

Constraint-Based Configuration: Beyond Rules

Constraints: Teaching rather than Telling

Using constraints, your configuration system can be taught how your products and solutions are put together rather than simply what works and doesn't work. This can dramatically reduce maintenance and provide a far more intelligent, flexible and future-proof configuration application.

When evaluating a potential configuration supplier, it's easy to focus on the end-result. After all, the people in your organization who are demanding a better sales tool are often the ones who will use it, not the ones who will create it. While those factors are important, this can lead to an over emphasis on the interface and

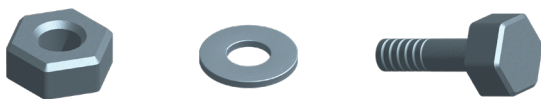
output features which prioritize how the users make selections, adjust and apply pricing rules, as well as how integrations to down-stream applications such as ERP systems are carried out.

The risk is that one of the most crucial factors may be ignored or given low priority: the creation and maintenance of the logic behind the configurable products. There's not much use having a wonderful looking and well-integrated configuration system if it takes a prohibitively long time to launch new product lines or make updates to the existing ones.

Constraints vs Rules

At Tacton we often use the word constraints to describe the way we define logical relationships. We tend to avoid the word rules because in our world a rule is nowhere as powerful as a constraint. So, what's the difference between a rule and a constraint?

A perfect example is the simple idea of combining nuts, bolts and washers into a valid combination. We need to create the logic that allows the selection of a valid nut-washer-bolt assembly. The traditional and brute force method is to simply define all valid combinations and ensure a user selects one.



A slight improvement would be to create valid combinations of nut-washers, nut-bolts, washerbolts and then guide the user as he selects each component. But it quickly becomes obvious that there are problems to such a system.

Maintenance can easily become a nightmare. What happens as new washers, bolts, and nuts are made available and others are removed. What if we constantly change which ones are available

in certain markets. What if the valid combination is based on the application? Certain environments may exclude certain materials making otherwise fine solutions invalid.

Even with only 100 nuts, 100 bolts, and 100 washers – we have potentially 1,000,000 combinations to manage.

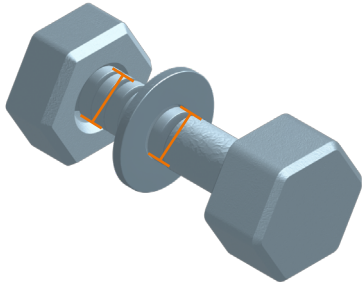
A rule system based on a friend (who likes who) or a foe (who doesn't like who) can easily be a nightmare to create and maintain. We have seen examples where thousands of old rules are left in the system long after the components they describe are removed from the company's ERP or PDM system.

Sometimes companies reduce their maintenance burden by only creating rules that dictate a certain selection path. First choose the bolt, then the washer, finally the nut. This means that they only need to create rules that manage those selection transitions. They don't allow the nut to be chosen first since there are no rules covering that path through the product. This then creates a forced path through the configuration application that doesn't allow the user to decide what's important to them. Imagine a chair configurator that forced you to choose material and then color. Once material is chosen you see available colors.

But what if you'd prefer to choose color first and then see available materials. With Tacton that never becomes a problem.

Constraints to the Rescue

Tacton's technology is based on constraint logic. Constraints tend to describe logical conditions which must be met, for instance "The diameter of the bolt must match the diameter of the washer" or "The material of the bolt must match the material of the nut."



To implement such a system, it is often necessary to add characteristics to the components themselves. Perhaps each nut must specify its own material, diameter, weight, and cost. Each bolt could have a characteristic describing the markets it can be sold in, whether it's suitable for deep-sea applications, and what nut materials it can be combined with. The philosophy is quite simple but highly effective. With such a system we can define constraints that describe each condition – these constraints can be made conditional "If application is deep sea environment then all materials must be deep-sea compatible." It becomes possible to apply a layer of constraints on a product describing market requirements, application requirements, business requirements as well as guided selling or needs-based logic.

And even better, this constraint-based system doesn't presuppose the order of selection, so users are free to select or answer questions in any order they see fit.

Minimize Maintenance

Over the years we have encountered numerous customers who have suffered due to poorly designed configuration systems. Even if the creation of simple friend/foe rules is automated, the risk of creating a slow application with hundreds of thousands of rules is very real.

We have seen situations where a system that covered only 30% of a product portfolio required 300,000 rules and took half a year to achieve. When Tacton was used, the full 100% of the portfolio was covered and it only required 1 month and 300 constraints. Plus, the maintenance and introduction of new items was significantly easier than before.

In Closing

To put it simply, a constraint-based system:

- Minimizes maintenance by removing the need to write rules when new items are added – maintenance is needed only when the logic changes.
- Allows users to follow any path through the configuration.
- Allows the application of different "warehouses" of options based on market to the same underlying logic system – so that different markets are supported by the same logic.
- Allows fast optimization so that the configurator can quickly find the best solution.



Tacton is a leading SaaS company trusted by global manufacturers. Tacton Trusted Configuration simplifies sales for manufacturers of complex products. Tacton's Configure Price Quote software is named a Leader by Gartner in the Magic Quadrant for CPQ Application Suites and is recognized for its advanced product configuration and visualization capabilities.

Tacton's founders pioneered computer-based product configuration which today powers Tacton CPQ and CAD Design Automation. Since 1998, Tacton is trusted by global customers such as ABB, Daimler, MAN, Scania, Siemens, Xylem, and Yaskawa. It is co-headquartered in Chicago and Stockholm, with regional offices in Karlsruhe, Warsaw, and Tokyo.

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