

# Constraint Objects – Integrating Constraint Definition and Graphical Interaction

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**Abstract:** This paper describes the implementation of a new constraint-based technique for direct manipulation in interactive CAD, which will simplify the design process, especially in the early stages. We introduce so called Constraint Objects and Parameter Objects which constitute an object-oriented view on constraints. They serve to simulate the mutual degrees of freedom between objects for which a geometric relation (distance, angle, parallel, congruence, etc.) has been defined. A 2-D profile editor has been realized for interactively constructing lines and circles in various ways. Each construction operation, implicitly defines constraints to capture the intent of the operation. These constraints are represented by corresponding parameter objects and constraint objects. A constraint solver is applied to rewrite the set of constraints into its normal form if necessary. Finally, the resulting parameter-constraint-regular-object network serves to simulate the degrees of freedom of geometric objects during interactive dragging manipulations, and to make sure the existing constraints are not violated by subsequent operations.