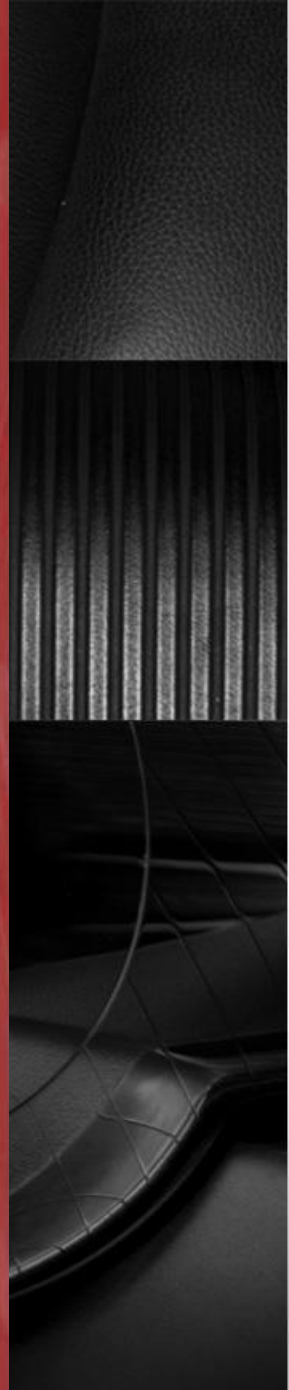


# CMER

Centre for Mining Equipment Research



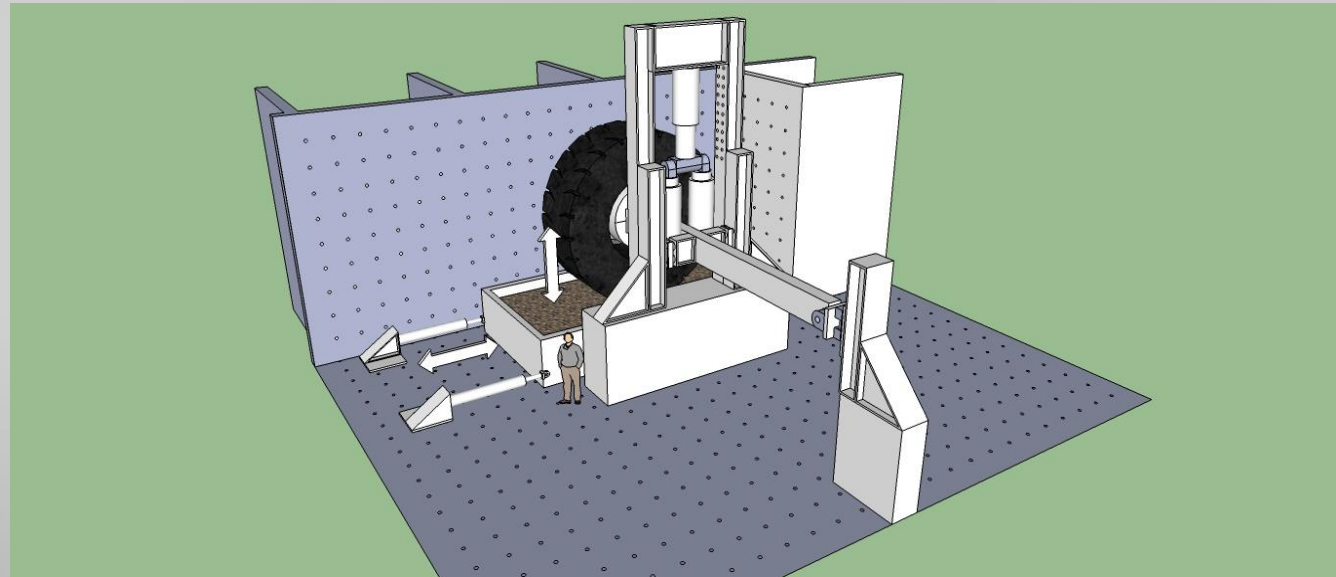


# Centre for Mining Equipment Research (CMER)

- a full-scale testing facility for world-class engineers and geophysicists
- Q: what happens when massive machines operating in extreme conditions are repeatedly subjected to stress?
- cross disciplinary research centre—mining and mechanical engineering, metallurgy, welding, structural engineering, construction and geophysics
- set new operational benchmarks and redesign the next generation of equipment and road surfaces for Canada's mining industry.
- equip a new generation of equipment-ground interaction specialists to apply the best practices discovered here to mining and other industries around the world.

