Parametrics Master Class

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Parametrics

- First introduced in 2010
- Refined further in 2011
- Most important new feature in ten years
- Takes time to master
- Solution, looking for a problem
- Allow the user to explore complex geometric problems
- Add intelligence to drawings

Underlying concepts

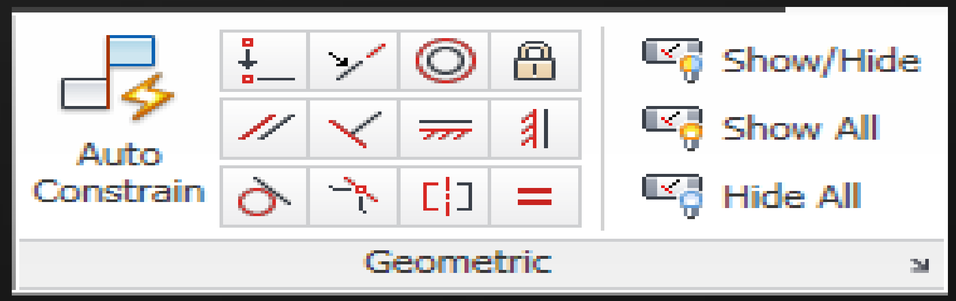
- Works on the concept of constraining geometry
- Geometry can be in one of three states
  - Under constrained
  - Fully constrained – where we want to be!
  - Over constrained

Constraints

- Constraints are the gears that make it work
- Two types of constraints
  - Geometric
  - Dimensional
- They work together.

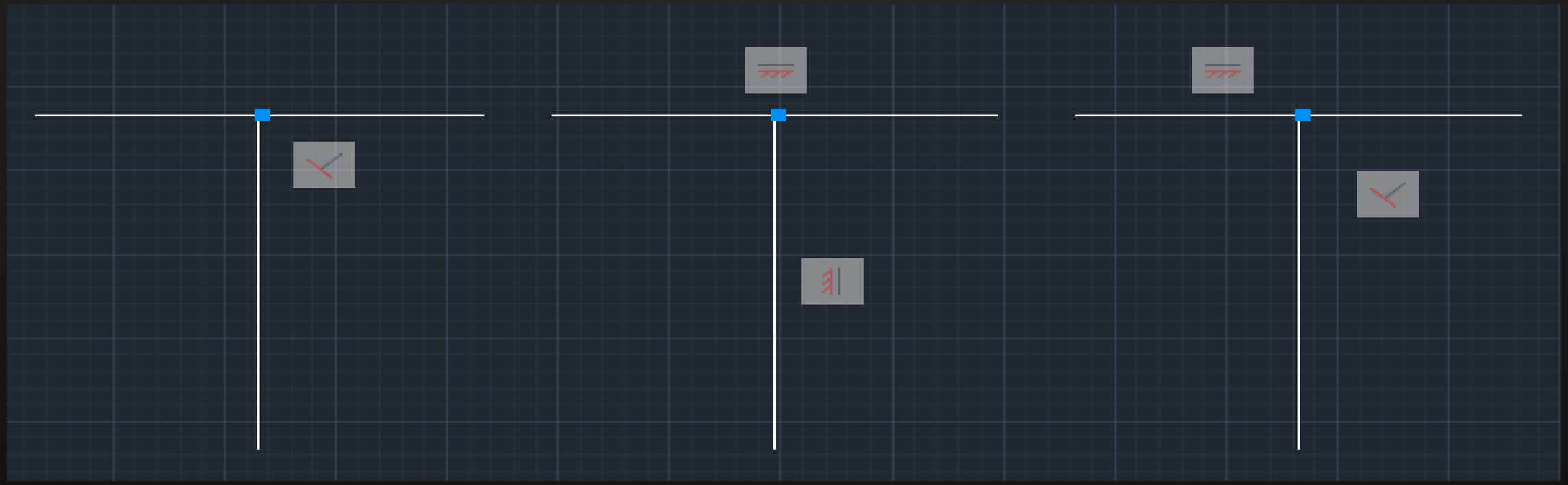
Geometric Constraints

- On the Parametrics panel
- Twelve geometric Constraints
- Each react differently and work with different objects.



