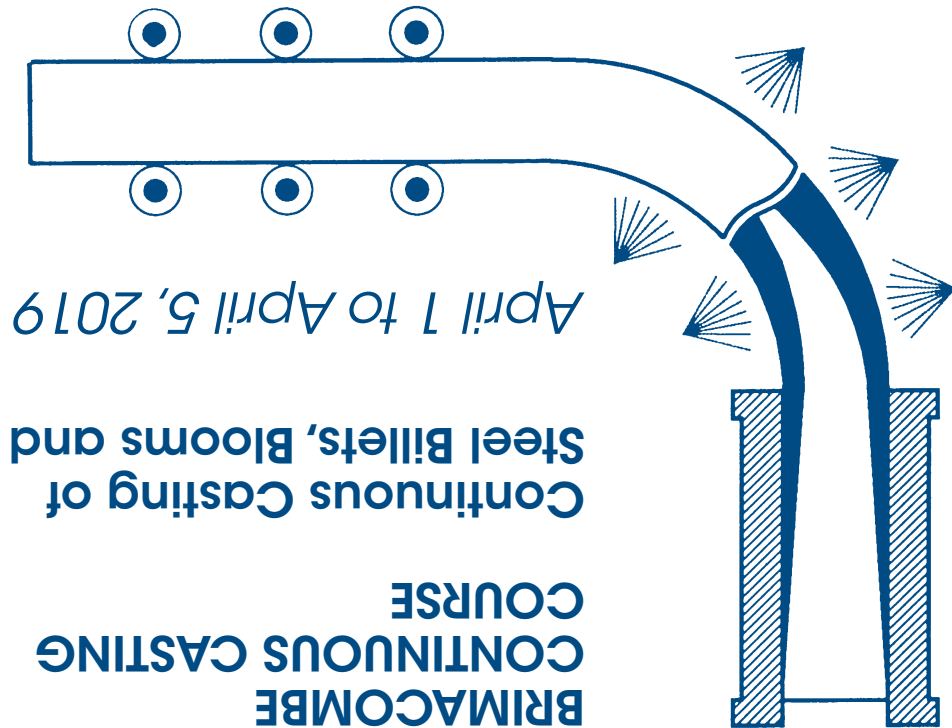


Pinnacle Vancouver Harbourfront Hotel  
1133 West Hastings Street, Vancouver, B.C. Canada V6E 3T3



*April 1 to April 5, 2019*

Continuous Casting of  
Steel Billets, Blooms and Slabs

# BRIMACOMBE CONTINUOUS CASTING COURSE



Dr. J. Keith Brimacombe

Sponsored by the Brimacombe Continuous Casting Society

[www.brimacombecourse.org](http://www.brimacombecourse.org)

# Brimacombe Continuous Casting Course – 2019

## Continuous Casting of Steel Billets, Blooms and Slabs

**Time** Monday, April 1 to Friday, April 5  
7:00 a.m. to 6:00 p.m.

**Place** Pinnacle Vancouver Harbourfront Hotel  
1133 West Hastings Street  
Vancouver, B.C. Canada V6E 3T3

**Fee** **Either** \$3,650 CDN or \$2,850 US

### WHO WILL BENEFIT

The Brimacombe Continuous Casting Course is designed for people who are concerned with controlling and improving the quality and production rate of continuously cast steel shapes. Persons who will benefit include shop floor operating personnel, quality control and research personnel, management personnel and individuals in support industries associated with continuous casting.

### COURSE DESCRIPTION

Topics to be covered include chemical interactions, steel cleanliness, transfer operations, fluid flow, tundish metallurgy, mould design/behaviour, spray systems, heat extraction, solidification, segregation, electromagnetic stirring, crack formation and newer technologies such as thin slab casting. The Course offers a practical understanding of the continuous-casting process and quality based on fundamental principles, and deals with problems commonly experienced in production. Much of what will be presented and discussed is based on our research, some of it unpublished, which spans a twenty-five year time period.

