- 4 configurable analog outputs (voltage, current, speed, position LiDAR,…)
- 1 digital adjustment button for the external set value



Gear motor



ERD200100 : CONTROLING SOFTWARE (op. with Windows): « D_CCA » :

▪ It is operating under Windows environment

and enables to drive the didaRada *via* Ethernet.

▪ Configuration of the system, via an ergonomic graphic interface:

- selection of the system structure: speed or position open/closed loop.
- selection of the control type, characteristic values: constant step, ramp, sine, trapezoid signals.
- selection of the corrector and its adjustments (P, PI, PID, Z corrector, On/Off, tacho-generator feedback)
- selection of the power interface type (current or voltage).
- selection of the fluid braking intensity and its trigger time.
- selection of the acquisition and recording parameters.
- selection of the measurements units.

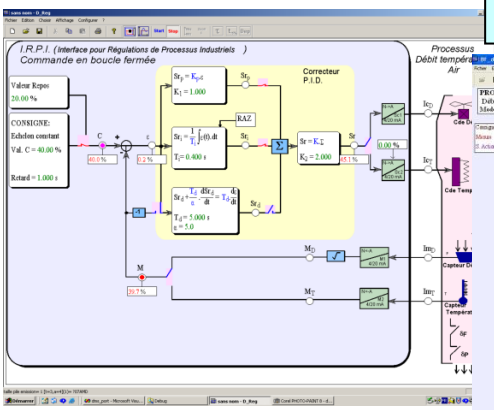
It also enables the structured running of the experimental work:

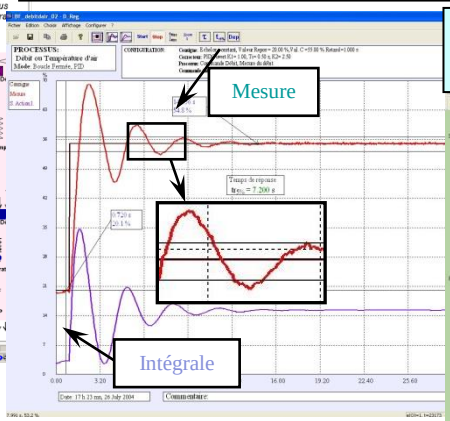
- request for the displaying of a time response of one (or several) characteristic parameter(s): position, speed, acceleration, motor current/voltage, control signal, overflow, corrector output etc…
- modification of the time diagram scales (zoom in X, or Y)
- recording of the running test, comparison with the previous tests
- determination of the automatic control characteristic values (time constants, 5% response time, overflow amplitude etc…)
- transfer of the result curves to be controlled by other processing software, such as MATLAB.

Parameter screen
Exemple of speed control by PI single loop corrector

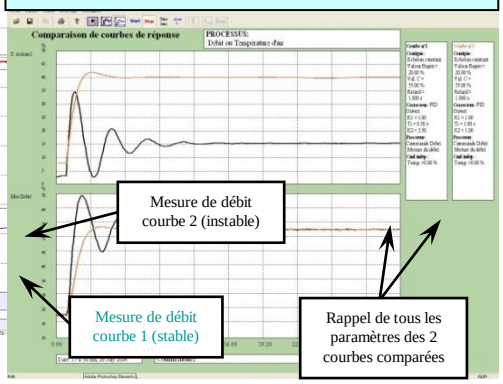
Examples of D_CCA curves:

Response in closed loop speed control, with automatic calculation of the reaching time in the 5% zone.





Comparison screen between OL responses



ERD 540 800: D_Scil Creation module of real-time correctors under Scilab/XCOS

D_Scil: Complete development process, representative of current methods in automation developments. This method is described here after in 5 main successive steps. It is a tangible representation of development in the industrial technology field, as its aim is to achieve cost optimization in both software development and hardware prototyping.

HIGHLIGHTS

- Automatic generation of real-time corrector
- Creation of new real-time correctors
- Knowledge in real-time computing aren't required
- Convenient for research studies

EXPERIMENTS MANUALS– (students and teacher manuals)

ERD 200 040 / 050 : Experiments in linear control

Set of experiments with the motor with current interface

Identification in Open loop no1
Speed control with a Proportional corrector
Speed control with a Proportional +Integral corrector
Speed control with a P corrector with Tachometric feedback

Set of experiments with the motor with voltage interface

Identification in Open loop no2
Speed control with a Proportional corrector
Speed control with a Proportional +Integral corrector
Position control with a Proportional corrector
Position control with a Proportional and Derivative corrector

Standard configurations:

ERD200B: « STUDY OF A SPEED AND POSITION SERVO SYSTEM ON AN APPROACH RADAR » Package, including:		
References	Decription	Qty
ERD200000	DC motor speed and position servo-control operating unit	1
ERD200100	Control and acquisition program, ON/OFF, P, PI, PID corrector, 3rd order Z transform, state feedback,	1
ERD200040	Manual of experiments (teacher book book) in the continuous linear range	1
ERD200050	Manual of experiments (student book book) in the continuous linear range.	1
EGD000010	2-m UTP/RJ45 lead	1
EGD000005	Power supply, 24 Vdc, 2.9 A	1

ERD200S: « STUDY OF A SPEED AND POSITION SERVO SYSTEM ON AN APPROACH RADAR with PROTOTYPING » Package, including		
References	Description	Qty
ERD200B	**« STUDY OF A SPEED AND POSITION SERVO SYSTEM ON AN APPROACH RADAR » Basic package**	**1**
ERD200800	**D_Scil,** Module for creating real-time correction in *Scilab / Xcos* applied to ERD100000 (see documentation)	1

Packing list:

Net : Dimensions, 300x 350 x 350 mm, weight 4 kg
Brut : 1 carton box, 40 x 30 x 50 cm, weight 7 kg.

Document non contractuel

® Marques déposées

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