



IC-IMPACTS

A Canadian Network of Centres of Excellence

Social Innovation *through* University- Industry-Community Partnerships

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IC-IMPACTS

- › An International **Network of Centres of Excellence** funded equally by Governments of **Canada** and **India**
- › The UBC-hosted **pan-Canadian, pan-Indian** Centre serves as a new model for international collaboration
- › **Scalable** in solving global problem
- › Total current **funding: \$60 million**



Partners & Collaborators

78 Academic Partners 99 Industry Partners 42 Government Partners 24 Community Partners



Our Network



FACULTY

STUDENTS

INDUSTRY

COMMUNITY





Core Research Areas



Safe & Sustainable Infrastructure

- Low-Carbon Materials
- Sensors
- Strengthening



Integrated Water Management

- Sensors
- Alternative Power Supplies
- Water Treatment Systems



Public Health

- Rapid Diagnostic Devices and Lab-on-chip Sensors
- Infectious and Water-borne Diseases
- Mobile Health Technologies



Integrated Water Management

- 3D printed pH and chlorine sensors for water
- Off-grid water treatment with zero energy
- ICT platform for water quality monitoring
- Optical sensors for E. coli in water





Public Health

- **Diagnostics** for emerging viral diseases such as **Dengue and West Nile virus**
- Engaging pharmacists to enhance **early detection of tuberculosis**
- Improving **child immunisation** services in India
- Developing **portable diagnostic** tools for detection of infectious diseases such as **HIV and malaria**





Safe and Sustainable Infrastructure

- **Alkali activated concrete** paver blocks constructed from bottom ash-fly ash
- **SHM protocols for railway bridges** and **heritage structures** (NDT, image processing, and Compton Scatter)
- **Nano-coatings** on fibers and rebar





Examples of Translating Research into Communities (Safe & Sustainable Infrastructure)

Self Healing Road, Thondebhavi



KRS Dam, Mysore



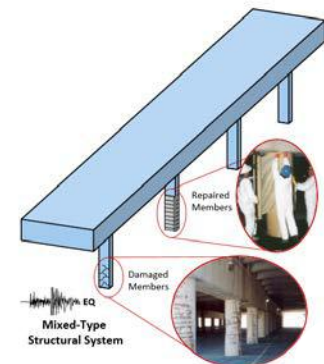
STF (Scrap Tire Fiber) Repair, UBC



Seismic Retrofit



GFRP Wraps on Bridge Columns, Toronto





Thondebhavi Self-Healing Concrete Rural Pavement Project

- India needs **2.4 million km of rural pavement**, this project saw the successful installment of **self-healing** road in Thondebhavi, India
- Reduce road thickness by 50% using high strength concrete with advanced **nano-modified hydrophilic fiber** system.
- Reduce **carbon footprint** by incorporating 50% flyash in concrete



Restoring Krishanraj Sagara Dam, Mysore



Krishanraj Sagar Dam, Mysore
Built 1924 Across River Kaveri
3.5 km long 38 m high
Total Capacity 49 Billion ft³



- › Collaborative project between U of Alberta, Archaeological Society of India and National Institute of Engineering, Mysore
- › Novel Nanolime Material for Repair



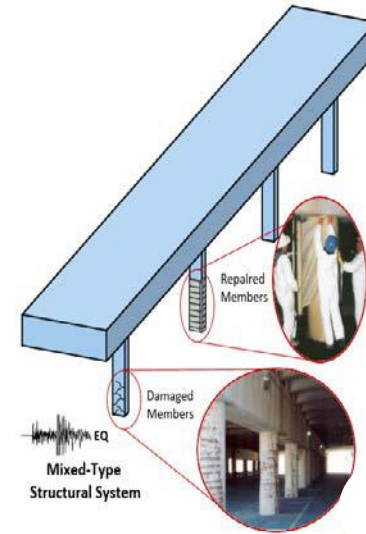
Scrap Tire Fiber (STF) in Concrete Repair Project at UBC

- **3 billion tires** produced every year, only 35% recycled!
- Developed a process for **extraction of fiber** from tires
- Placement at **MacMillan Building**, UBC
- **Sensors** monitoring performance



Sustainable Infrastructure Using Smart FRPs

- **Rehabilitate** and extend the life of **corroded columns** with Demonstrated on bridge on **Highway 401** in Toronto
- Results incorporated into **CSA Code S806** “Design and Construction of Buildings Components with Fibre-Reinforced Polymers”
- Extension to an **RO Plant in Roorkee, India**

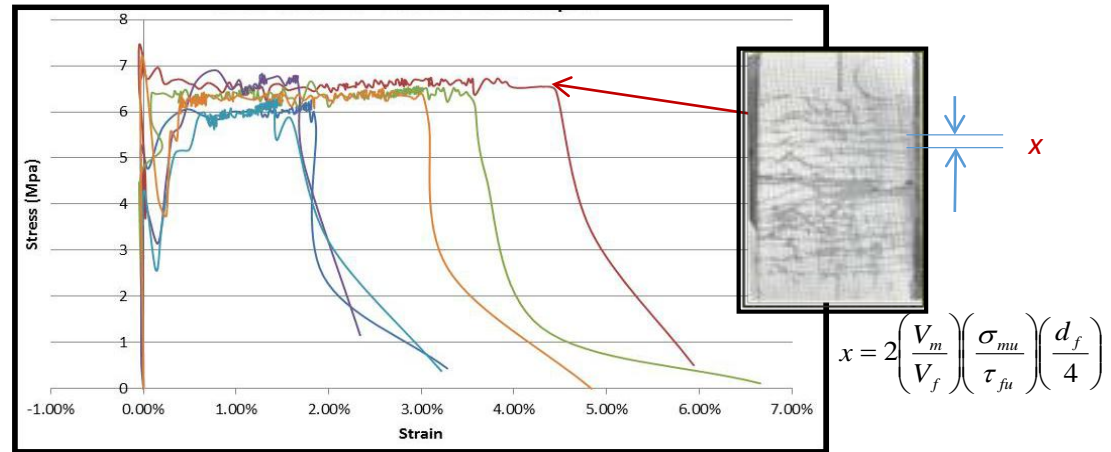
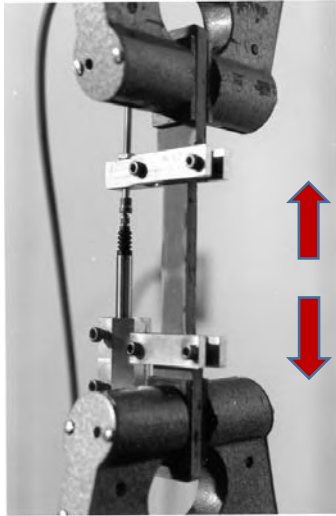