### CORRESPONDENCE AND INFORMATION

The Brimacombe Continuous Casting Society  
Mary Jansepar, Course Coordinator  
Department of Materials Engineering  
The University of British Columbia  
Room 309 - 6350 Stores Road  
Vancouver, B.C. Canada V6T 1Z4

Telephone: (604) 822-2676 (Mary Jansepar)

Facsimile: (604) 822-3619

Email: [info@brimacombecourse.org](mailto:info@brimacombecourse.org)  
(Mary Jansepar)

Website: [www.brimacombecourse.org](http://www.brimacombecourse.org)

### COURSE CO-DIRECTORS:

Dr. Indira V. Samarasekera

Dr. Edward S. Szekeres

**\*\* The Brimacombe Continuous Casting Society  
is a Canadian non-profit organization. \*\***

# Course Lecture Schedule

## Brimacombe Continuous Casting Course 2019

### Pinnacle Vancouver Harbourfront Hotel 1133 West Hastings Street Vancouver, B.C. Canada V6E 3T3

#### Sunday, March 31st

5:30 - 8:00 p.m. COCKTAIL RECEPTION (with light buffet)  
Pinnacle Vancouver Harbourfront Hotel  
Ballroom Foyer, 2<sup>nd</sup> Floor

#### Monday, April 1st

7:00 - 7:30 a.m. Continental Breakfast and Registration  
Confirmation, Ballroom Foyer

7:30 - 8:00 a.m. Welcome to Course (ESS)

8:00 - 8:30 a.m. Tribute to Keith Brimacombe (IVS)

8:30 - 9:00 a.m. Brief Introduction to Continuous Casting  
Systems (ESS)

9:00 - 9:15 a.m. BREAK

9:15 -10:15 a.m. Considerations in Caster  
Operation (RJO)

10:15 -11:00 a.m. Inclusion Defects (RJO)

11:00 -12:00 p.m. Chemistry Control (RJO)

12:00 - 1:15 p.m. LUNCH BREAK

1:15 - 2:00 p.m. Slags for Ladle and Tundish (RJO)

2:00 - 2:45 p.m. Slag-Metal Interface Phenomena (RJO)

2:45 - 3:00 p.m. BREAK

3:00 - 4:00 p.m. Cleanliness Control (RJO)

5:00 p.m. Walk to Marina

6:00 - 9:00 p.m. HARBOUR CRUISE WITH COCKTAILS AND  
DINNER (SPOUSES INCLUDED)

#### Tuesday, April 2nd

7:00 - 7:30 a.m. Continental Breakfast, Ballroom Foyer

7:30 - 9:30 a.m. Caster Operation to Minimize Oxide  
Defects (RJO)

9:30 - 9:45 a.m. BREAK

9:45 -11:30 a.m. Basic Aspects of Moulds (BGT)

11:30 -12:00 p.m. Introduction to Mould Powders (RJO)

12:00 - 1:15 p.m. LUNCH BREAK

1:15 - 2:00 p.m. Mould Powders (RJO)

2:00 - 3:30 p.m. Aspects of Mould Oscillation (ESS)

3:30 - 3:45 p.m. BREAK

3:45 - 5:30 p.m. Fluid Flow in the Mould (BGT)

NOTE: Audio and/or video taping  
of lectures is not permitted.

\*Groups divided into billets and  
slabs/blooms for simultaneous sessions.

