Scenario: Six machine 2 hour 'virtual' ramp. Loads and/or generation begin 20% 45 minute ramp up at $t = 10$ minutes, hold for 10 minutes when $t = 55$ minutes, then reduce 20% over 45 minutes.

Definite time controllers act on bus 8 and 9 shunts to keep bus voltage within the 1.0-1.04 PU range. Additionally, MVAR branch flow was tested as a shunt trigger.
AGC is sent to generators 1 and 3 every 30 and 45 seconds respectively.

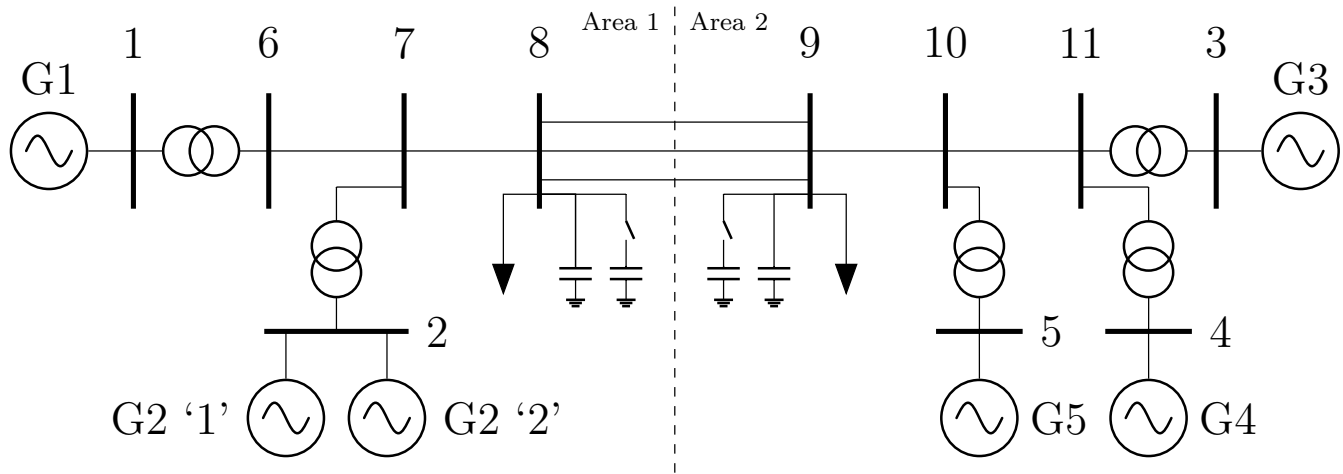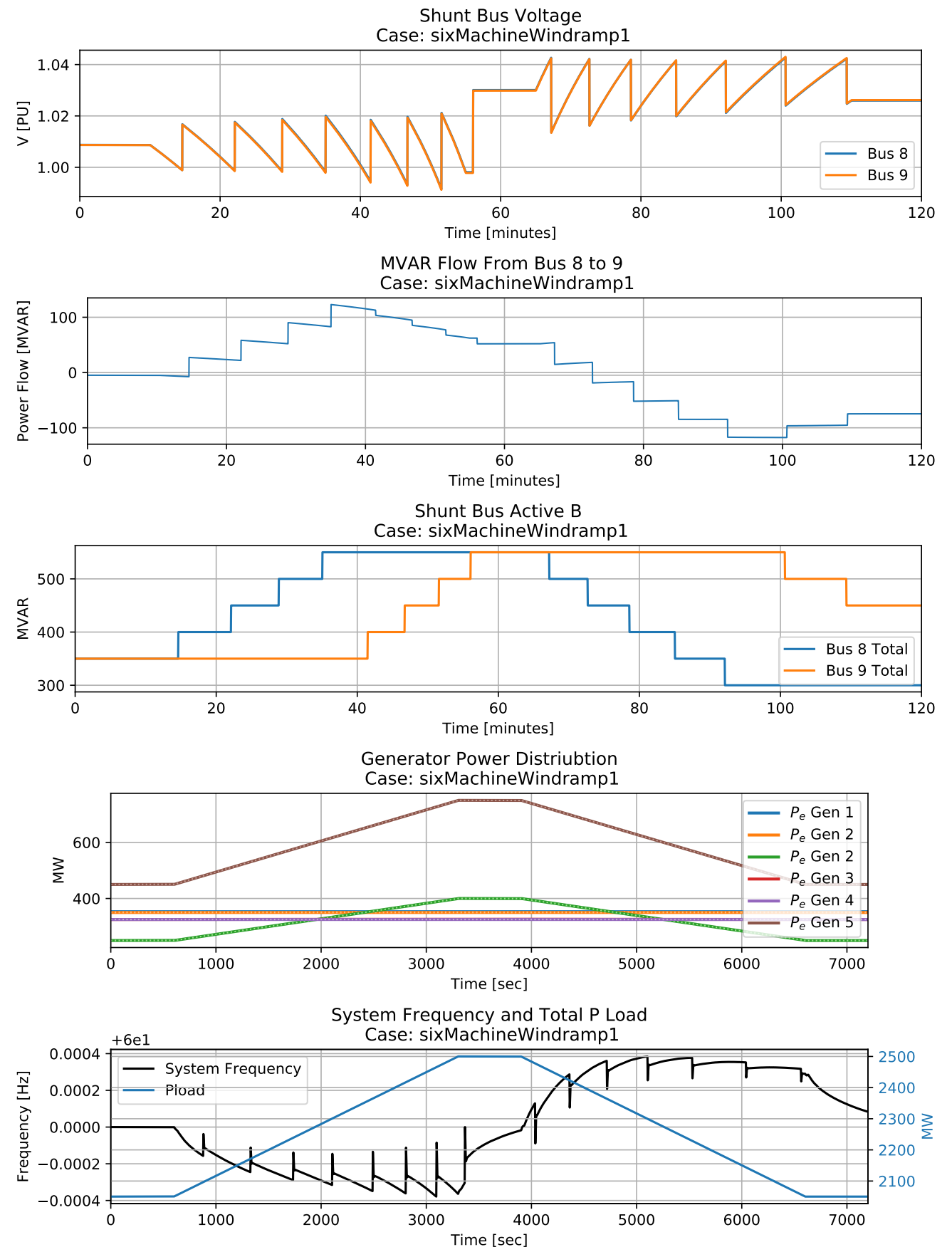A third ramp was conducted without the ramping of load for a more realistic scenario.
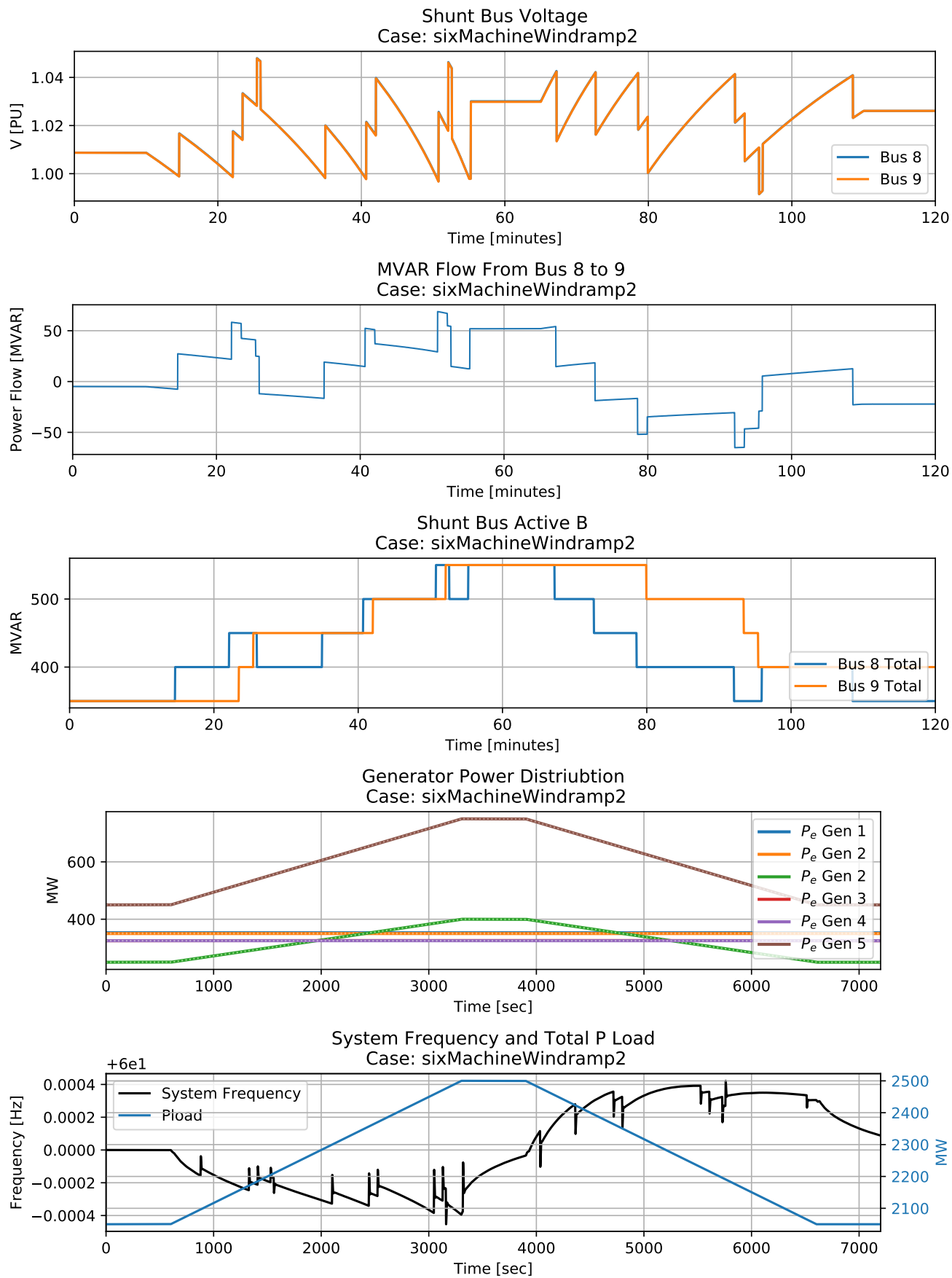

