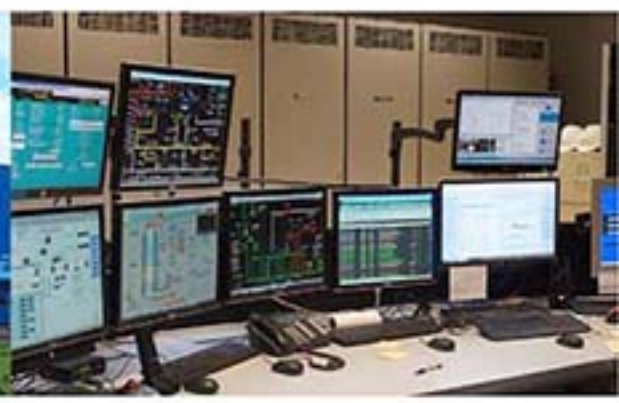
DEVELOPMENT | TRAINING | CONSULTING

OPERATOR TRINING SIMULATOR
SIMGENICS

LIST OF CONTENT



TECHNICAL GUIDANCE
CIRCULATING WATER SYSTEM - SIMULATOR BASED

Training covers the plant circulating water and cooling water systems. The purpose of the circulating water system is to remove the latent heat of vaporization from the low pressure turbine exhaust steam.

LEARN IN REAL CONTROL ROOM ENVIRONMENT

UNDERSTANDING THE "WHY" NOT JUST THE "HOW" THE PLANT PERFORMS

RUNDOWN

Circulating Water System	
Hours	**Lesson Plan**
08.00-10.00	Circulating Water System & Mixed Flow Pumps
10.00-12.00	Condenser & Condenser Air Removal
12.00-13.00	Lunch Break
13.00-15.00	Simulator Exercise : Effect of Hight Circ Water Temperature
15.00-17.00	Simulator Exercise : Loss of One Circulating Water Pump

LEARNING MATERIALS

- *State the purpose of the circulating water system.*
- *Explain the difference between a centrifugal pump and a mixed flow pump.*
- *Explain the motor current profile on a standard mixed flow pump.*
- *Demonstrate proper response to loss of one circ water pump while the plant is in operation.*
- *Identify and correct the efficiency losses in the plant cycle caused by increased circulating water temperature or reduced circulating water flow.*
- *Identify and correct efficiency losses in the plant cycle caused by improper startup and/or venting of the condenser and/or circulating water system.*
- *State the purpose of the plant auxiliary cooling water system.*
- *State the difference between condenser vacuum, and condenser back-pressure.*

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TECHNICAL GUIDANCE
CONDENSATE SYSTEM - SIMULATOR BASED

Training covers the plant condensate system. The purpose of the condensate system is to return the condensed low pressure turbine exhaust steam back to the steam/water cycle. The condensate system has many lessons to teach an operator. Once the condensate system is fully understood, many other items in the plant tend to "fall into place". There is definitely more to the condensate system than most people consider or think about. This lesson looks at the different aspects of the condensate system and uses the simulator to promote a better understanding.

LEARN IN REAL CONTROL ROOM ENVIRONMENT

UNDERSTANDING THE "WHY" NOT JUST THE "HOW" THE PLANT PERFORMS

RUNDOWN

CONDENSATE SYSTEM	
Hours	**Lesson Plan**
08.00-10.00	Hotwell Level Control & Condensate Pump Fundamentals
10.00-12.00	Deaerator & Extractionof the Turbine
12.00-13.00	Lunch Break
13.00-14.00	Simulator Exercise : Filling Dearator
14.00-15.00	Simulator Exercise : Tube Leak
15.00-17.00	Simulator Exercise : Loss of a condensate pump at full load

LEARNING MATERIALS

- *State the purpose of the condensate system.*
- *Explain the level control systems associated with the hotwell.*
- *Explain the importance of condensate pump venting.*
- *State a general procedure for placing the condensate system in service from a drained state.*
- *Explain the importance of the condensate system recirculation valve(s).*
- *Explain the hazards associated with the lowest pressure feedwater heaters located in the neck of the main condenser.*
- *Describe the cause and effect of under and over extraction of turbine as the result of condensate flow fluctuations.*
- *State the purpose of the low pressure heaters located in the condensate system.*
- *State the purpose of the deaerator.*
- *Demonstrate properly filling the deaerator from a system drained state.*
- *Demonstrate recognition and damage mitigation during a severe low pressure feedwater heater tube leak.*
- *Demonstrate the correct response to the loss of one condensate pump while the plant is in operation.*

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TECHNICAL GUIDANCE
FEEDWATER SYSTEM - SIMULATOR BASED

The training covers the plant feedwater system. The purpose of the feedwater system is to heat and pump the purified, deaerated condensate to the boiler.

