Chapter 2 – Standard Job times

In this chapter we will look at modelling the *time* aspects of a process. The process map tells us only the actions which have to be taken to do a more complicated task. We can also use process maps to visually identify waste and the parts of the process which add value. In this chapter we enhance our understanding by quantifying the time used by these process elements.

Standard versus variable times?

If you measure the amount of time it takes to do nearly any manual task – you will get variation between attempts. Machine based tasks – eg the time needed to automatically change the tool on a numerically controlled lathe - tend to be less variable.

It is also true that the time variations of many small tasks are fairly small. If there are one or two items with large variation. The overall variation is mostly dictated by a few tasks with big time variations.

Finally human nature being what it is – if you generously give someone 60 seconds to do a task. They will never take less than 60 seconds and only occasionally exceed 60 seconds!

With this in mind, the time needed to do many industrial processes is worked out on a *standard time* basis. A standard time is not actually a measurement – but it is a time allowance for each task.

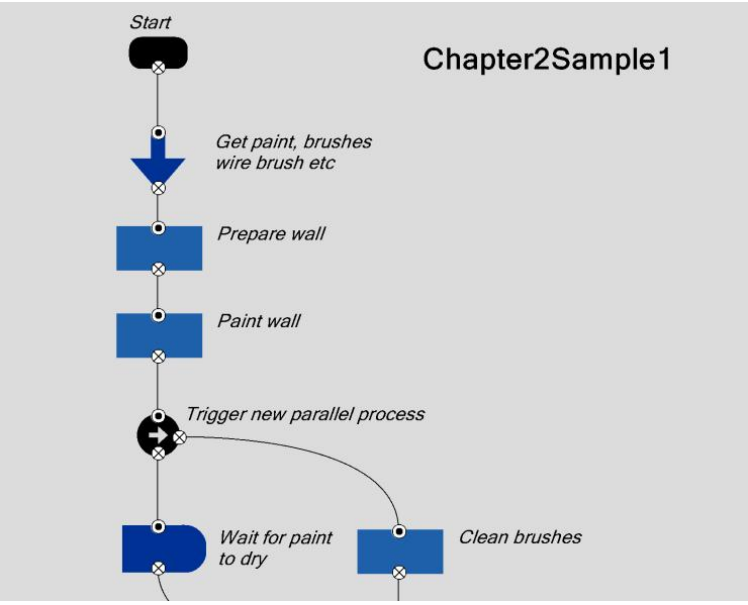
Standard times can be based on historical time measurements or worked through artificially by breaking the task into movements and allowing a constant time for each type of movement.

This chapter will consider standard times. We will, for now, assume that the standard time is the time a job really takes to do! (actually its an approximation!) We will consider variable times and risk in Chapter 3 and actually analyse the wasted element of time in chapter 4.

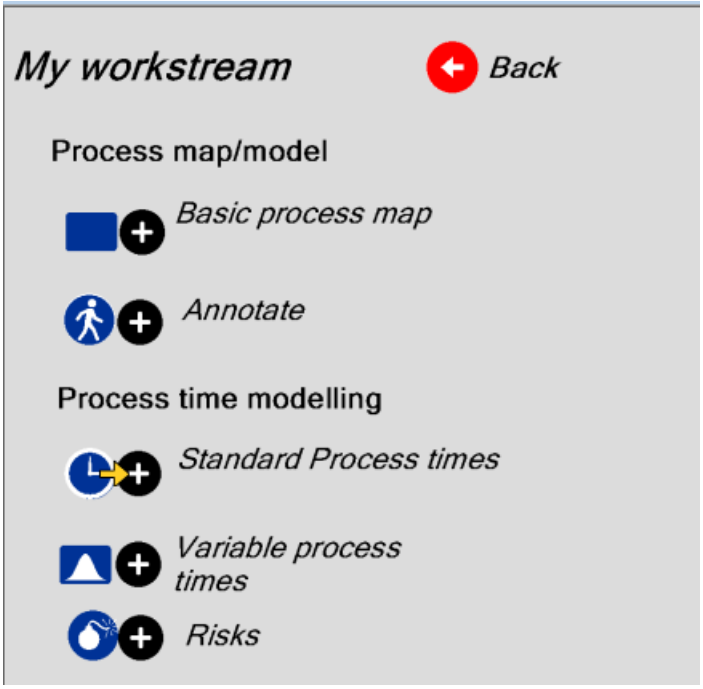
Setting the standard time on tasks in Aliquis

Method 1:

