



# The Centre for Mechanised Mining Systems

## Wits short course

# Conveying, Storage and Handling of Bulk Solids

**8 – 13 November 2010 - University of the Witwatersrand, Johannesburg**

### Introduction

Following on the success of two existing post-graduate courses on Belt Conveying of Bulk Solids, and Bulk Solids Storage and Handling, the School of Mechanical, Industrial and Aeronautical Engineering has decided to combine both courses into one advanced short course on Conveying, Storage and Handling of Bulk Solids in 2010.

### Course objectives

This course is aimed at managers, engineers, technologists and other personnel in the resources industries who would benefit from a better understanding of the design and operation of belt conveyors as well as the understanding necessary for designing and selecting suitable equipment for reliable bulk solids storage, handling and transportation.

It is recommended that participants have prior knowledge of belt conveyor standards as a basis for obtaining maximum benefit from this course.

### Course content

The course will provide an advanced overview of the subject of belt conveying. It will present the fundamental concepts related to the static and dynamic design of belt conveyor systems. It will provide the understanding necessary for designing and selecting suitable equipment for reliable bulk solids handling and transportation, and for the efficient operation of belt conveyors.

The course will demonstrate the importance of the measurement of the basic flow-related properties of bulk solids and particulates and the application of this information to the design of storage bins, and feeding and handling equipment.

The content of this program is based largely on the principles of granular mechanics.

### Topics

The subject matter of this course will include:

- an overview of open and closed belt conveying systems
- static design principles
- design of horizontal and vertical curves
- dynamic analysis
- high speed belt conveyor design and considerations
- bulk solid and conveyor belt interactions
- characterization of bulk solids;
- basic properties of particulates;
- property variation of bulk solids;
- basic concepts in mass, funnel and expanded flow bin design;
- application of flow properties to the determination of bin wall loads and feeder loads;
- interfacing of feeders with storage vessels.

### Course dates

Monday 8 November – Saturday 13 November 2010.

The Saturday morning tutorial is optional but highly recommended for those participants who will be submitting the assignment and writing the examination.

## Method of assessment

The course is offered over 5½ consecutive days. Participants have a choice of attending the full 5½ day course and completing a subsequent assignment and writing an examination, which will enable them to achieve a full Wits Certificate of Competence, or only to attend for 5 days to receive a Wits Certificate of Attendance.

Students will be informed of the examination date on commencement of the course.

## Venue

The course will be held at Sturrock Park, University of the Witwatersrand, Johannesburg.

## Accreditation

This is a formal course (MECN7035) in the postgraduate programme of the School of Mechanical, Industrial and Aeronautical Engineering.

The University regards this course as NQF level 9.

The course has been accredited by ECSA for CPD purposes as follows: 5 day attendance = 4 points, 5 day attendance and satisfactory completion of assignment and examination = 6 points.

## Course fees

The course fee to attend the full 5½ day course is R 12 760 (VAT included). These fees include lectures by renowned experts, lunches and refreshments, course notes, examination and certification costs.

Employees of sponsors of the Centre for Mechanised Mining Systems (African Rainbow Minerals, Anglo Platinum, De Beers, Gold Fields, Joy Mining Machinery, Lonmin and Sandvik) receive a 50% reduction in course fees.

**No-one will be allowed to attend the course if payment has not been received.**

## Cancellation and refund policy

Cancellations must be sent in writing to: Sam Moolla: MineMech, Centre for Mechanised Mining Systems, Private Bag 3, Wits, 2050 or by fax +27 11 7177364 or email [Sam.Moolla@wits.ac.za](mailto:Sam.Moolla@wits.ac.za) up to **10 working days before** the course. A full course fee will be charged for cancellations received thereafter.

## HOW TO REGISTER:

To register, please complete the attached registration form and fax it to: 011 717 7364 or scan and email to [Sam.Moolla@wits.ac.za](mailto:Sam.Moolla@wits.ac.za).

For further enquiries, contact Sam Moolla on (011) 717-7329. A list of accommodation venues close to Wits University is available on request.

