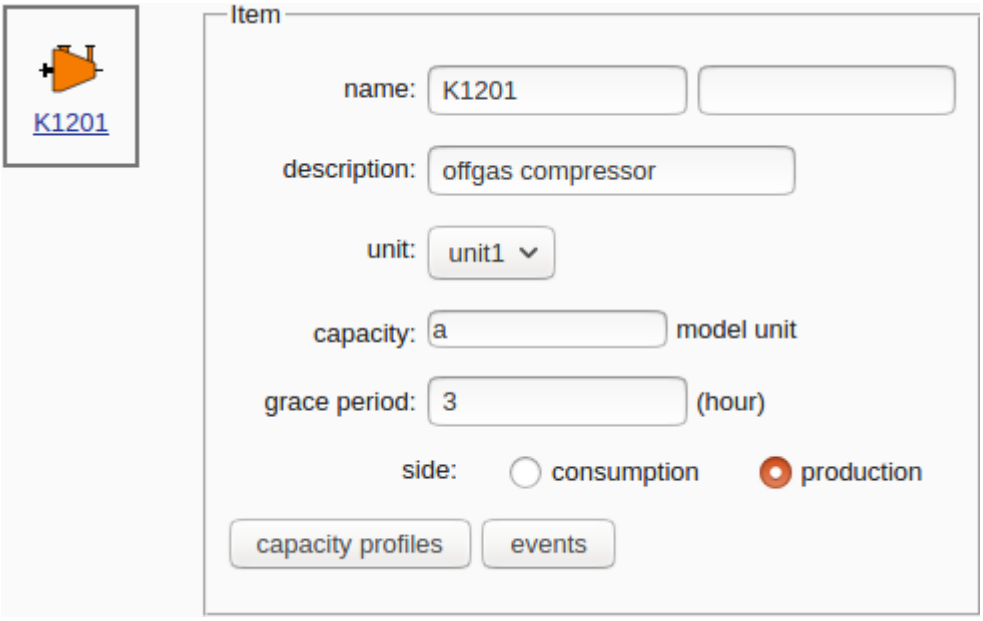
Items

An item is an individual component of an integrated system, such as a well or an injection compressor.

ARTIS ensures that the names of the items are unique. When pasting, ARTIS uses the first free alphanumerical successor for the new item names. But the item name postfix is kept the same, making it easy to copy and paste complete trains or other subsystems that have consistent tag numbering.



For an item with a positive grace period, its downtime does not reduce system capacity immediately, but only after the grace period has expired. For example:

- when an off-gas compressor has failed, we can flare the off-gas for a maximum of 3 hours before gas production needs to stop
- off-spec condensate can be sent to the off-spec tank but after 6 hours it is full
- if there is a failure of power supply, the process control system continues to run on the uninterruptible power supply for at most 24 hours.

Since the grace periods are defined on the items, they affect the diagram perspective results, not the unit perspective results. All planned and unplanned downtime events get the full grace period, even for consecutive events on the same item, component, and mode. The grace periods assume that the temporary backup is available whenever the item has a downtime event. In case of doubt, the network buffers can be used as an alternative way to model it.

Production and consumption

An item is either on the production or the consumption side. The consumption items define the demand, so they set the context. Hence, the two sides are asymmetric; everywhere in the diagram hierarchy, the results are relative to the demand.

For a consumption item, its demand is defined as its expected capacity, in the usual way, that is by taking account of the planned and unplanned downtime.

For a production item, no demand is given.

A model, or any selection, has given demand if it has at least one consumption item and one of the following

situations applies:

- a series has given demand if and only if at least one of its elements has given demand
- a parallel arrangement has given demand if all its elements have given demand
- a network has given demand if and only if all paths from source to sink have given demand.

For a model, or any selection, that doesn't have a given demand according to the above rules, the demand is assumed to default to the peak capacity. This convention makes the consumption modelling consistent with all previous ARTIS versions, standard reliability block diagram terminology, and with the ISO 14224 and ISO 20185 definitions.

How it works

In a run, ARTIS always first computes the available capacity of the items that are on the consumption side. This sets the context for the results, including the cumulative availability plots, expected availability plots, and the other availability results. This is representative of real-world cases where the overall performance of a system is measured on its ability to meet a specified demand. The consumption limits act as a cap or choke with any production in excess of it being ignored as surplus, because it is not needed. Losses only occur when the system fails to meet this demand.

The designation of items in the model as 'production' or 'consumption' has no effect on the simulation itself which is only governed by the item capacities, availability data, network topography and buffer priorities. The distinction between production and consumption does not affected any of the buffer results.

Curtailment modelling

For a model that satisfies two necessary conditions, ARTIS computes the curtailment instead of the losses.

These conditions are: * the network must have buffers * the consumption is defined at the source, and not at the sink

Curtailment is measured at the source, but all other definitions are same as in a normal run.

When demand exceeds production there is a shortfall either due to planned and unplanned downtime or system capacity constraints, this is presented as such in the results. The corollary to this case is when production exceeds demand, leading to curtailment. In this case, the available production is curtailed due to a lack of demand and a lack of storage capacity. This can be modelled in ARTIS by reversing the production and consumption designations, i.e. production items become consumption items, and vice versa.

For example, in a model with upstream and downstream facilities, the upstream can be designated as consumption, and the downstream as production. The results are then calculated based on the available capacity of the upstream, and when this exceeds the available capacity of the downstream then the upstream incurs curtailment. The results then show the expected lost production as curtailment.