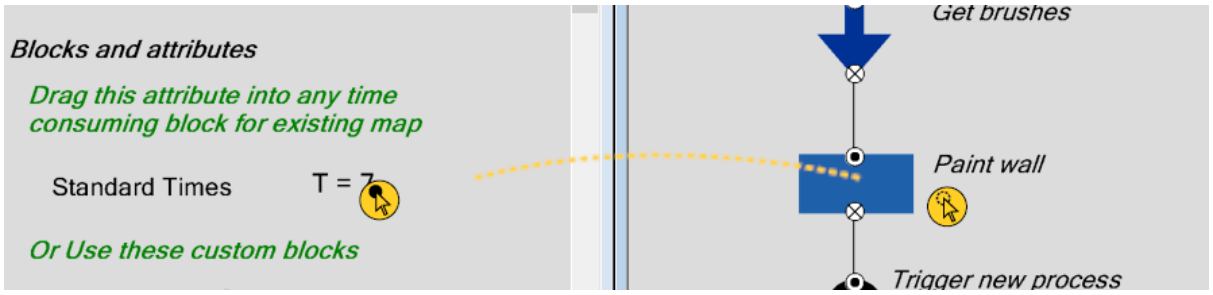
Start with a process map eg : Open Chapter2Sample1.inp from the exercise directory which accompanies this book :



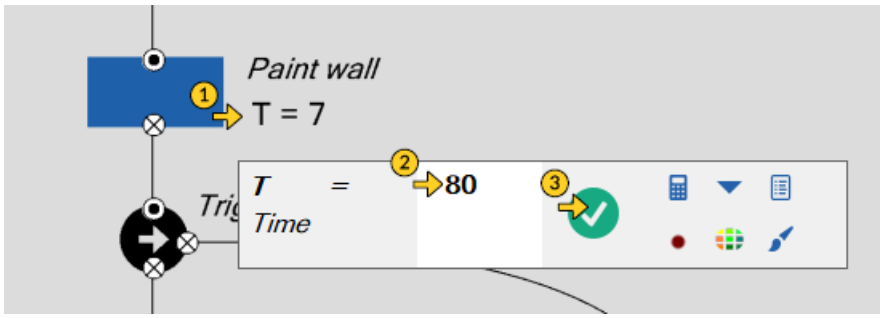
In the library go to the *standard process times* sub library :



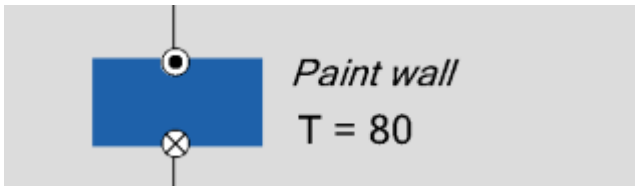
Drag the standard time attribute into the block :



Set the time to what you think it should be :

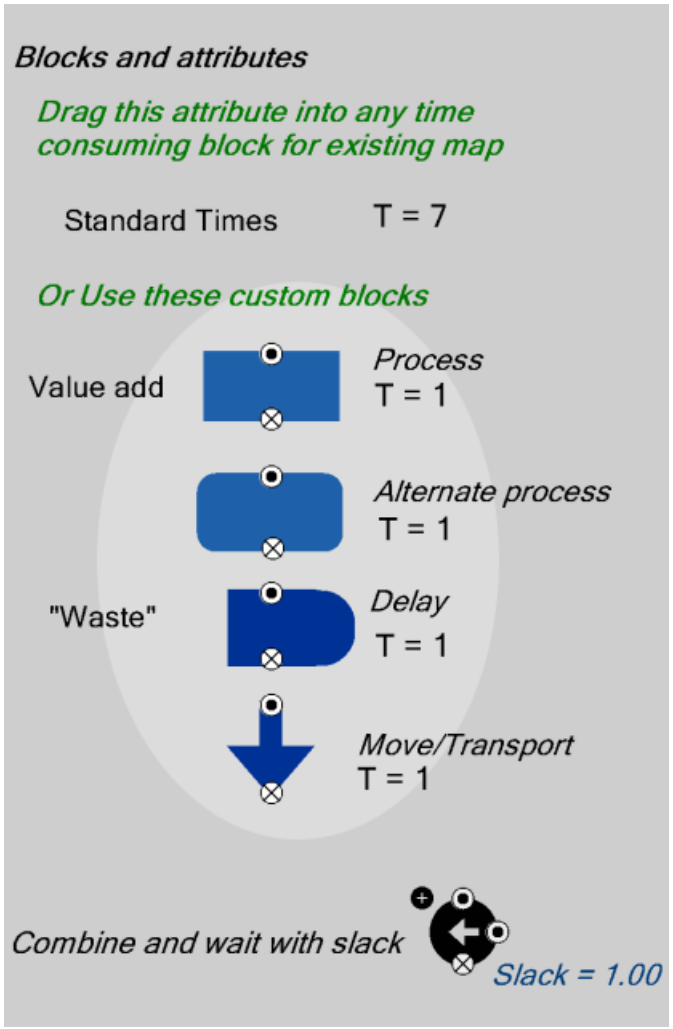


Result :



Method 2:

This *standard process times* sub library contains blocks that have the times set already.



