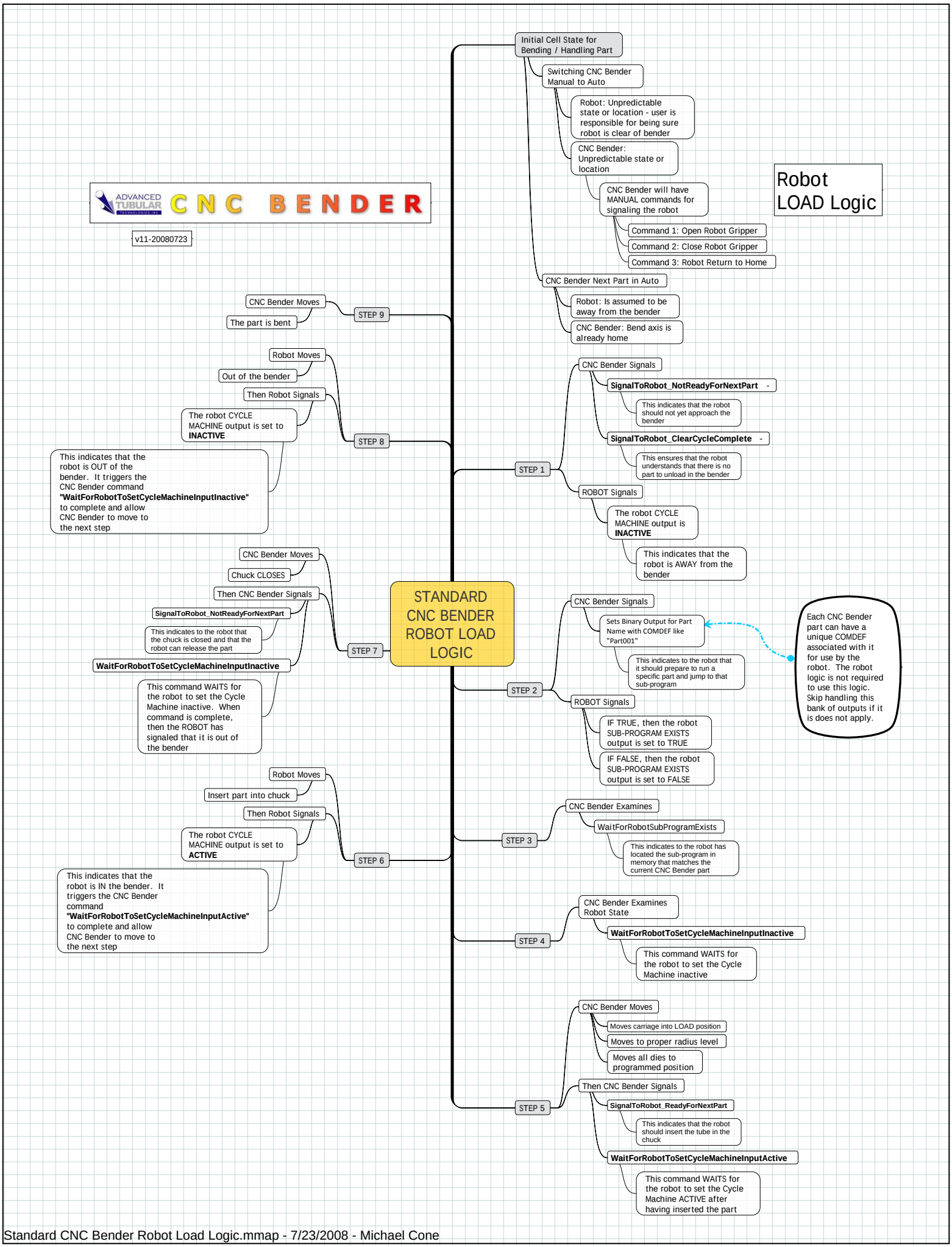
ADVANCED TUBULAR TECHNOLOGIES INC
CNC BENDER
v11-20080723
Robot LOAD Logic
STANDARD CNC BENDER ROBOT LOAD LOGIC
Initial Cell State for Bending / Handling Part
Switching CNC Bender Manual to Auto
Robot: Unpredictable state or location - user is responsible for being sure robot is clear of bender
CNC Bender: Unpredictable state or location
CNC Bender will have MANUAL commands for signaling the robot
Command 1: Open Robot Gripper
Command 2: Close Robot Gripper
Command 3: Robot Return to Home
CNC Bender Next Part in Auto
Robot: Is assumed to be away from the bender
CNC Bender: Bend axis is already home
STEP 1
CNC Bender Signals
SignalToRobot_NotReadyForNextPart -
This indicates that the robot should not yet approach the bender
SignalToRobot_ClearCycleComplete -
This ensures that the robot understands that there is no part to unload in the bender
ROBOT Signals
The robot CYCLE MACHINE output is INACTIVE
This indicates that the robot is AWAY from the bender
STEP 2
CNC Bender Signals
Sets Binary Output for Part Name with COMDEF like "Part001"
This indicates to the robot that it should prepare to run a specific part and jump to that sub-program
Each CNC Bender part can have a unique COMDEF associated with it for use by the robot. The robot logic is not required to use this logic. Skip handling this bank of outputs if it is does not apply.
ROBOT Signals
IF TRUE, then the robot SUB-PROGRAM EXISTS output is set to TRUE
IF FALSE, then the robot SUB-PROGRAM EXISTS output is set to FALSE
STEP 3
CNC Bender Examines
WaitForRobotSubProgramExists
This indicates to the robot has located the sub-program in memory that matches the current CNC Bender part
STEP 4
CNC Bender Examines Robot State
WaitForRobotToSetCycleMachineInputInactive
This command WAITS for the robot to set the Cycle Machine inactive
STEP 5
CNC Bender Moves
Moves carriage into LOAD position
Moves to proper radius level
Moves all dies to programmed position
Then CNC Bender Signals
SignalToRobot_ReadyForNextPart
This indicates that the robot should insert the tube in the chuck
WaitForRobotToSetCycleMachineInputActive
This command WAITS for the robot to set the Cycle Machine ACTIVE after having inserted the part
STEP 6
Robot Moves
Insert part into chuck
Then Robot Signals
The robot CYCLE MACHINE output is set to ACTIVE
This indicates that the robot is IN the bender. It triggers the CNC Bender command "WaitForRobotToSetCycleMachineInputActive" to complete and allow CNC Bender to move to the next step
STEP 7
CNC Bender Moves
Chuck CLOSES
Then CNC Bender Signals
SignalToRobot_NotReadyForNextPart
This indicates to the robot that the chuck is closed and that the robot can release the part
WaitForRobotToSetCycleMachineInputInactive
This command WAITS for the robot to set the Cycle Machine inactive. When command is complete, then the ROBOT has signaled that it is out of the bender
STEP 8
Robot Moves
Out of the bender
Then Robot Signals
The robot CYCLE MACHINE output is set to INACTIVE
This indicates that the robot is OUT of the bender. It triggers the CNC Bender command "WaitForRobotToSetCycleMachineInputInactive" to complete and allow CNC Bender to move to the next step
STEP 9
CNC Bender Moves
The part is bent