



## 2013 SUMMER SESSION WORKSHOPS AT C.A.S.T.

## FLEXIBLE FABRIC FORMWORK AND “GREENER” CONCRETE



UNIVERSITY  
OF MANITOBA

Professor Mark West will lead two, 3-Day Design + Build Workshops at the University of Manitoba's Centre for Architectural Structures and Technology Laboratory/Studio (CAST), in Winnipeg Canada.

**Workshop #1 June 17,18,19 2013**

**CAST-IN-PLACE FABRIC-FORMED COLUMNS**

**Workshop #2 June 20, 21, 22 2013**

**FABRIC-FORMED THIN-SHELL MOLDS  
FOR PRE-CAST AND GLASS FIBER  
REINFORCED CONCRETE (GFRC) PRODUCTS**

Flexible molds for casting concrete structures and products is a rapidly developing field of investigation and production with many practical and aesthetic advantages over conventional rigid formworks. Mark West is a key figure in this field and the Center for Architectural Structures and Technology (CAST) has been at the forefront of flexible fabric formwork research for over a decade.

These two workshops offer a rare opportunity to learn how to design and construct using these new techniques. These workshops will emphasize both the ecological advantages of light fabric formworks and the design potentials they hold.

- **Workshop #1** will explore the use of Alternative Cementitious Material (ACM) for low-carbon concrete structures in the production of fabric-formed columns.
- **Workshop #2** will explore Glass Fiber Reinforced Concrete (GFRC) applied to flexible fabric molds.



Interested professionals, practitioners, and students in architecture, engineering, fine arts, and construction are welcome to participate. All participants must have approval of the instructor.

#### REGISTRATION

Participants register using the registration form available at [umanitoba.ca/summer/Feature Programs/CASTWorkshops](http://umanitoba.ca/summer/Feature Programs/CASTWorkshops). Once a participant has approval, the registration and fee payment will be processed. Registration may be paid by cash, credit card (MasterCard or Visa), or cheque (payable to the University of Manitoba). Space is limited. Application deadline is **June 3, 2013**, but applications may be accepted after this date subject to space availability.

#### Fees

<b>Workshop #1</b>	\$1,100 CAD + GST
<b>Workshop #2</b>	\$1,100 CAD + GST

Workshop details are available at [umanitoba.ca/summer](http://umanitoba.ca/summer) - click on Feature Programs → CAST Workshops. Inquiries may be directed to Mark West at: [mark.west1@ad.umanitoba.ca](mailto:mark.west1@ad.umanitoba.ca). For information on registration, fee payment, or accommodation contact Cheryl Hadaller at: [hadalle@ms.umanitoba.ca](mailto:hadalle@ms.umanitoba.ca)

**SEE FULL WORKSHOP DESCRIPTIONS BELOW FOR MORE DETAILS**

**Collaborators in these workshops are:  
University of Manitoba Summer Session, Extended Education, and Faculty of Architecture,  
with corporate contributors Antex Western Ltd. and City Mix Inc.**



## Workshop #1

# CAST-IN-PLACE FABRIC-FORMED COLUMNS



UNIVERSITY  
OF MANITOBA

DATES: June 17,18,19 2013

LOCATION: CAST Laboratory/Studio  
University of Manitoba, Winnipeg, MB CANADA

HOURS: 9:00 a.m. – 5:00 p.m. each day

INSTRUCTOR: Professor Mark West  
(with Dr. Asia Shvarzman)

Sustainability themes in this workshop include:

- Waste reduction strategies for concrete formwork through low-material, reusable, fabric molds.
- The introduction of low carbon Alternative Cementitious Material (ACM) concretes.

This workshop will begin by casting 3 full-scale fabric-formed concrete columns. Subsequent workshop activities will involve the design and construction of scaled working models of fabric formworks (using light fabrics and plaster to model full-scale construction methods). Our work with these models will allow participants to explore a range of design and construction options using these new formwork methods, and invent and develop their own designs. Participants will learn about fabric choices, construction details, and their design implications.

Participants will learn techniques for building simple fabric molds. By the end of the workshop, participants will know enough to begin designing and building fabric formworks for reinforced concrete columns. This is primarily a hands-on workshop. No prior construction or design experience is required. Teaching and construction activities will be geared to individual participant's skills and experience. Participants will work individually and in teams of two or three.

## Workshop #1 Continued

The full-scale fabric-formed columns will be cast on the first day of the workshop. They will be filled with three different concrete mix designs: we will use a normal portland cement concrete as well as two low-carbon, Alternative Cementitious Material (ACM) concretes, namely a “geopolymer” concrete and a high performance gypsum-based concrete. These new mix designs use post-consumer and post-industrial waste for both low-carbon cements (based on fly ash, an industrial waste product) and recycled aggregates, to reduce environmental impact compared to traditional portland cement concretes.

The full-scale column constructions will be the first time that geopolymer concrete will be used in fabric molds, so this part of our work will also constitute a unique research experiment. In these constructions, participants will see and use flexible fabric column formworks, providing them with the knowledge and experience they will need to use these techniques in their own work and constructions. Participants will also see and use the two new ACM concretes, giving them hands-on experience with these new “greener” concrete materials.

The workshop will include a lecture presentation by Professor Mark West on a variety of fabric formwork methods and applications, and a lecture presentation by Dr. Asia Shvarzman, research scientist at Antex Western Corp., and a specialist in Alternative Cementitious Materials including low-carbon “geopolymer” concrete.