RO Plant in Roorkee, India

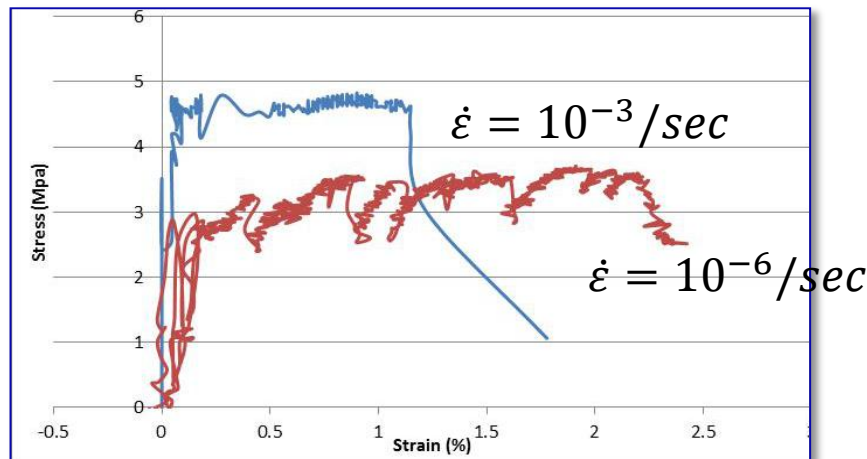


Fiber Reinforced Concrete: Eco-friendly Ductile Cementitious Composite (EDCC)

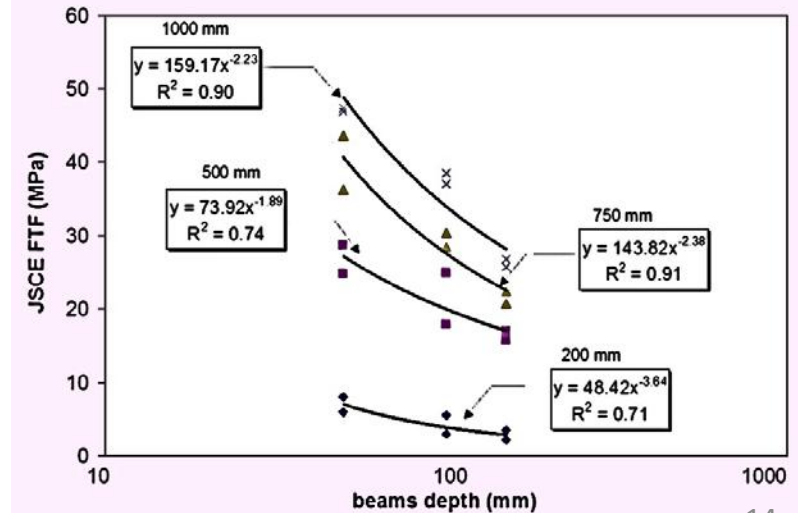
Quasi-Static $\dot{\epsilon}$ Response



$\dot{\epsilon}$ Associated with Earthquakes

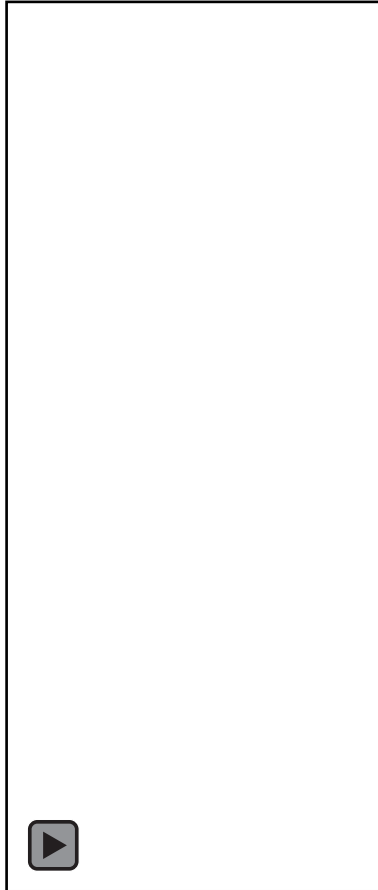


Size and Rate Effects





Translating Research: Eco-friendly Ductile Cementitious Composite (EDCC) for seismic upgrades on URM



Jamieson Elementary School, Deployment of Retrofit Material in 2017



Where is IC-IMPACTS Heading?



A new breed of entrepreneurs making discoveries for the global economy

Global Innovation, Commercialization and International Trade

Expansion to other countries ,
especially China, US and Mexico





Thank you!

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