## RESUMES OF COURSE LEADERS

**Dr Craig Wheeler** is a Senior Lecturer in Mechanical Engineering at the University of Newcastle, Australia. He worked for 10 years with BHP Billiton in Australia in a variety of engineering positions, including maintenance, production and design. Since joining the University he has worked as a Research Fellow at the Center for Bulk Solids and Particulate Technologies, a Consultant for TUNRA Bulk Solids and more recently as a Senior Lecture in the School of Engineering.

**Prof Bill McBride** graduated from the University of Newcastle in Australia in 1991 in Mechanical Engineering. He worked for both TUNRA Bulk Solids and the Centre for Bulk Solids and Particulate Technologies as a research engineer and consulting engineer up to 2002, when his Doctorate was conferred. Prof McBride is currently Head of Mechanical and Mechatronics Engineering at the University of Newcastle. Prof McBride's research interests include stockpile mechanics, transfer chute design, and the application of CAE tools to bulk materials handling.

**Course Outline – Conveying, Storage and Handling of Bulk Solids**  
8<sup>th</sup> – 13<sup>th</sup> November 2010

Day	Time	Topic	Presenter
1	8:30 – 9:00	Registration	
	9:00 – 10:30	<ul style="list-style-type: none"> <li>• Introduction and Course Overview</li> <li>• Open and Closed Belt Conveyors</li> </ul>	BMc & CW
	10:30 – 11:00	Morning Tea	
	11:00 – 12:30	<ul style="list-style-type: none"> <li>• Open and Closed Belt Conveyors (cont.)</li> <li>• Overview of Static Design Procedures</li> </ul>	CW
	12:30 – 13:30	Lunch	
	13:30 – 15:00	<ul style="list-style-type: none"> <li>• Overview of Static Design Procedures (cont.)</li> </ul>	CW
	15:00 – 15:30	Afternoon Tea	
	15:30 – 17:00	<ul style="list-style-type: none"> <li>• Static Design Example 1</li> <li>• Tutorial 1 - Static Design</li> </ul>	CW
2	9:00 – 10:30	<ul style="list-style-type: none"> <li>• Belt Transitions and Vertical Curves</li> <li>• Static Design Example 2</li> </ul>	CW
	10:30 – 11:00	Morning Tea	
	11:00 – 12:30	<ul style="list-style-type: none"> <li>• Tutorial 2 - Multigrade Analysis</li> </ul>	CW
	12:30 – 13:30	Lunch	
	13:30 – 15:00	<ul style="list-style-type: none"> <li>• Tutorial 2 - Multigrade Analysis (cont.)</li> </ul>	CW
	15:00 – 15:30	Afternoon Tea	
	15:30 – 17:00	<ul style="list-style-type: none"> <li>• Stopping and Starting Characteristics</li> </ul>	GS
3	9:00 – 10:30	<ul style="list-style-type: none"> <li>• Main Resistances, Design Optimisation and Dynamics</li> </ul>	CW
	10:30 – 11:00	Morning Tea	
	11:00 – 12:30	<ul style="list-style-type: none"> <li>• Bulk Materials Characterisation</li> </ul>	BMc
	12:30 – 13:30	Lunch	
	13:30 – 15:00	<ul style="list-style-type: none"> <li>• Bulk Materials Characterisation (cont.)</li> </ul>	BMc
	15:00 – 15:30	Afternoon Tea	
	15:30 – 17:00	<ul style="list-style-type: none"> <li>• Tutorial 3 - Data Conversion</li> </ul>	BMc
4	9:00 – 10:30	<ul style="list-style-type: none"> <li>• Bin Design</li> </ul>	BMc
	10:30 – 11:00	Morning Tea	
	11:00 – 12:30	<ul style="list-style-type: none"> <li>• Tutorial 4 - Bin Design</li> </ul>	BMc
	12:30 – 13:30	Lunch	
	13:30 – 15:00	<ul style="list-style-type: none"> <li>• Feeder Design including Flowrate</li> </ul>	BMc
	15:00 – 15:30	Afternoon Tea	
	15:30 – 17:00	<ul style="list-style-type: none"> <li>• Tutorial 5 - Feeder Design</li> </ul>	BMc
5	9:00 – 10:30	<ul style="list-style-type: none"> <li>• Tutorial 5 - Feeder Design (cont.)</li> </ul>	BMc
	10:30 – 11:00	Morning Tea	
	11:00 – 12:30	<ul style="list-style-type: none"> <li>• Elevation of Bulk Solids</li> </ul>	BMc
	12:30 – 13:30	Lunch	
	13:30 – 14:30	<ul style="list-style-type: none"> <li>• Transfer Chute Design – Continuum Approach</li> </ul>	CW
	15:00 – 15:30	Afternoon Tea	
	15:30 – 17:00	<ul style="list-style-type: none"> <li>• Computational Methods (DEM and CFD)</li> </ul>	CW & BMc
6	9:00 – 10:30	<ul style="list-style-type: none"> <li>• Review Questions for Assignment and Exam</li> </ul>	CW & BMc
	10:30 – 11:00	Morning Tea	
	11:00 – 12:30	<ul style="list-style-type: none"> <li>• Review Questions for Assignment and Exam</li> </ul>	CW & BMc

