The Flexcrevator:

An Improved Pit Emptying Technology with Trash Exclusion

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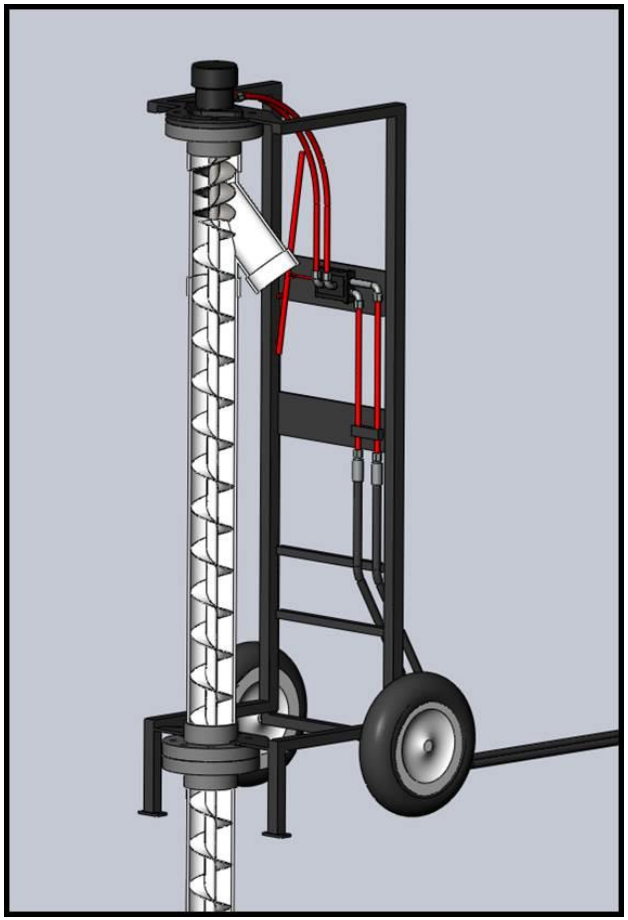
Background

Excrevator

- Auger based system for pit emptying
- Designed to handle dense sludge
- Testing in South Africa, India, and Malawi



Background

Excrevator

- Issues observed during field testing:
  - Rigidity of system made maneuvering within the pit difficult
  - System did not handle liquid sludge well
  - **Trash clogging the system**