### REGISTRATION

Participants register using the registration form available at [umanitoba.ca/summer/Feature Programs/CAST-Workshops](http://umanitoba.ca/summer/Feature_Programs/CAST-Workshops). Once a participant has approval, the registration and fee payment will be processed. Registration may be paid by cash, credit card (MasterCard or Visa), or cheque (payable to the University of Manitoba). Space is limited. Application deadline is **June 3, 2013**, but applications may be accepted after this date subject to space availability.

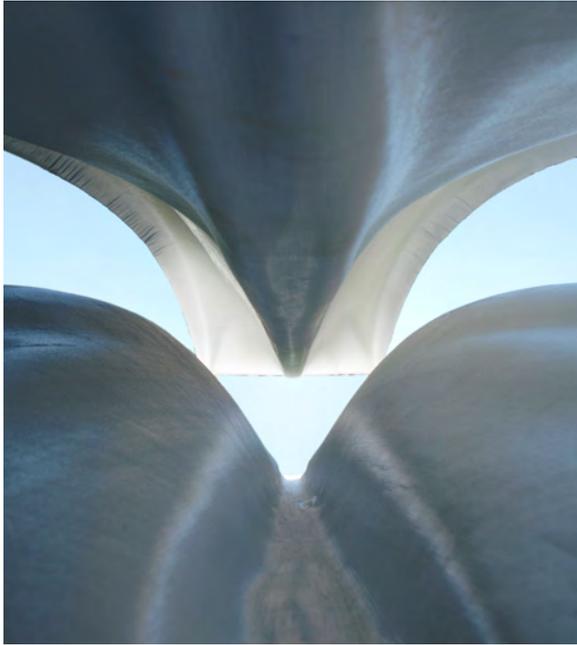
Fees: \$ 1,100 CAD + GST

### IMPORTANT NOTES:

- No food or refreshments provided – each participant is responsible for supplying their own food during the workshop.
- CSA Approved steel-toed footwear is required for work in the CAST Laboratory.
- In order to participate in the workshop(s), all participants must sign a Release and Indemnification form that outlines risk and shared responsibility associated with the workshop.

Inquiries about the workshop may be directed to Mark West at:  
[mark.west1@ad.umanitoba.ca](mailto:mark.west1@ad.umanitoba.ca) or **204-474-7427**.

For information on registration, fee payment, or accommodation contact Cheryl Hadaller at:  
[hadalle@ms.umanitoba.ca](mailto:hadalle@ms.umanitoba.ca) or 204-474-8008; toll free 1-888-216-7011 ext. 8008



## Workshop #2

# FABRIC-FORMED THIN-SHELL MOLDS FOR PRE-CAST AND GLASS FIBER REINFORCED CONCRETE (GFRC) PRODUCTS



UNIVERSITY  
OF MANITOBA

DATES:	June 20, 21, 22 2013
LOCATION:	CAST Laboratory/Studio, University of Manitoba Winnipeg, MB CANADA
HOURS	9:00 a.m. – 5:00 p.m. each day
INSTRUCTOR:	Professor Mark West (with Justin Brown)

Sustainability themes in this workshop include:

- Material reduction through thin-shell design strategies using Glass Fiber Reinforced Concrete (GFRC) and flexible fabric molds.

This workshop will focus on fabric molds for lightweight, thin-shell, concrete products, including glass fiber reinforced concrete (GFRC). This is primarily a hands-on workshop. No prior construction or design experience is required. Teaching and construction activities will be geared to individual student skills and experience. The workshop includes a lecture presentation by Professor West on thin-shell, and other, fabric formwork techniques, and instruction and assistance in building fabric thin-shell molds. GFRC specialist Justin Brown, of 2-Stone Designer Concrete in Calgary Alberta, will co-teach this workshop.

GFRC uses glass fibers for tension reinforcing in a special concrete mix design. This allows the production of very thin concrete castings with significant flexural strength. GFRC is not currently used for primary structures, but it is used in a wide variety of secondary structural applications (eg. concrete curtain-wall panels), and lightweight concrete products (eg. urban furniture, countertops, etc.).

## Workshop #2 Continued

Techniques for constructing two kinds of fabric molds will be taught and explored: flexible fabric molds (where the product is produced directly from a flexible sheet) and rigidified fabric molds (where a fabric sheet, backed with GFRC, is made into a rigid mold). Participants will work in teams of two to produce the molds and the GFRC castings made from these molds. Workshop participants will receive the knowledge and experience they need to produce such molds and casts in their own work.

### REGISTRATION

Participants register using the registration form available at [umanitoba.ca/summer/Feature Programs/CAST-Workshops](http://umanitoba.ca/summer/Feature Programs/CAST-Workshops). Once a participant has approval, the registration and fee payment will be processed. Registration may be paid by cash, credit card (MasterCard or Visa), or cheque (payable to the University of Manitoba). Space is limited. Application deadline is **June 3, 2013**, but applications may be accepted after this date subject to space availability.

Fees: \$ 1,100 CAD + GST

### IMPORTANT NOTES:

- No food or refreshments provided – each participant is responsible for supplying their own food during the workshop.
- CSA Approved steel-toed footwear is required for work in the CAST Laboratory.
- In order to participate in the workshop(s), all participants must sign a Release and Indemnification form that outlines risk and shared responsibility associated with the workshop.

Inquiries about the workshop may be directed to Mark West at:  
[mark.west1@ad.umanitoba.ca](mailto:mark.west1@ad.umanitoba.ca) or **204-474-7427**.

For information on registration, fee payment, or accommodation contact Cheryl Hadaller at:  
[hadalle@ms.umanitoba.ca](mailto:hadalle@ms.umanitoba.ca) or 204-474-8008; toll free 1-888-216-7011 ext. 8008