#### Wednesday, April 3rd

7:00 - 7:30 a.m. Continental Breakfast, Ballroom Foyer

7:30 - 9:45 a.m. Strand Solidification on a Macroscale -  
Empirical Methods (ESS)

9:45 -10:00 a.m. BREAK

10:00 -11:00 a.m. Solidification on a Microscale and

11:00 -12:00 p.m. Solidification-Related Imperfections (ESS)

12:00 - 1:15 p.m. LUNCH BREAK

1:15 - 2:30 p.m. Mould Heat Transfer (BGT)

2:30 - 3:15 p.m. Below-Mould Heat Transfer (BGT)

3:15 - 3:30 p.m. BREAK

3:30 - 4:30 p.m. Intermixing During Grade Transitions (BGT)

4:30 - 5:30 p.m. High Temperature Mechanical Properties  
of Steel (BGT)

#### Thursday, April 4th

7:00 - 8:00 a.m. Canadian Breakfast in the Vistas 360  
(19<sup>th</sup> Floor)

8:00 - 9:30 a.m. Crack Formation (IVS)

9:30 - 9:40 a.m. Presentation of Course Certificates

9:40 -10:00 a.m. BREAK (Divide Lecture Room)

10:00 -11:00 a.m.\* I Billet Mould Design, Operation, and  
Maintenance (IVS)  
II Nozzle Design and Flow Issues in Slab  
Casting (BGT)

11:00 -12:00 pm Billet Mould Tapers, Oil Lubrication and  
Billet Quality (IVS)  
II Slab Mould Behaviour (BGT)

12:00 - 1:15 p.m. LUNCH BREAK

1:15 - 3:00 p.m. Mould Oscillation and Upsets in Billet  
Casting (IVS)  
II Slab Mould Tapers, Slag Lubrication  
and Quality (BGT)

3:00 - 3:15 p.m. BREAK

3:15 - 4:15 p.m. I Defects in Billet Casting - Wrap up (IVS)  
II Online Detection of Breakouts and  
Slab Quality Problems (BGT)

4:15 - 5:30 p.m. I Panel Discussion on Billet Casting (IVS/ESS)  
II Panel Discussions on Slabs/Bloom  
Casting (RJO/BGT)

#### Friday, April 5th

7:00 - 7:30 a.m. Continental Breakfast, Ballroom Foyer

7:30 - 8:45 a.m. Spray Cooling and Related Defects (IVS)

8:45 - 9:00 a.m. BREAK

9:00 -10:00 a.m. Casting Defects and Product  
Performance Case Studies (BGT & RJO)

10:00 -11:30 a.m. Containment in the Submould Region (ESS)

11:30 - 12:00 p.m. Challenges in High Speed Casting (BGT)

12:00 p.m. COURSE ENDS

## GENERAL INFORMATION

The Course will be held at the Pinnacle Vancouver Harbourfront Hotel in downtown Vancouver. The hotel is located at 1133 West Hastings Street, Vancouver, B.C. Canada V6E 3T3. A limited block of rooms has been reserved for course attendees at a reduced rate. This special rate only applies to room reservations made on or before February 28, 2019, so **MAKE YOUR RESERVATION EARLY!** Room reservations can most easily be made via links on our website <[www.brimacombecourse.org](http://www.brimacombecourse.org)>. The website also includes a phone number for the hotel. However, to obtain the special rate when making reservations by phone you must **STATE THAT YOU ARE ATTENDING THE BRIMACOMBE CONTINUOUS CASTING COURSE.** The most convenient means of transportation between the Vancouver International Airport and the Pinnacle Vancouver Harbourfront Hotel is by taxi (about \$35). An alternative means is via the Canada Line SkyTrain at a cost of \$9.10. The exit station is within 3 blocks of the Pinnacle Vancouver Harbourfront Hotel. You can buy tickets from the ticket vending machines located at the Canada Line Station in the airport. An informative guide to Vancouver travel and other attractions can be found at: <http://www.vancouver-travel-tips.com>. Many excellent restaurants are located within easy walking distance of the hotel. Western business casual is typical dress for the Course. **U.S. CITIZENS: PLEASE NOTE THAT YOU MUST POSSESS A VALID U.S. PASSPORT FOR CUSTOMS.**

## INSTRUCTORS

**Dr. Indira V. Samarasekera:** Senior Advisor, Bennett Jones LLP. Member of the National Academy of Engineering. Previously President and Vice-Chancellor, University of Alberta and Vice President Research, University of British Columbia. Expert in heat flow and stress analysis with extensive experience in mould design and its effect on quality.