The feedwater system is relatively straight forward. The deaerator storage tank provides the net positive suction head requirements for the boiler feed pumps. The boiler feed pumps increase the pressure of the condensate from the condensate system sufficiently to overcome the pressure in the boiler and maintain the drum level.

LEARNING MATERIALS

- *State the purpose of the feedwater system.*
- *State the various methods used for feedwater flow control (drum level control).*
- *Describe the difference between single element and three element drum level control.*
- *State the importance of the BFP recirculation system.*
- *State the proper order of opening the major valves when placing a BFP in service.*
- *State the obstacles encountered with maintaining drum level when a BFP trips at elevated unit load.*
- *State the purpose of the high pressure feedwater heaters.*
- *State the effect and potential purpose of closing the extraction on the high pressure feedwater heater.*
- *Demonstrate unit operation in single and three element control.*
- *Demonstrate unit operation with the H.P. feedwater heater out of service.*
- *Demonstrate proper actions to maintain continued unit operation when one BFP trips at full load and the unit runbacks are disabled.*

RUNDOWN

FEEDWATER SYSTEM	
Hours	**Lesson Plan**
08.00-10.00	Boiler Feed Pump Fundamentals
10.00-12.00	High Pressure Feedwater Heaters & Drum Level Control
12.00-13.00	Lunch Break
13.00-14.00	Simulator Exercise : Single & Three Element Drum Level Control
14.00-15.00	Simulator Exercise : Operation with the Highest Pressure Extraction
15.00-17.00	Simulator Exercise : Loss of One BFP When at Full Unit Load

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TECHNICAL GUIDANCE
BOILER STEAM & WATER

The training covers the boiler water and steam system. Essentially, this covers everything from the economizer inlet to the main and reheat steam outlet to the turbine. While there are many fundamental truths being taught in this lesson, there are also many practical truths.

RUNDOWN

BOILER WATER & STEAM SYSTEMS	
Day 1	
Hours	**Lesson Plan**
08.00-09.00	Introduction
09.00-11.00	Economizer & Steam Drums
11.00-12.00	Circulation of Boiler Water
12.00-13.00	Lunch Break
13.00-14.00	Saturation Rate of Change
14.00-17.00	Superheaters & Reheater
Day 2	
Hours	**Lesson Plan**
08.00-10.00	Attemperators
10.00-12.00	Boiler Safety Valves
12.00-13.00	Lunch Break
13.00-17.00	Simulator Exercise : Effect of Attemperation

LEARNING MATERIALS

- *State the purpose of the economizer.*
- *State the purpose of the steam drum.*
- *Describe natural and controlled circulation as applied to boilers.*
- *Describe Boiler Saturation Rate of Change.*
- *Describe the different superheaters and their purpose.*
- *State the purpose of the attemperators.*
- *State the hazards associated with attemperators.*
- *State the purpose of the reheater.*
- *State the purpose of the boiler safety valves.*
- *Demonstrate correctly placing a boiler water circulating pump in service.*
- *Demonstrate and explain the negative effects superheat and reheat attemperators have on the plant efficiency and overall operation.*

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TECHNICAL GUIDANCE
BOILER AIR & FLUE GAS - SIMULATOR BASED

The training covers the boiler fuel, combustion air, and flue gas system. The theory portion of this lesson covers primarily the individual components within the boiler fuel, air, and flue gas system. However, the simulator deals entirely with operating these components as one interconnected system. This lesson deals with some of the larger areas of operation that an operator works with on a daily basis.

RUNDOWN

BOILER AIR & FLUE GAS	
Day 1	
Hours	**Lesson Plan**
08.00-09.00	Feed water System Purpose
09.00-11.00	Combustion Chemistry & Boiler Air Flow
11.00-12.00	Air Preheaters & Regenerative Air Heaters
12.00-13.00	Lunch Break
13.00-14.00	Boiler Fuel Preparation & Delivery
14.00-17.00	Boiler Controls
Day 2	
Hours	**Lesson Plan**
08.00-12.00	Simulator Exercise : Loss of a Regenerativr Air Heater at Full Load
12.00-13.00	Lunch Break
13.00-15.00	Simulator Exercise : Properly Removing and Restarting a Pulverizer
15.00-17.00	Simulator Exercise : Loss of a FD Fan When at Full Unit Load