BMc - Bill McBride

CW - Craig Wheeler

GS - Graham Spriggs

**Please complete and return to:**  
Centre for Mechanised Mining Systems  
Private Bag 3, Wits, 2050  
Tel: (011) 717-7329 Fax: (011) 717-7364  
E-mail: Sam.Moolla@wits.ac.za



# The Centre for Mechanised Mining Systems

## Conveying, Storage and Handling of Bulk Solids 8 – 13 November 2010

Certificate of Competence  Certificate of Attendance  (please tick (v) one)

### Personal details

Title: Prof/Dr/Mr/Mrs/Ms \_\_\_\_\_ Initials: \_\_\_\_\_

Surname: \_\_\_\_\_

Full names: \_\_\_\_\_

Gender: Male  Female

Preferred name (to be used on name tag)  
\_\_\_\_\_

\*ID number: \_\_\_\_\_

Work Tel: \_\_\_\_\_ Cell: \_\_\_\_\_

Fax No: \_\_\_\_\_ Email: \_\_\_\_\_

Highest qualification: \_\_\_\_\_

If other, please specify: \_\_\_\_\_

\*Company/Institution: \_\_\_\_\_

\*Position: \_\_\_\_\_

\*Postal address: \_\_\_\_\_

Postal code : \_\_\_\_\_ Country (if not SA): \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

**\*Compulsory fields must be completed**

### Special requirements

Dietary requirements: None  Kosher  Halaal

Other \_\_\_\_\_

Disability: Yes  No  If yes, please specify:  
\_\_\_\_\_

### Cancellation and refund policy

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**No-one will be allowed to attend the course if payment has not been received.**

### Payment details

Company information (if you are not paying for yourself):

Company name: \_\_\_\_\_

Company VAT Reg. No: \_\_\_\_\_

Company registration number: \_\_\_\_\_

Name of person responsible for payment:  
\_\_\_\_\_

Tel no: \_\_\_\_\_ Fax No: \_\_\_\_\_

Email address: \_\_\_\_\_

### Course Fees

R12 760 including VAT.

Employees of the Founding Sponsors of the Centre for Mechanised Mining Systems – African Rainbow Minerals, Anglo Platinum, De Beers, Gold Fields, Joy Mining Machinery, Lonmin and Sandvik receive a 50% reduction in course fees.

Total payment: \_\_\_\_\_

### Payment

#### 1. Direct deposit or money transfer

Fees may be deposited directly into the Faculty of Engineering & the Built Environment bank account.

Banking details are as follows:

First National Bank of South Africa (FNB)

Braamfontein Branch, Johannesburg

Branch code 255005

Account number: 62150130260

Account name: Faculty of Engineering & the Built Environment

As a reference on the deposit slip or transfer notice, please state your Invoice number or delegate name(s).

Please fax a copy of the deposit slip or transfer notice to Sam Moolla at (011) 717-7364.

#### 2. Cheques

Cheques are payable to the Faculty of Engineering & the Built Environment, and should be sent to the Centre for Mechanised Mining Systems, Private Bag 3, Wits 2050.