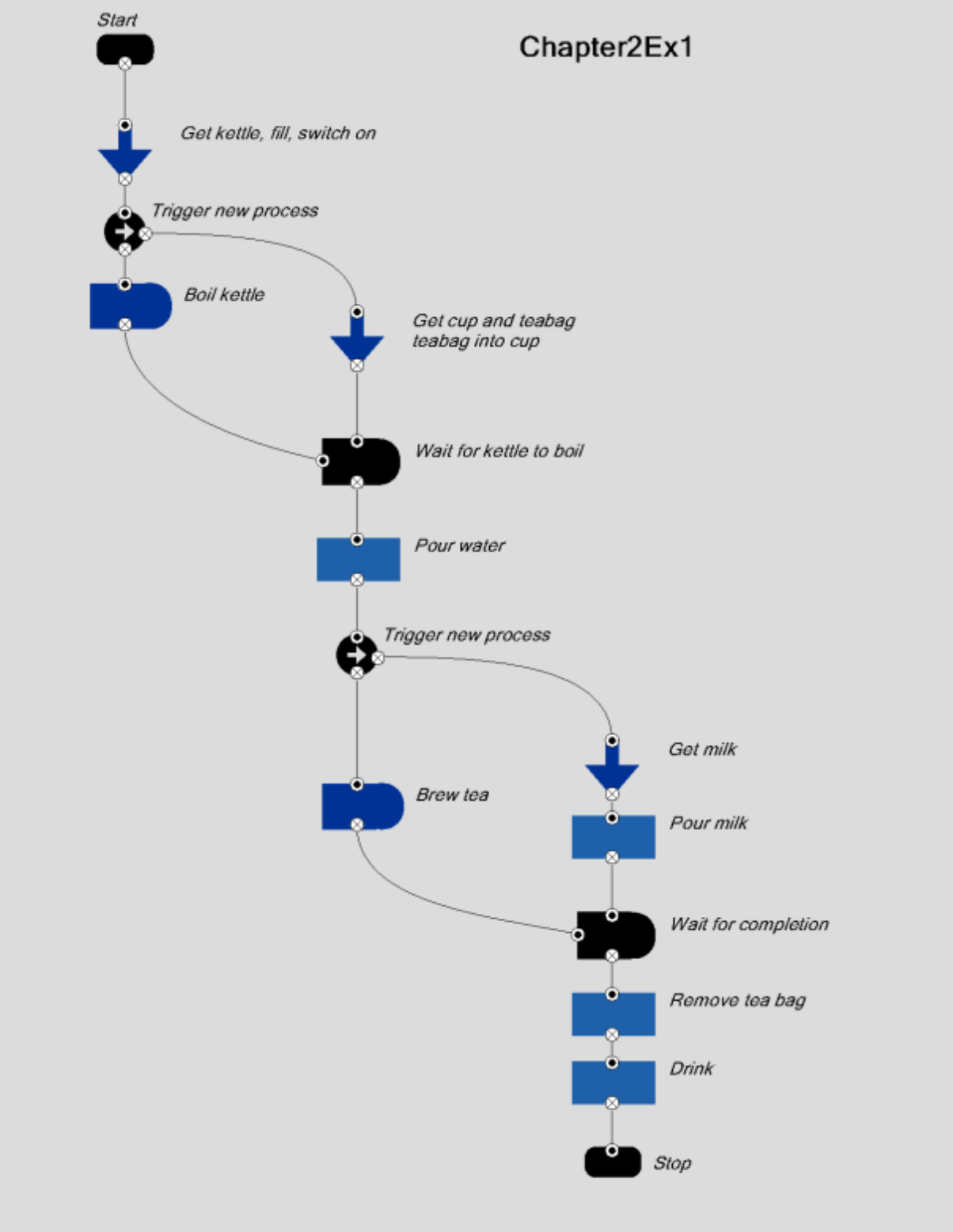
If you want to you can build your map with these blocks and then subsequently set the times. This is clearly a more efficient way of building Aliquis models but in a collaborative environment it is probably wise to break down the task into two stages. Stage 1 – establish the process map. Stage 2 – Establish the job times.

It's up to you!

Exercise 1

This is a follow on from the exercise in chapter 1. You may use your process map from there to start this exercise or open *Chapter2Ex1.inp* from the exercise directory which accompanies this book.

This is a process for making a quick cup of tea. Personally I think it need a bit of improvement as all good tea should be brewed properly in a pot! However, it is hoped that most students will be able to understand this for educational purposes

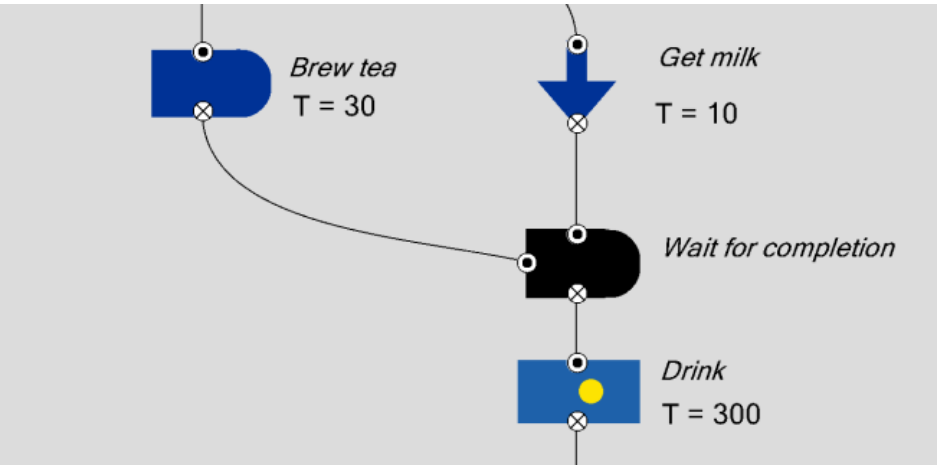


My estimate of times for this process are :

