



ID

inca Discovery

CONSTRAINED LINEAR MODEL
IDENTIFICATION TECHNOLOGY

THE DISCOVERY EXPERIENCE

DISCOVER

INCA Discovery enables a control engineer doing model based control work to impose prior knowledge on the model identification problem in the form of process gain, dead time and Time-to-Steady-State constraints. INCA Discovery achieves higher levels of process realism in the model matrix, improving the performance of control applications, thereby generating a higher return on investment.

PROVEN!
To improve
profitability

Scalability: INCA Discovery is designed to work with thousands of data signals (DCS tags), and data sets spanning several months or several years.

Usability: You can drag individual signals or entire signal lists into the Independents/Dependents tab to populate a case, which is much easier than searching for one signal at a time. You can also search for tags by using wild cards and "Type-ahead" technology.

Efficient use of Step Test Data: INCA Discovery uses individual slicing per CV rather than the traditional "common" slicing approach. As a result, you can combine many CVs in one case and selectively mark which MVs affect each CV, and all the available data per CV will be used for the model ID run.

Calculations are Supported: A large set of formulas is provided to create calculated signals. It has an Excel-like look and feel.

Flexible User Interface: You can dock and undock time trends and rearrange the windows in many different ways. Trends can be hidden and brought back as needed. This approach improved productivity especially if you have multiple monitors connected to your machine. We tend to do slicing on the prediction plots, as that makes the task of selecting bad data much easier.

Curve Constraints: For all the model identification algorithms, you can set Time To Steady State, minimum dead time, and model gain constraints on a per curve basis, for all or some of the model curves.

Final Model Matrix & Formats: You can drag and drop model curves into your final model matrix and export models in most of the popular formats.

INCA DISCOVERY CAPABILITIES:



Parametric Transfer Function Models:

We use a FIR to State Space model conversion step with automatic model order determination, so noisy FIR curves can be converted into a series of low order transfer functions giving a smoother response model.

Distinguish between MV slices and CV slices:

An MV slice means the process was not responding normally and the data is unusable. In that case, INCA Discovery will re-initialize after the bad slice. If you introduce a CV slice, you assume the process was fine but that the instrument was reading incorrectly, and INCA Discovery only removes the affected data points. This is much more efficient than the traditional common slicing approach.

Automatic Dead Time Detection:

The Automatic FIR method uses a series of quadratic polynomials to fit a smooth FIR model with improved process realism. INCA Discovery relies on model uncertainty estimates to automate dead time and TTSS detection, and to determine if transients and cycles late in the model curve are real or not.

Locked Curves:

Weak or non-existent model curves are automatically detected and defined as "Null" (zero) curves. You can lock any model curve, edit the FIR smoothing factor, and then rerun it. This is handled as an equality constraint in the QP solver. This is useful during a retest when you only want to move a subset of the MVs and re-identify those models. You can even mix and match the different model ID algorithms: You can copy a Transfer Function model curve into the FIR method, lock it, and then rerun the FIR trial, possibly with different smoothing. Or you can copy a model curve from an imported model, and then paste it into your new case, lock it, then rerun the case.

INCA DISCOVERY AT WORK

Model Identification Technologies supported in version 1.0:

- **Standard FIR Algorithm:** Both smoothed and unsmoothed
- **Transfer Function Method:** INCA Discovery contains a new method that generates smooth transfer functions by converting the FIR models into a state space model with pure dead time.
- **A New Quadratic Polynomial Based FIR Approach:** INCA Discovery determines the model uncertainty bound around the model curve, detects dead time and TTSS, and then determines how many straight lines it will take to approximate the Impulse Response without violating the uncertainty bound. As a result, the models are very smooth and reflect the real process dynamics better.