LEARNING MATERIALS

- *State the purpose and describe the operation of the forced draft fans, primary air fans, and induced draft fans.*
- *Describe the combustion chemistry necessary to convert air and fuel into heat, CO2, and ash.*
- *State the different methods of air flow control on a large utility boiler.*
- *Describe the function of the air preheaters and the regenerative air heaters.*
- *State the various methods used for preparing the boiler fuel for combustion.*
- *State the importance of controlling the various major emissions from the boiler.*
- *Describe the major control loops necessary to control the fuel and air on the boiler.*
- *Demonstrate proper damage mitigation on loss of regenerative air heater at full load.*
- *Demonstrate RH temperature control using burner tilts.*
- *Demonstrate the proper procedure to add into or remove a pulverizer from service.*
- *Demonstrate proper procedure for loss of one F.D. fan when the unit is at full load and the runbacks are disabled.*

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TECHNICAL GUIDANCE
TURBINE AND TURBINE AUXILIARY SYSTEMS - SIMULATOR BASED

The training covers the turbine and turbine auxiliaries. The turbine is nothing more than a heat machine. It converts the heat energy in the steam to mechanical horsepower to drive the generator. The generator, of course, changes mechanical energy to electrical energy.

RUNDOWN

TURBINE & AUXILIARIES	
Day 1	
Hours	**Lesson Plan**
08.00-09.00	Turbine - Heat Engine
09.00-11.00	Turbine Steam Admission & Control Valves
11.00-12.00	Turbine Supervisory Instrumentation
12.00-13.00	Lunch Break
13.00-14.00	Turbine Lube & Hydraulic Oil Systems
14.00-17.00	Steam Seal Systems & Minimizing Turbine Stress
Day 2	
Hours	**Lesson Plan**
08.00-12.00	Simulator Exercise : Turbine Overspeed
12.00-13.00	Lunch Break
13.00-17.00	Simulator Exercise : Oil Whip & Differential Expansion

LEARNING MATERIALS

- *Describe the role of the turbine to covert heat energy to horsepower.*
- *State the number, type, and purpose of the steam valves that control turbine speed and load during start-up and normal operation.*
- *Describe the purpose and function of the steam seal system.*
- *Describe the purpose and function of the turbine lube oil system.*
- *Describe the purpose and function of the turbine hydraulic oil system.*
- *Describe the purpose and the function of the turbine control system and control system components.*
- *Demonstrate a turbine overspeed and explain at least three major items that must be done to reduce the chances of a catastrophic turbine overspeed.*
- *Demonstrate turbine differential expansion mitigation.*
- *Demonstrate turbine oil whip and subsequent mitigation.*

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TECHNICAL GUIDANCE

GENERATOR AND AUXILIARY SYSTEMS - SIMULATOR BASED

The training covers the generator and generator auxiliaries. The generator is nothing more than a very, very powerful electromagnet spinning inside a complex grid of core iron and stator (armature) coils. The generator converts mechanical (rotational) horsepower into electrical energy. The power produced by the generator is wholly a function of how much horsepower is being supplied to it from the turbine.

RUNDOWN

GENERATOR AND AUXILIARY SYSTEMS	
Day 1	
Hours	**Lesson Plan**
08.00-09.00	The Generator
09.00-11.00	General Electric Excitation System
11.00-12.00	Westinghouse Excitation System
12.00-13.00	Lunch Break
13.00-14.00	General Electric & Westing house Seal Oil Systems
14.00-17.00	Generator Aux Cooling & Monitoring Systems
Day 2	
Hours	**Lesson Plan**
08.00-10.00	Simulator Exercise : Initial Excitation and Synchronization
10.00-12.00	Simulator Exercise :Adjusting Geneerator Voltage and its Effects
12.00-13.00	Lunch Break
13.00-17.00	Simulator Exercise : Operating with the Voltage Regulator in manual

LEARNING MATERIALS

- *Describe the role of the generator to convert mechanical energy to watts (voltage and current).*
- *State the purpose and describe the basic operation of the exciter and voltage regulators.*
- *Describe the purpose and function of the hydrogen cooling system.*
- *Describe the purpose and function of the generator seal oil systems.*
- *Describe the purpose and function of the stator cooling water system.*
- *Demonstrate placing excitation on the generator and synchronizing the generator to the power grid.*
- *Demonstrate generator operation with the AUTO voltage regulator out of service.*
- *Demonstrate operation of the generator during a large load change when the AUTO voltage regulator is in MANUAL.*

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TECHNICAL GUIDANCE
INTEGRATED UNIT SHUTDOWN - SIMULATOR BASED

The training covers the shut-down from full load to off-line of the SimGenics simulator for Westar Energy.
A power plant shutdown is a large series of steps and sub-steps that are necessary to remove all of the equipment and systems from service to a safe shutdown and off-line condition.