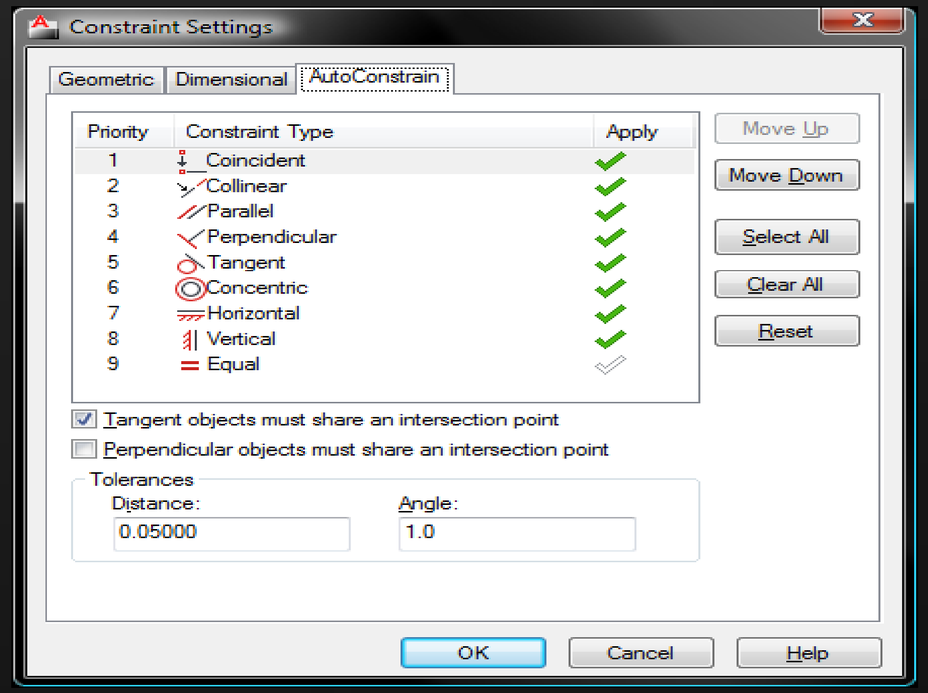
Same, same but different

- Understand your goal
- Three examples here, all look similar but are different.



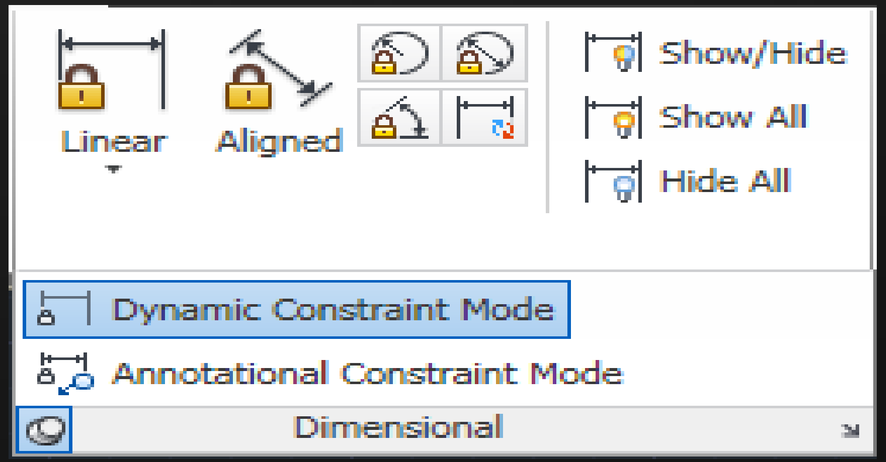
Auto Constrain

- Effective first pass tool
- Change it’s parameters with CONSTRAINTSETTINGS



Dimensional Constraints

- Quantitatively define relationships between objects
- Looks like a dimension but behave differently
- Six different constraints

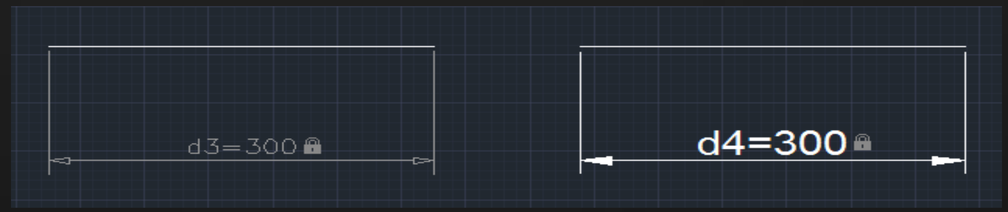


Usage

- Can be applied to objects or constraint points
- Two different type of dimensional constraints
  - Dynamic
  - Annotational
- Dynamic – style neutral, scale automatically
- Annotational – similar to normal dimension
- Controlled by the CONSTRAINTFORM system variable

