

Advance	Hold	Stop
1- EVT_OUT		L-ON
2- EVT_IN		L-ON
3- RAMPR	975	30
4- SET_WAIT	75	
5- G_SOAK		0.20
6- RAMPR	1900	30
7- SET_WAIT	25	
8- G_SOAK		0.15
9- RAMPR	2135	30
10- GTCNDEL	3	1 wait up
11- SOAK		0.04
12- SETPT	2000	
13- TC_INQ	2040	wait
14- SETPT	2000	
15- GTCNDEL	60	1 wait down
16- EVT_OUT	200	S-ON
17- SET_WAIT	40	
18- GTCNDEL	120	1 wait down
19- EVT_OUT		S-off
20- EVT_OUT		S-ON
21- EVT_OUT		L-off
22- DELAY		10
23- NO-OP		
24- NO-OP		
User Alarm 2		
Recipe 1 running at step 2, 0.00 remaining		
Run time: 1.32 Remaining time: 0.39		
Acknowledge	MiniBatch	Return

Fig. 1. Recipe management display with operation codes

a process based on desired results such as case depth or surface carbon. Process modeling is now part of the control logic, creating a different approach to obtain the desired results. These controllers allow for target-value control instead of set parameters of atmosphere, time and

temperature. Even though these applications are widely available, they have not been widely implemented for some heat-treating processes.

Carburizing, for example, has a number of modeling solutions that are used to simulate a process (Fig. 2). Some of these

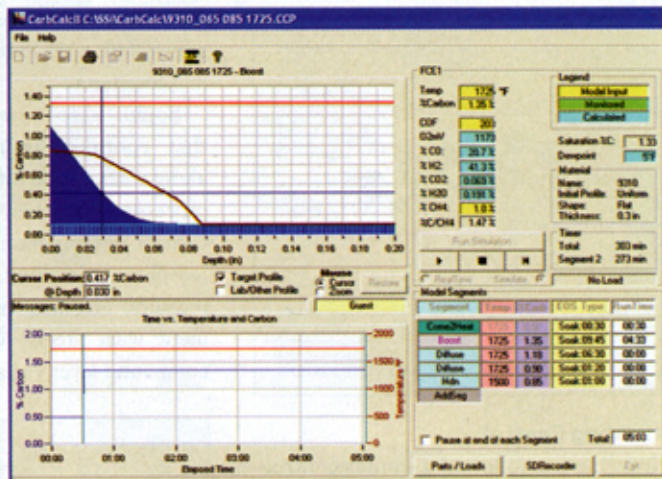


Fig. 2. CarbCALCII – Carbon simulation package

applications have a control component that manages the soak times on the boost and diffuse phase. This ensures that the proper carbon potential is available to the workpieces and that the diffusion meets the required case depth so as to achieve the desired metallurgical results.