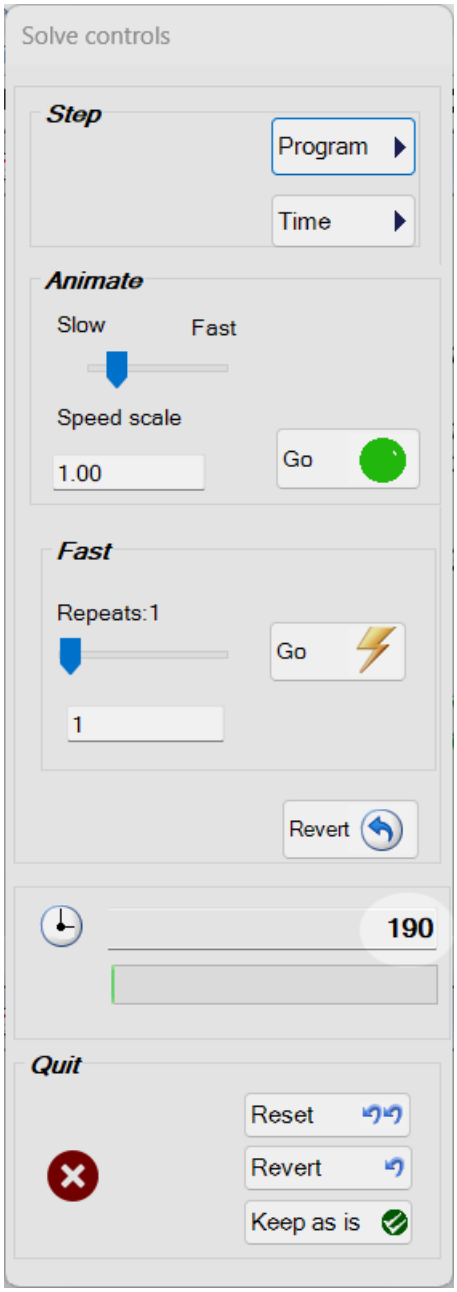
1. Fill kettle, switch on (*20s*)
2. boil water (*120 s)*
3. While the kettle is on get cup and teabag. Put tea bag into cup. (*15s)*
4. When kettle has boiled, pour water into cup. *(10s)*
5. Wait a while for tea to brew. *(30s)*
6. While waiting to brew get some milk from the fridge. *(10s)*
7. Add some milk. *(9s)*
8. When tea has brewed remove teabag – put in bin. *(10s)*
9. Drink..(300s)

How long does it take to make (not drink) a cup of tea using this process?

Hint – when you have put all the times in solve to here :



You can then read off the time on the solver here :



The time to make the tea is 190 seconds

Aliquis Block Attributes

The variable named *T* which you have either dragged into a block or found visible in a library block is called a system attribute. The behaviour of all blocks in Aliquis depends on what type of block they are and the attributes they contain.

The attributes may, or may not be visible to the user. In the process map library all the blue blocks are actually "Time Delay" type block. They all contain an attribute *T* (time). However, in initial process mapping we are not really interested in the time for each block so the attribute is not made visible to the user. When we move on to process timing analysis, we

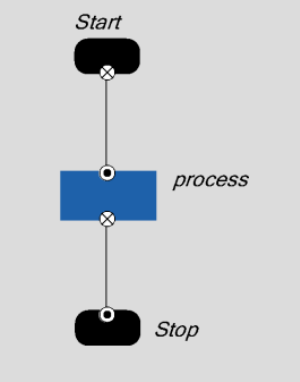
transfer a new value of T from the library and we make it visible and directly adjustable through the *attribute display*. This is what you did when you dragged *T* into a block.

An attribute display is a handle to the underlying attribute allowing you to see it and changer it. I

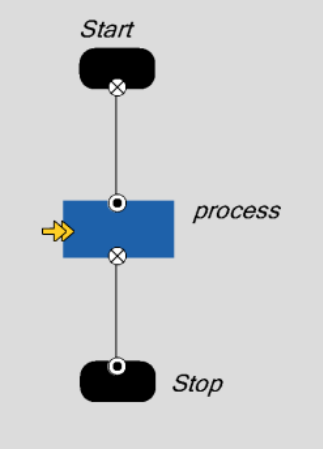
For reference There are 2 other methods you can use to adjust the attribute or its visibility.

Have a go with these using any block in your model.