LEARNING MATERIALS

- *Identify and complete the major milestones of shut-down to take the plant offline. In a safe and efficient manner with the least possible time to cool down.*
- *Identify and the subsystems that can be taken from service during the shutdown.*
- *Describe the optimal cool down methods and practices for the boiler.*
- *Describe the optimal cool down methods and practices for the turbine.*
- *Identify and correct problems that arise in the course of shutting down the plant.*
- *Demonstrate a successful unit shutdown from any milestone or point in the process.*

RUNDOWN

INTEGRATED SHUTDOWN	
Day 1	
Hours	**Lesson Plan**
08.00-10.00	Introduction
10.00-12.00	Concurrent System Shutdown Objectives
12.00-13.00	Lunch Break
13.00-15.00	Forced Cooling of The Boiler
15.00-17.00	Forced Cooling of The Turbine
Day 2	
Hours	**Lesson Plan**
08.00-12.00	Shutting Down with a Large Waterwall Tube Leak
12.00-13.00	Lunch Break
13.00-17.00	Simulator Exercise : Normal Shutdown

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PELATIHAN
PENGOPERASIAN PEMBANGKIT LISTRIK
INTEGRATED START UP

Menggunakan *Operator Training Simulator* (OTS) **SimGenics** yang merupakan sistem pembangkit listrik presisi tinggi yang dikembangkan dengan menggunakan basis *data modeling* dari proses nyata pembangkit listrik di Amerika. Sistem ini dikembangkan oleh **SimGenics** dan telah memenuhi standar sertifikasi internasional (*ANSI/ISA-77.20.01-2012 Fossil Fuel Power Plant*).

LEARN IN REAL CONTROL ROOM ENVIRONMENT

UNDERSTANDING THE "WHY" NOT JUST THE "HOW" THE PLANT PERFORMS

MATERI

- *Simulator System Introduction.*
- *Steady State Simulator Operation.*
- *Energy in = Energy Out.*
- *Circulating and Cooling Water Systems.*
- *Condensate System*
- *Feedwater System*
- *Boiler Steam & Water*
- *Boiler Air & Flue Gas*
- *Turbine and Turbine Auxiliary Systems*
- *Generator and Auxiliary Systems*
- *Integrated Unit Startup*

MANFAAT

- Dapat mempelajari fundamental proses pembangkit listrik.
- Mampu menjalankan prosedur *start-up* pembangkit listrik termasuk otomatisasi keseluruhan proses.
- Mampu mengidentifikasi masalah-masalah yang muncul selama proses *start-up* pembangkit listrik dan cara mengatasinya
- Dapat melakukan berbagai skenario dalam pengoperasian pembangkit listrik tanpa mengganggu proses operasi rill.
- Mendapatkan pengakuan kemampuan di bidang pembangkit listrik dari lembaga yang *authorize*

INFORMASI & PENDAFTARAN

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SimGenics

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POWERPLANT

INTEGRATED START-UP

OPERATOR TRAINING SIMULATOR

Competancy Based Training

Sistem Pembelajaran Era Industri **4.0**

OTS SimGenics

Simulator sistem pembangkit listrik dengan presisi tinggi dikembangkan dengan basis *data modeling* dari proses nyata pembangkit listrik di Amerika (*Westar Energy*). Sistem ini dikembangkan oleh SimGenics berdiri sejak Tahun 1980 dan telah memenuhi *standard* sertifikasi internasional (ANSI/ISA-77.20.01-2012).
Memiliki customer yang tersebar di seluruh dunia (Pembangkit dan Perguruan Tinggi).

LEARN IN REAL CONTROL ROOM ENVIRONMENT

UNDERSTANDING THE "WHY" NOT JUST THE "HOW" THE PLANT PERFORMS

PELATIHAN KOMPETENSI UNTUK MAHASISWA/I (PROGRAM SKPI)

Pelatihan ini merupakan skema pembelajaran pengoperasian pembangkit untuk mahasiswa/i yang lebih mengutamakan *technical knowhow* dengan porsi praktik lebih banyak dibandingkan dengan pembelajaran berdasarkan teori.

Materi pelatihan:

- Mempelajari fundamental proses pembangkit listrik.
- Menjalankan prosedur *start-up* pembangkit listrik termasuk otomatisasi keseluruhan proses.
- Identifikasi masalah-masalah yang muncul selama proses *start-up* pembangkit listrik dan cara mengatasinya.

Tersedia Program Sertifikasi Kompetensi
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Contact Person:

Fasilitas Training

- 1 unit OTS untuk 3 Orang
- Training Modul per orang
- Sertifikat SimGenics
- Kudapan & Makan Siang
- Kelas *Full AC* & *Internet*
- Dokumentasi Foto

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