**Dr. Brian G. Thomas:** Professor of Mechanical Engineering, Colorado School of Mines at Golden, Colorado, and Director of the Continuous Casting Centre. Over 30 years experience conducting research on the continuous casting of steel. Expert in computational modeling.

**Dr. Edward S. Szekeres:** Principal Consultant, Casting Consultants, Inc. His experience includes over twenty years at U.S. Steel Research plus over 34 years as an independent consultant on continuous casting of steel. Expert on strand solidification and caster design.

**Dr. Ronald J. O'Malley:** Professor and also Director of the Kent D. Peaslee Steelmaking Manufacturing Research Center, Missouri University of Science & Technology. Previous positions: Researcher, Armco Inc.'s Technology Center, chief metallurgist at Nucor Steel-Decatur LLC. AIST Distinguished Member and Fellow. Expertise in clean steel and thin-slab continuous casting technologies.

## REGISTRATION

Registration is easily made on our website or by completing the form below and sending it in either by FAX or EMAIL. When you register for the course, both an information letter and an invoice will be emailed to you. For registration to be complete, the full fee must be sent to the address given below by February 28, 2019. Payment can be either by cheque (preferred) or by wire transfer. Upon payment, a confirmation number will be issued and the registration process is complete. **A confirmation number is required for admittance.** If the fee is not prepaid, the application will be cancelled on March 1, 2019. Registration after March 1st is subject to space availability and must be accompanied by the fee. A cancellation charge of 20% of the fee will be levied for withdrawal of a registration after March 1st. The Brimacombe Continuous Casting Society reserves the right to cancel or reschedule the course.

## THE BRIMACOMBE CONTINUOUS CASTING SOCIETY

Mary Jansepar, Course Coordinator  
Department of Materials Engineering  
The University of British Columbia  
Room 309 - 6350 Stores Road  
Vancouver, B.C. V6T 1Z4

CANADA

Telephone: (604) 822-2676

Facsimile: (604) 822-3619

Email: [info@brimacombecourse.org](mailto:info@brimacombecourse.org)

Website: [www.brimacombecourse.org](http://www.brimacombecourse.org)

## Registration Form

I enclose \_\_\_\_\_ to cover the fee for the Continuous Casting of Steel Billets, Blooms and Slabs, April 1-5, 2019

**\$3,650 Canadian or \$2,850 US**

CHEQUE TO BE MADE PAYABLE TO THE **BRIMACOMBE CONTINUOUS CASTING SOCIETY**

First Name \_\_\_\_\_ Middle Initial \_\_\_\_\_ Surname \_\_\_\_\_

Position or Title \_\_\_\_\_

Company \_\_\_\_\_ Plant \_\_\_\_\_

Address \_\_\_\_\_

Telephone No. \_\_\_\_\_ Facsimile \_\_\_\_\_ Email \_\_\_\_\_

**NAME BADGE INFORMATION** (This information will appear on your name badge only) if same as above, no need to fill info below.

First Name \_\_\_\_\_ Surname \_\_\_\_\_ Company \_\_\_\_\_

### MAIL REGISTRATION FORM AND CHEQUE TO:

THE BRIMACOMBE CONTINUOUS CASTING SOCIETY  
Mary Jansepar, Course Coordinator  
Department of Materials Engineering  
The University of British Columbia  
Room 309-6350 Stores Road  
Vancouver, B.C. Canada V6T 1Z4

**NO CREDIT CARD PAYMENTS ACCEPTED. FEE(\$) MUST BE RECEIVED BY FEBRUARY 28, 2019. PERSONAL CHEQUES ACCEPTED.**

**Bank Information (for wire transfers only)**

The Royal Bank of Canada  
4501 West 10<sup>th</sup> Avenue  
Vancouver, B.C. Canada V6R 2J2  
**Brimacombe Continuous Casting Society**  
**Account Number: 07600-1016344**  
SWIFT CODE: ROYCCAT2