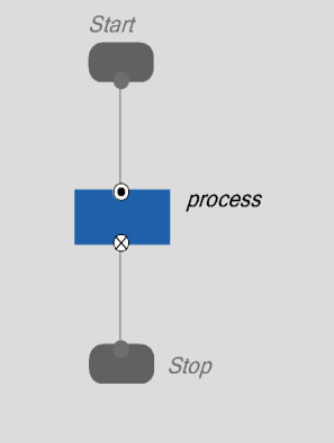
Method 1 : Adjust visibility but no change…
Start with a process map process element :



Double click the block :

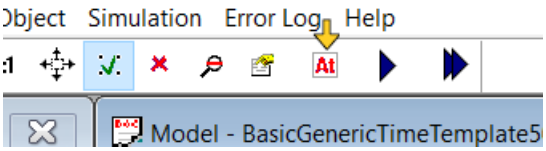


Result :

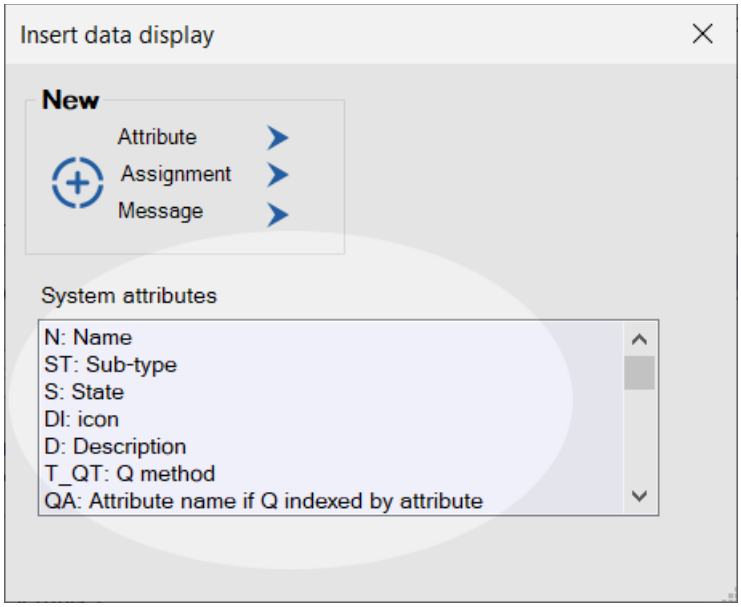


Note: The other blocks are greyed out. You are now “inside” the process block

Click the attributes button :

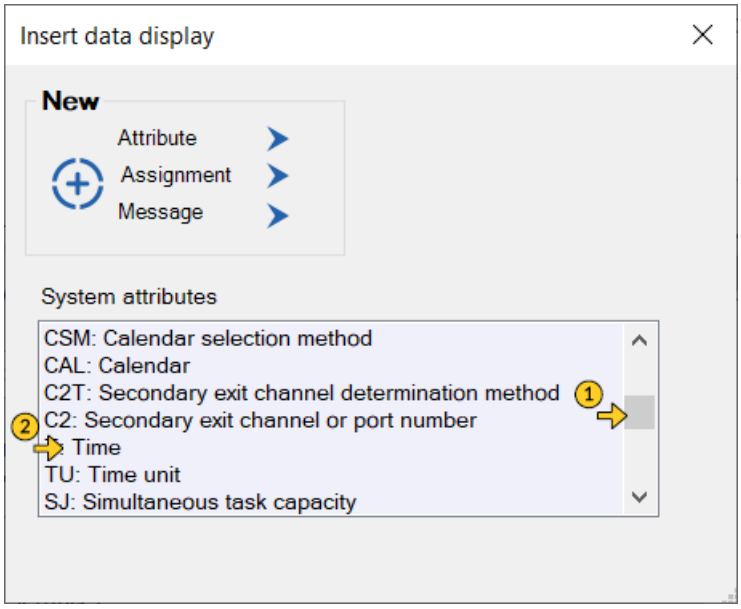


Result :

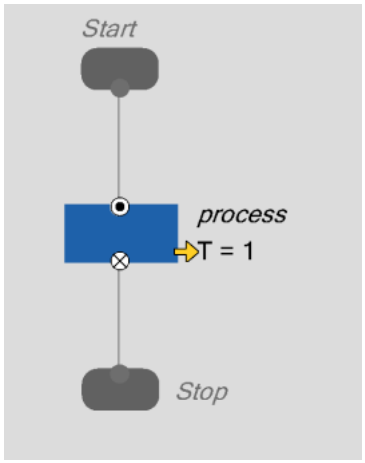


This is a list of all the system attributes in the block.

Scroll down to find T: Time and click it.