Figure 1: Two Area Six Machine System.

Results: Definite time controller appears to function as desired. PSLTDSim could be used for capacitor switching coordination. When load and generation ramps together odd frequency 'blips' occur when shunts are switched. When load is not ramped with generation, AGC forces generator 3 to a very low power generation point.

CASE 1: Voltage control on shunts only. Generation and Load Ramp

Shunt Bus Voltage
Case: sixMachineWindramp1

MVAR Flow From Bus 8 to 9
Case: sixMachineWindramp1

Shunt Bus Active B
Case: sixMachineWindramp1

Generator Power Distriubtion
Case: sixMachineWindramp1

System Frequency and Total P Load
Case: sixMachineWindramp1

CASE 1: Voltage and Qbr control on shunts. Generation and Load Ramp

Shunt Bus Voltage
Case: sixMachineWindramp2

MVAR Flow From Bus 8 to 9
Case: sixMachineWindramp2

Shunt Bus Active B
Case: sixMachineWindramp2

Generator Power Distriubtion
Case: sixMachineWindramp2

System Frequency and Total P Load
Case: sixMachineWindramp2

CASE 3: Voltage control on shunts only. Generation Ramp only

Shunt Bus Voltage
Case: sixMachineWindramp3

MVAR Flow From Bus 8 to 9
Case: sixMachineWindramp3

Shunt Bus Active B
Case: sixMachineWindramp3

Generator Power Distriubtion
Case: sixMachineWindramp3

System Frequency and Total P Load
Case: sixMachineWindramp3