# The CMER facility

- \$7.75-million in test equipment
- centrepiece is a custom-built 3.5 M lb cyclic load frame that will allow the testing of actual-size mining equipment at high g-levels
- located in an existing building, operated by C-FER Technologies, Edmonton, Alberta



# Facility tools

	Description	Purpose	Estimate
1	Custom built 3M lb, 0 Hz to 10 Hz cyclic testing frame	Testing (a) large-scale tire, rim, and suspension assemblies, (b) excavator or other track assemblies on simulated ground conditions; and (c) fatigue and abrasion testing.	\$4,000,000
2	Safety caging and protection systems	plus associated safety controls and precautionary systems for test configurations.	\$250,000
3	Preparation tooling: Water jet cutter Surface mill Laser hybrid system	Sample/surface preparation for testing in the test frame that mimics or improve on components in current industrial field use. Welding systems also used to investigate new techniques.	\$1,000,000
4	Surface strain cameras Laser ranging system	Instrumentation permits measurement of surface strains on three simultaneous surfaces of cyclically loaded components, permitting a 3D strain response record. Laser acquires larger surface changes	\$500,000
5	120+ channel data acquisition & tools	Data recording systems and associated instruments permitting common time stamped data acquisition in concert with test frame.	\$400,000
6	Inertia response triaxial accelerometers, sensors	Re-usable sensors feeding data in concert with item 4, and items 1-5 during cyclic loading conditions.	\$300,000
7	Custom-built railed geotechnical material test tank plus motion actuating system	Test bed to house running surface material, which can be run through item 1 which a component in item 1 cycles on the surface of the test bed contained geotechnical material.	\$400,000
8	Forklift/tire manipulator/front end loader tool	Large component manipulator to work with existing overhead crane infrastructure already in place at C-FER. Used to position and orient test samples in the test frame and move ground samples	\$350,000
9	72, 1 Hz to 250 Hz, geophones with data acquisition	Permits field ground response data acquisition due to equipment motion on test bed material (item 7) response to tire or track loading from item 1. Includes internal processing.	\$550,000
	Total		\$7,750,000



# The team

- 9 Principal Users + 1 business manager
- world leaders in mining equipment-ground interactions.
- substantial industry experience working with resource and equipment manufacturing companies.
- specifically with SMART mining companies and equipment manufacturers **now invited to participate**
- focal point for research on the performance of mining equipment.
- led by Dr. Tim Joseph

# The team

<b>Name</b>	<b>Position within CMER</b>	<b>Expertise</b>
<b>Tim Joseph</b>	Principal User & Director	Mining equipment operations and maintenance in the global mining and equipment manufacturing industry including Canadian oil sands
<b>Mike Lipsett</b>	Principal User	
<b>Doug Schmitt</b>	Principal User	
<b>Jozef Szymanski</b>	Principal User	
<b>Leijun Li</b>	Principal User	
<b>Patricio Mendez</b>	Principal User	Wear materials and metallurgical materials development
<b>John Nychka</b>	Principal User	
<b>Yasser Mohamed</b>	Principal User	Operational modeling development
<b>Ward Wilson</b>	Principal User	Geotechnical expert with extensive experience in the Canadian oil sands
<b>Brian Wagg</b>	C-FER liaison and business manager	Interface with the C-FER business operations group

# Expertise of the team

<b>skill</b>	<b>team members</b>
<b>Equipment/component design and performance</b>	Joseph, Szymanski, Lipsett
<b>Geotechnical/geophysical considerations</b>	Wilson, Schmitt
<b>Novel materials development and surface applications including new materials</b>	Li, Mendez, Nychka
<b>Modeling applications</b>	Mohamed



## 4 technical target areas

- designing next generation retrofits and mining equipment:
- equipment/component performance (including operator health issues);
- geomechanics and geophysics implications (new standards);
- materials performance; and
- Simulation tools for field use





# Initial projects

- Materials that provide improved wear resistance
- Flexible (fatigue rated) welding technology for joined structures, creating intelligent failure indicating structures.
- Complete picture of tire performance
- Road design profiles specific for dynamic loading conditions.
- Impact stability concerns for ultra-class excavators have been relatively ignored because their sheer size is thought to make them stable.
- Develop rapid dampening hydraulic systems that can better react to known adverse loading conditions, whether in application as suspension or power generation cylinders



# Invitation to SMART members

- Join the first CMER Council
- Letters of support “in principle” – to Tim Joseph by May 31.
- Set overall management decisions regarding research directions, priorities and specific project funding and operational assistance will be made by the CMER Council