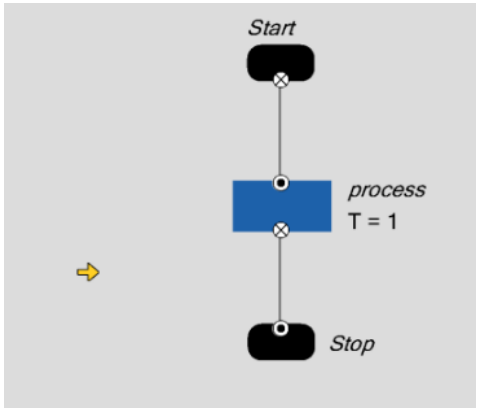


Place it where you want it to be seen in the block :



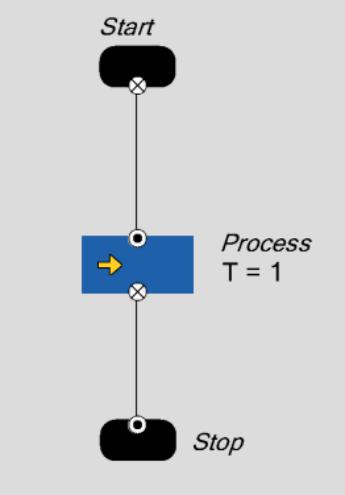
Its now visible and you can adjust it in the normal way.

To return from inside the block into the main model just click in space:

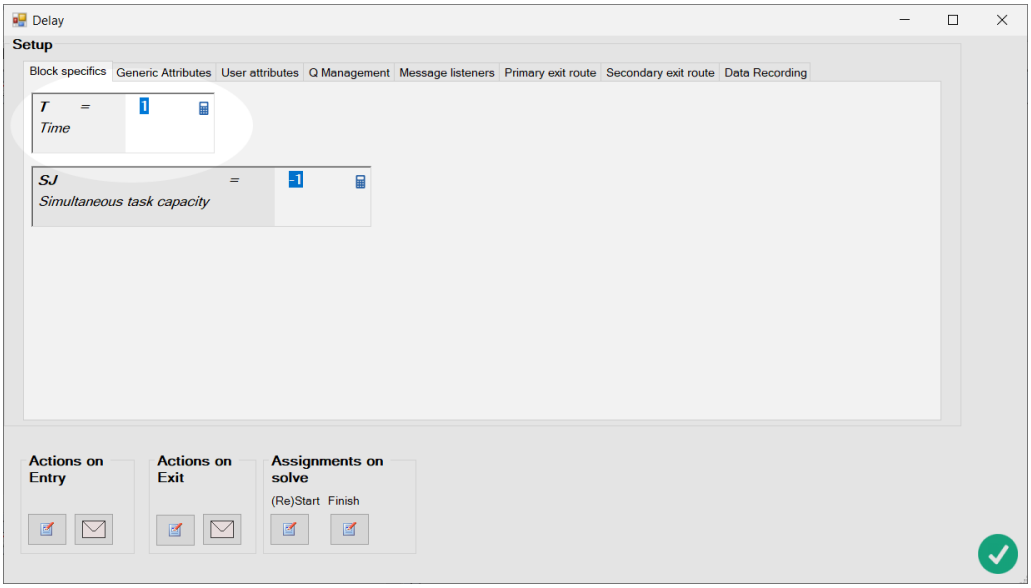


Method 2 : Use the block editor – changes the system attribute without changing its visibility

Simply click the block :



This brings up the block editor for the block :



Note the tabs at the top of the block editor. The default tab is labelled *block specifics* and *T* is one of the attributes specific to a *delay* block. Use the block editor to adjust the time here.

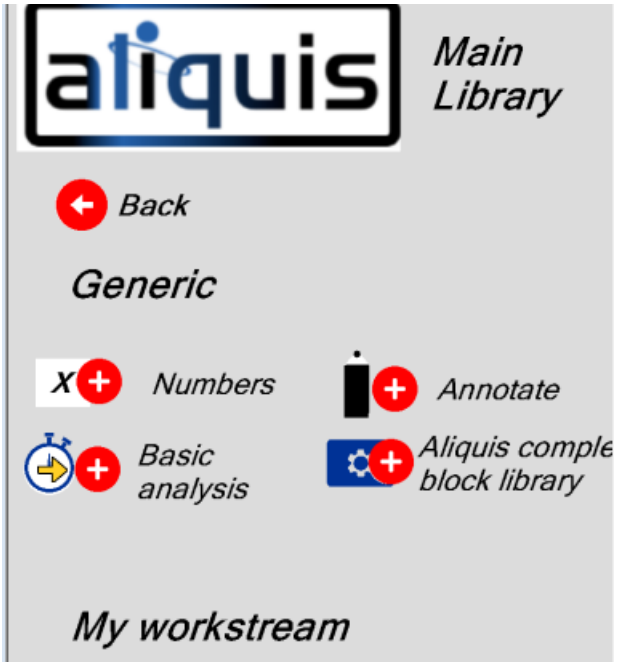
Finish with : 

There is much more to learn on the subject of attributes . They can be displayed in various ways, they can be used to define exit paths, queue management, visual displays and the blocks communication characteristics. They can be derived from formulas or assigned by events in the block or elsewhere in the model.

For now it is sufficient that you know they are there and that they can be accessed either via an *attribute display* or the *block editor*.

Time Analysis.

