

# Time dependent properties first steps (SAP2000)

## Tutorial

Name:	Time dependent material properties (SAP2000)
Description:	Basic introduction to using time dependent material properties
Program:	SAP2000
Version:	14+
Model ID:	na

To include time dependent properties (such as [Creep](#), [Shrinkage](#), tendon relaxation or change of Young's Modulus E) in the analysis, it is necessary to setup the model as described below.

! This article is for SAP2000, but the same concept applies also to CSiBridge.

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## Define a Staged Construction Load Case

- [Staged construction](#) load case must be set up by using "Define > Load Cases > Add New Load Case" menu command. Select load case type "Static" and analysis type "Nonlinear Staged Construction".
- Be sure to specify nonzero durations in stage definition.
- Check the "Time Dependent Material Properties" option on the "Nonlinear Parameters" form.

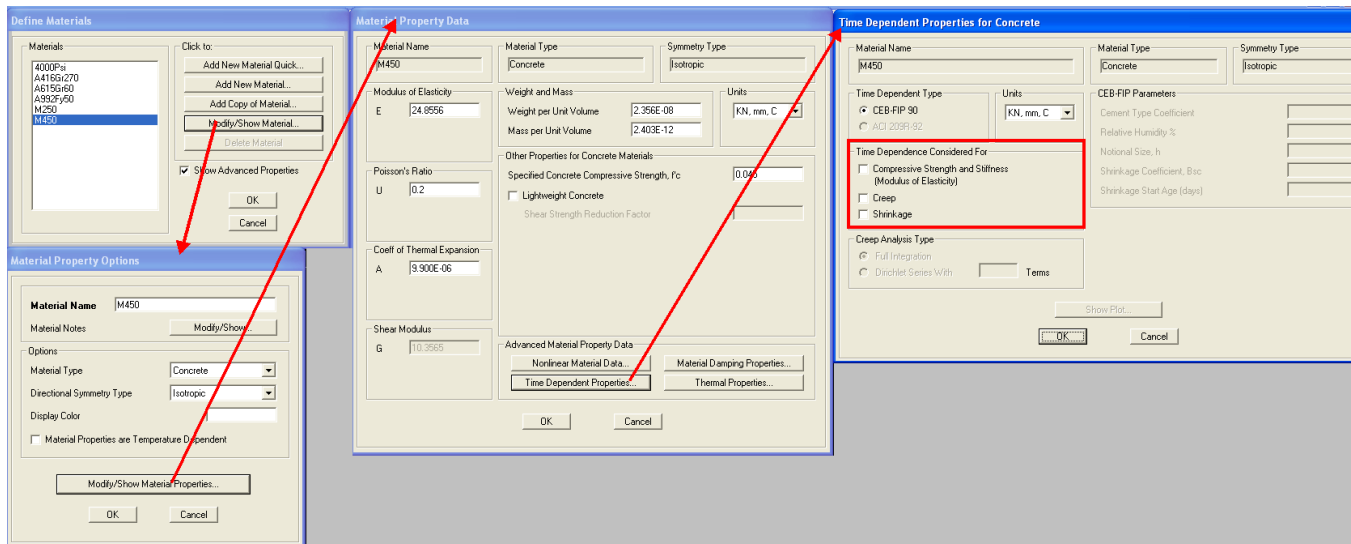
The screenshot displays two dialog boxes from the SAP2000 software. The left dialog, 'Load Case Data - Nonlinear Static Staged Construction', has the 'Load Case Name' set to 'STAGED' and 'Load Case Type' set to 'Static'. Under 'Analysis Type', 'Nonlinear' is selected, and 'Nonlinear Staged Construction' is checked. The 'Stage Definition' table has a red box around the 'Duration' column. The right dialog, 'Nonlinear Parameters', has 'Time Dependent Material Properties' checked under 'Material Nonlinearity Parameters'. A red arrow points from this checkbox to the 'Duration' column in the left dialog.

Stage No.	Duration (Days)	Provide Output	Output Label	User Comments
1		No		

Parameter	Value
Maximum Total Steps per Stage	200
Maximum Null (Zero) Steps per Stage	50
Maximum Constant-Stiff Iterations per Step	10
Maximum Newton-Raphson Iter. per Step	40
Iteration Convergence Tolerance (Relative)	1.000E-04
Use Event-to-event Stepping	Yes
Event Lumping Tolerance (Relative)	0.01
Max Line Searches per Iteration	20
Line-search Acceptance Tol. (Relative)	0.1
Line-search Step Factor	1.618

## Specify Time Dependent Properties

On the "Time Dependent Material Properties for Concrete", you would also need to specify for which material properties the time dependence should be considered:



## See also

- [CSI Analysis Reference Manual](#) (Nonlinear Static Analysis > Staged Construction, page 396) for additional information regarding staged construction analysis