



International Centre  
for Hydropower

# Turbine Governor Principles

Waterway Dynamics and Governing of Hydropower Plants

## **PART 1**

Online course 9th October – 30th November 2017  
[elearning.ich.no](http://elearning.ich.no)

## **PART 2**

Workshop at KGRTC, Zambia  
4 – 8 December 2017

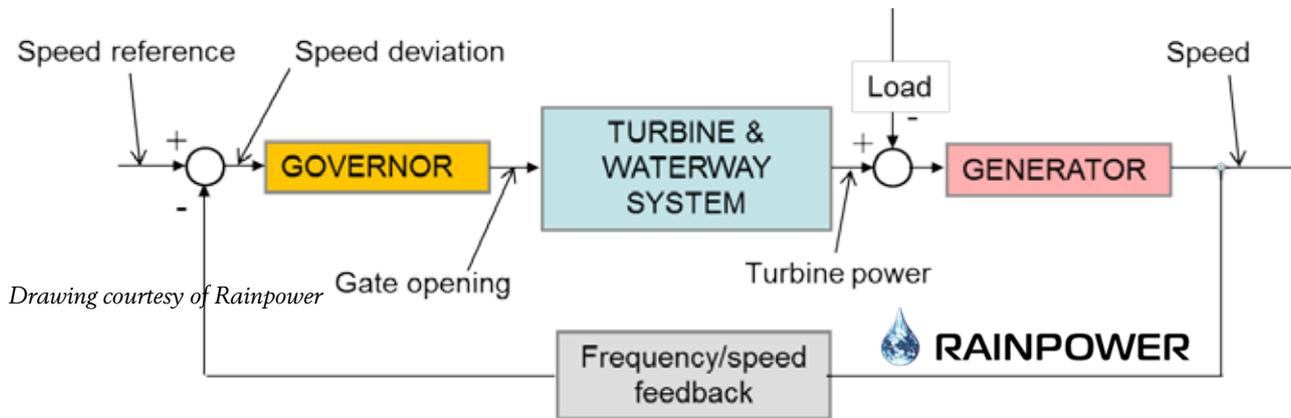
Application  
deadline  
20 September 2017  
Registration fee:  
USD\$ 800



**Gaining through Training**



## Principal block diagram for governing



**Experience shows that money put into good operation and maintenance programmes results in more power production than the same amount of money put into new production capacity.**



**Women are encouraged to apply.**



# THIS IS A 2 PART COURSE:



## PART 1

A web-based preparatory tool to advance and harmonise the skills of the participants.

- 6 modules (over 6 weeks)
- 1 module per week (4–6 hrs. workload per week)
- Assignments, tests and discussion forums (obligatory)

## PART 2

A physical 6-days workshop with participants upon completion of part 1 (web-based) of the course.

- With a skilled instructor
- Demonstration of testing equipment and methods
- Practical exercises

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## Condition evaluation is necessary to reduce the risk of failure

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### TARGET GROUP

Technical staff, Management and those engaged in planning, implementation and follow-up on maintenance activities in existing power plants.

### COURSE LAYOUT

- This course will give an understanding of regulation or governing of the hydro units and cover:
- The elementary principles of regulation.
- The relationship between the dynamics of the waterway(s) and the rotational inertia of the unit.
- The requirements for stability of the hydro-electric plants.
- The development from a simple mechanical-hydraulic governor to today's electronic-hydraulic governors.
- The different oil-hydraulic systems for the governor and its function explained.
- Today's modern technology.

### COURSE CONTENT

All relevant turbine governor components are described in detail with the actual types of damages and their causes.

The coursework also includes descriptions of measuring methods and measuring programmes with the necessary flow diagrams and inspection forms. These turbine governor components are described in separate chapters, and each chapter gives a detailed explanation of the:

- Components of damages
- Types of damages
- Measuring methods
- Measurement programme

*Scheduling, planning and tracking of Operation and Maintenance work can significantly improve efficiency of O & M and production capacity.*

All relevant turbine governor measuring methods are included:

- Visual inspection
- Resynchronization tests
- Load rejection tests
- Regulation tests
- Testing of over speed sensor
- Functional testing of electronics



## Specifics for the Online Course & Workshop in Zambia

### GENERAL

Joining the course presents an opportunity to learn about maintenance planning for the short and long term thus being able to take necessary actions in due time which can significantly improve efficiency of O&M and production capacity.

The course should facilitate participants with the capacity to identify performance indicators that support the maintenance decision-making process, thus develop solid internal condition assessment tools so as to gain consistency within their Power plants.

Participants are encouraged to bring along information about turbine maintenance issues of your interest that can be shared with colleagues.

### ADMISSION REQUIREMENTS

- A relevant background in hydropower engineering or its equivalent
- Proficiency in English is necessary
- Basic computer skills and internet access

Only online electronic applications will be processed. The application form can be accessed at the ICH web- site – [www.ich.no](http://www.ich.no)

Please ensure your application is received no later than the given **deadline – 20th September 2017**. Notice of admission will be given shortly after the application closing date.

ICH reserves the right to accept or reject any applicant on the basis of their qualifications and experience. Information on travel, detailed course programme and other relevant information will be sent to all participants in due course.

Participants will be allowed to attend the workshop in Zambia only if they have successfully completed part 1 of the course.

Arrival for the physical gathering should be a day prior to the workshop start and departure no earlier than the day after end of the workshop.

**Course fee – USD\$ 800,-**

The course fee includes access to part 1 of the course and the workshop – part 2 (accommodation, meals, a social programme and a workshop fieldtrip if applicable).

International travel expenses are not included.

A limited number of sponsored seats are available for participants from countries prioritized by NORAD (Norwegian Agency for Development Cooperation).

### MORE INFORMATION

Information on other courses can also be found on our website: [www.ich.no](http://www.ich.no) or by contacting [Carole@ich.no](mailto:Carole@ich.no)



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