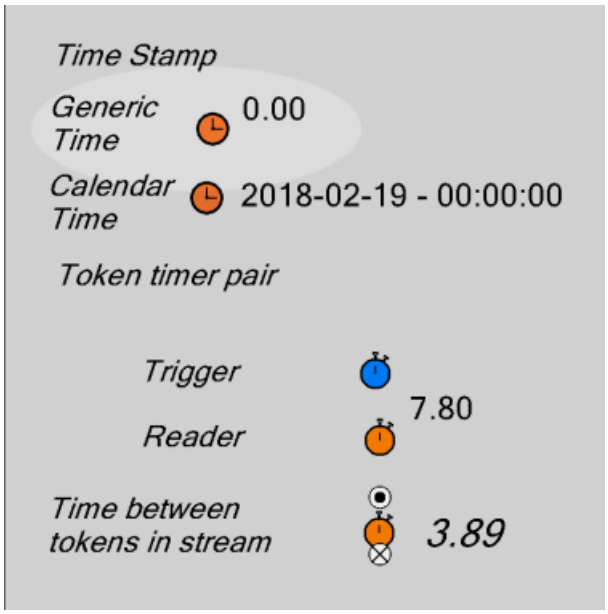
Aliquis contains tools for basic analysis here :



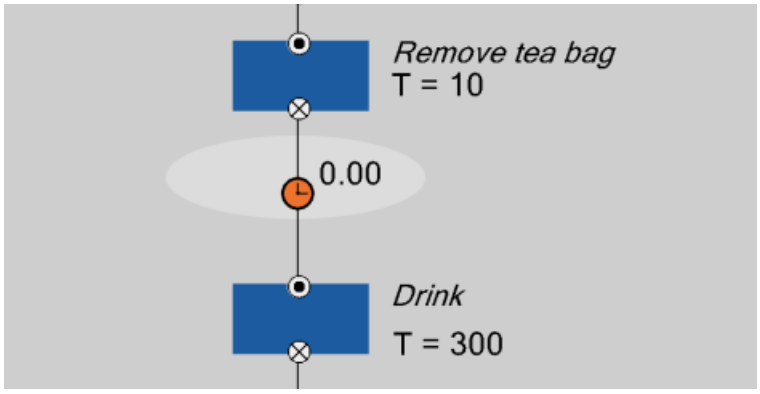
change

Open this library (not you can also go there directly from the *standard process time library*)

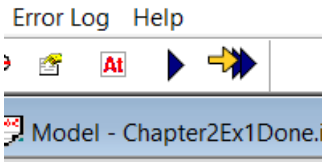
It has a time stamp block :



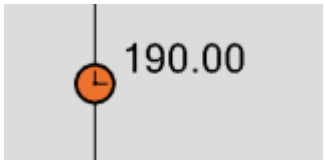
You can drag and drop this in to anywhere you want to measure the time at :



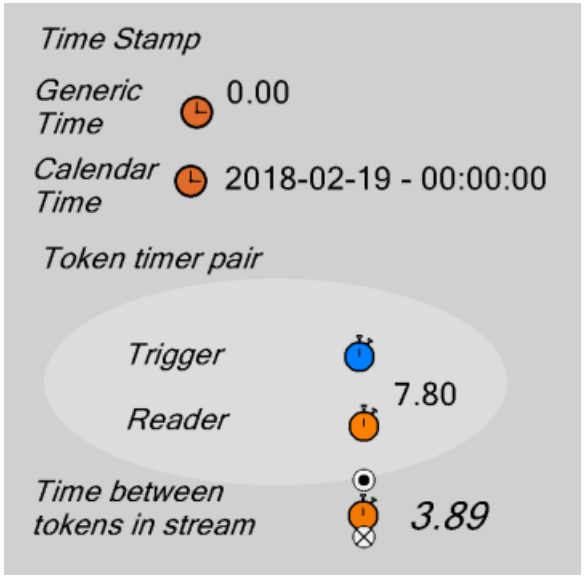
Now as the item goes through this point the time will be recorded. It is instructive to do a step solve to see this. However, it is also possible to do a 1 off quick solve to do the calculation:



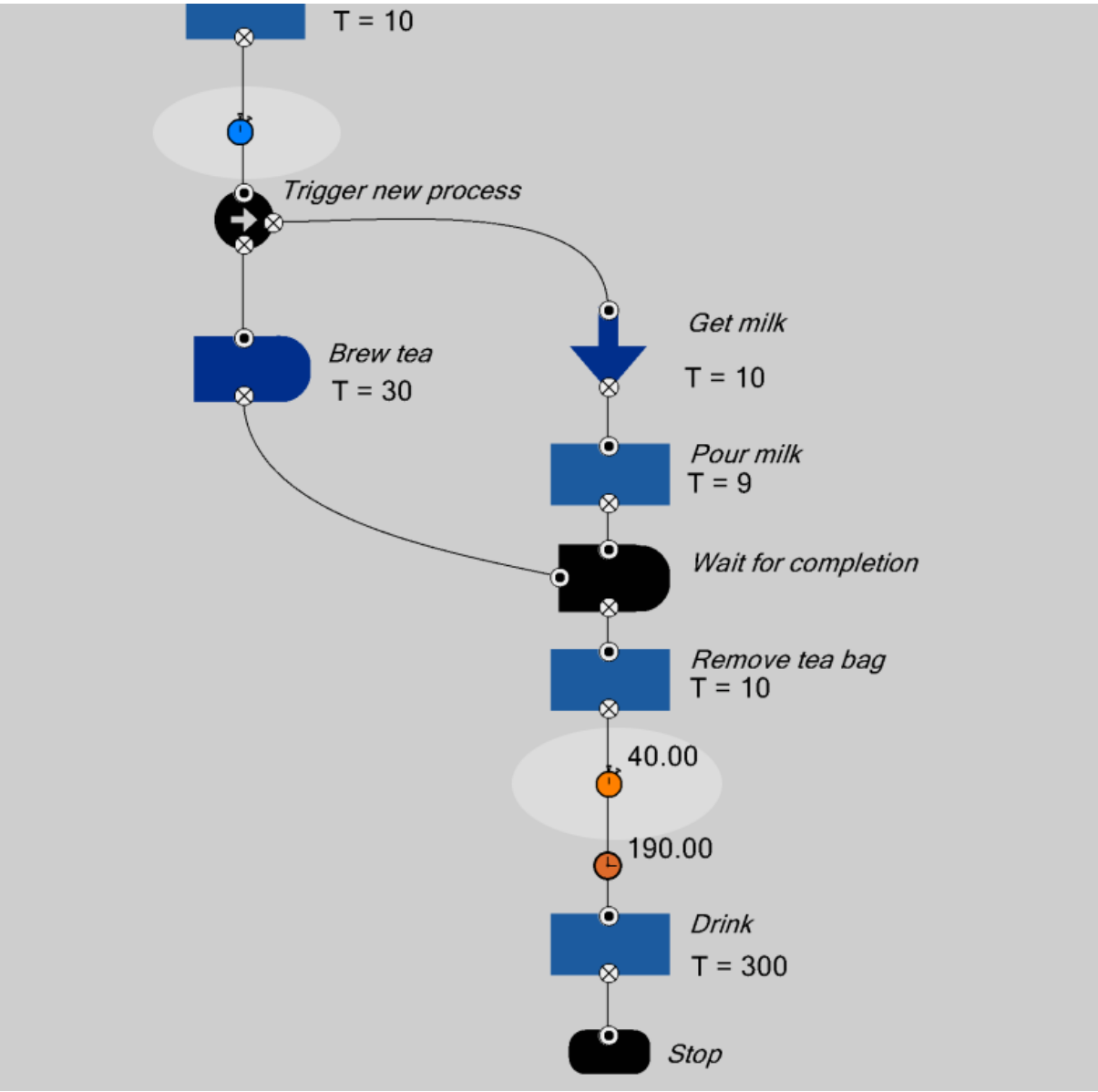
Result :



Suppose you want to measure the elapsed time between 2 points in the process. This can be achieved with a trigger/reader pair :



Here's an example of how these blocks can be used : Drop them in as follows and do a quick solve.



Summary

So in this chapter we have focussed on standard times and some elementary time analysis. As a result of your work so far you have a process map which comes alive with time elements and simulation.

In Aliquis you should now be familiar with the idea of setting attributes of blocks by dragging from the library and by using the block editor. You should also understand more about how the solve can work and how you can use the time stamp analysis blocks.

Key Engineering concepts :

- Standard job times

Key Aliquis concepts:

- Time stamps
- Elapsed time measurement
- System attributes – how they affect a blocks behaviour
- 2 ways of setting a system attibute
- The difference between an attribute and an attribute display

In chapter 3 we will look at the big subject of variability, uncertainty and risk and how to start analysing this with Aliquis

Questions :

1. Why do you think times matter in a process map?
2. Name 3 industrial or everyday life processes where the job time is more or less constant. Name 3 others where it varies considerably?
3. How would you describe a system attribute and an attribute display in Aliquis

Answers

1. A very simple answer : Time is money! In addition putting times on process elements allows engineers to plan to achieve certain production rates within a manufacturing system. This process is known as capacity planning. It also allows for "line balancing ". The process of making sure that machines and people are equally utilised and that production flows smoothly through a factory.
2. There are many examples. Here are some areas where the process elements have fairly fixed times: NC machine passes, Robotic assembly machines, Formula 1 tyre changes. Here are some examples where there is more variability : Patient time in a Doctors surgery, Many manual assembly tasks, Travel to work. The point of this question is to encourage you to start thinking about time variation. In general, the more automated a factory is, the less time variation on individual process steps occurs. Time variation damages the ability to predict production rates – particularly over short time scales. It also implies the need for greater buffer stock in a factory – and stock costs money. We will deal with variation in the next chapter.
3. An attribute is a piece of data that determines the behaviour of an Aliquis block. An attribute display is a visual display of one attribute within a block. The block does not have to have a display to have the attribute.