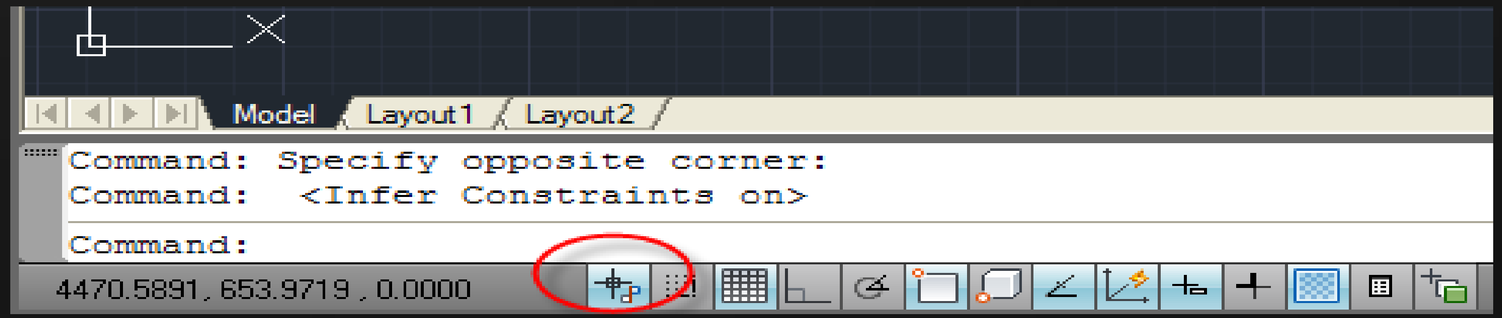
Reference Constraints

- Doesn’t affect geometry
- Indicated by enclosing parenthesis



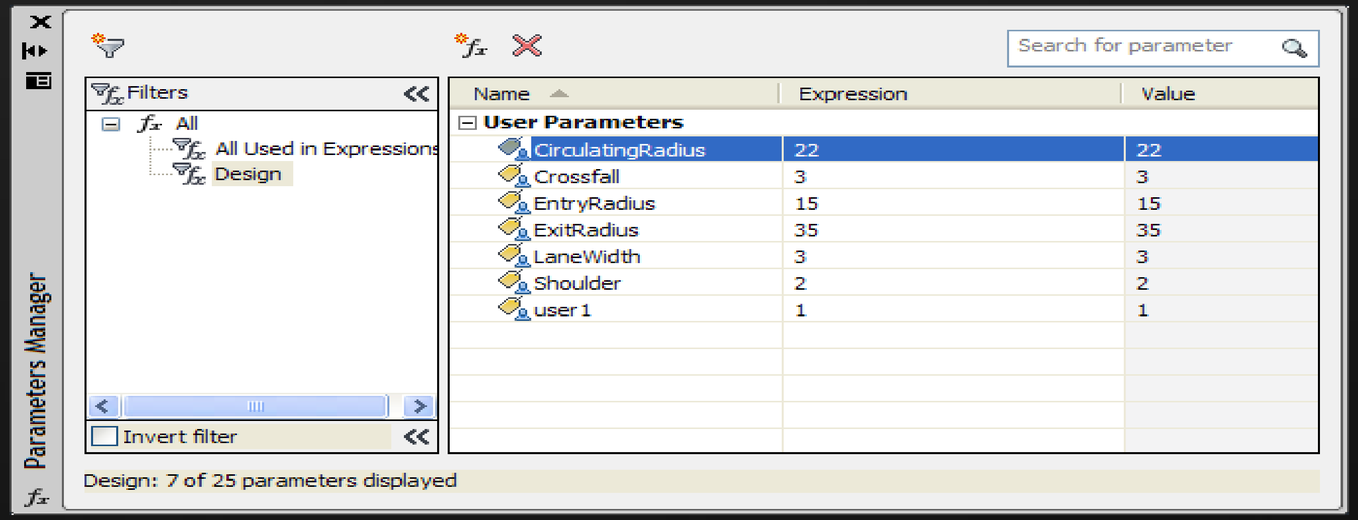
Inferred constraints

- Constrain as you go
- Can be toggled on/off with the CONSTRAINTINFER system variable
- Also with the taskbar



Paramters Manager

- Every dimensional constraint appears in the manager
- Use to manage all variables
- Can enter user parameters
- Expressions



Worked Example

- Create a line
- Add geometric constraints
- Add dimensional constraints
- Use construction lines
- Drive it with Parameters manager

Dynamic Blocks

- Geometric and Dimensional Constraints available in Block editor
- Construction lines
- Same methodology
- Look up tables

Design or document

- Obvious usage in design development
- Can be used in Paperspace to help organise your drawing

Three examples

- Roundabout and section
- Mechanical component
- Drawing

Key Strategies

- Understand your geometry and the interaction you want it to perform.
- Use the tools such as Auto Constrain and Infer Constraints to do the initial work for you.
- Use logical names for important dimensional constraints.
- Use Parameter Groups to isolate those parameters that the user should interact with.
- Toggle the display of constraints on/off to de-clutter the display
- Test the model frequently to ensure that it behaves as expected.
- Use formulas in constraints to calculate values rather than hard coding them

Questions?