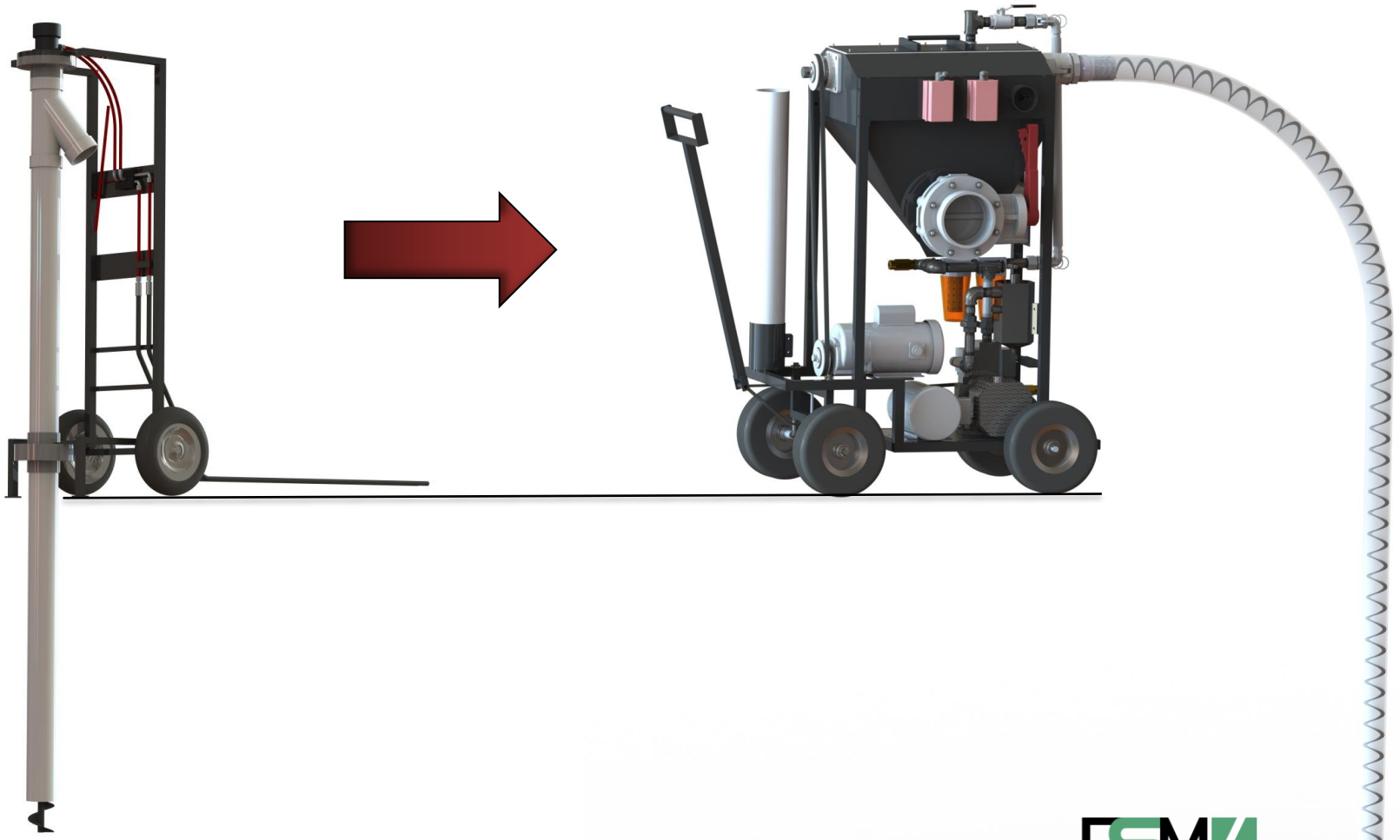
Background

Excrevator

Trash clogging the system

Excrevator → Flexcrevator

Design changes based on field testing



Flexcrevator

Design

- Vacuum system incorporated
  - 90 L tank
  - Pressure can be used for pit agitation
- Flexible, shaftless auger
  - Operated in reverse for trash rejection

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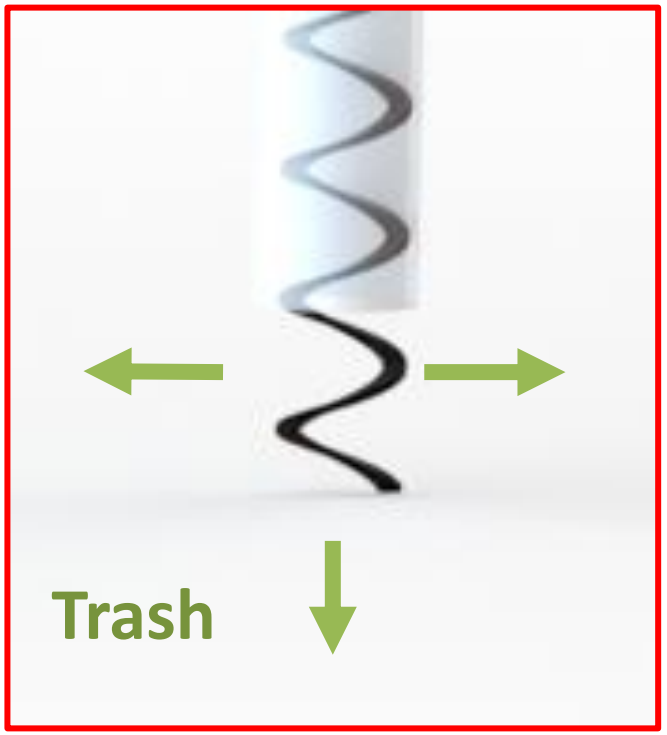

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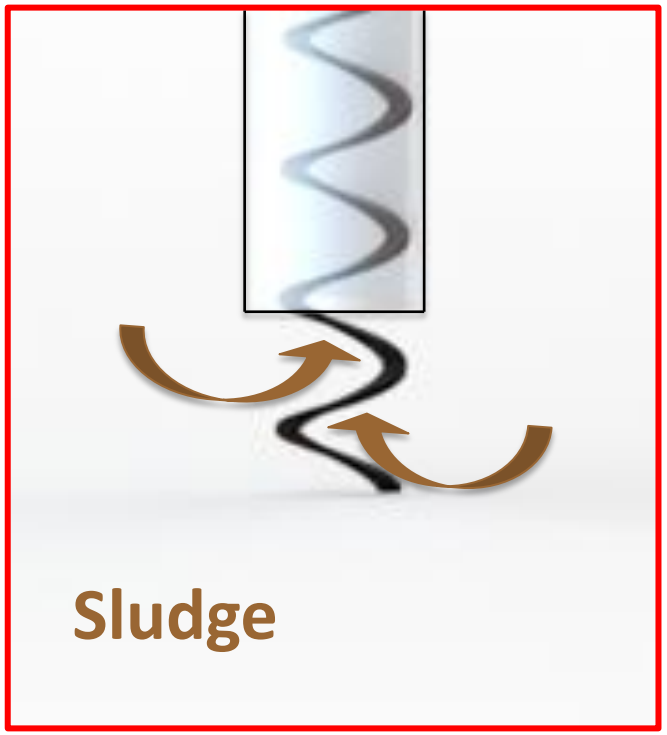


What to do with trash?

- Screen it
  - Will clog, needs high surface area
- Macerate it
  - Needs high rotational speeds, high energy
- “Fluidization and Fishing”

What to do with trash?

Fluidization and “Fishing”

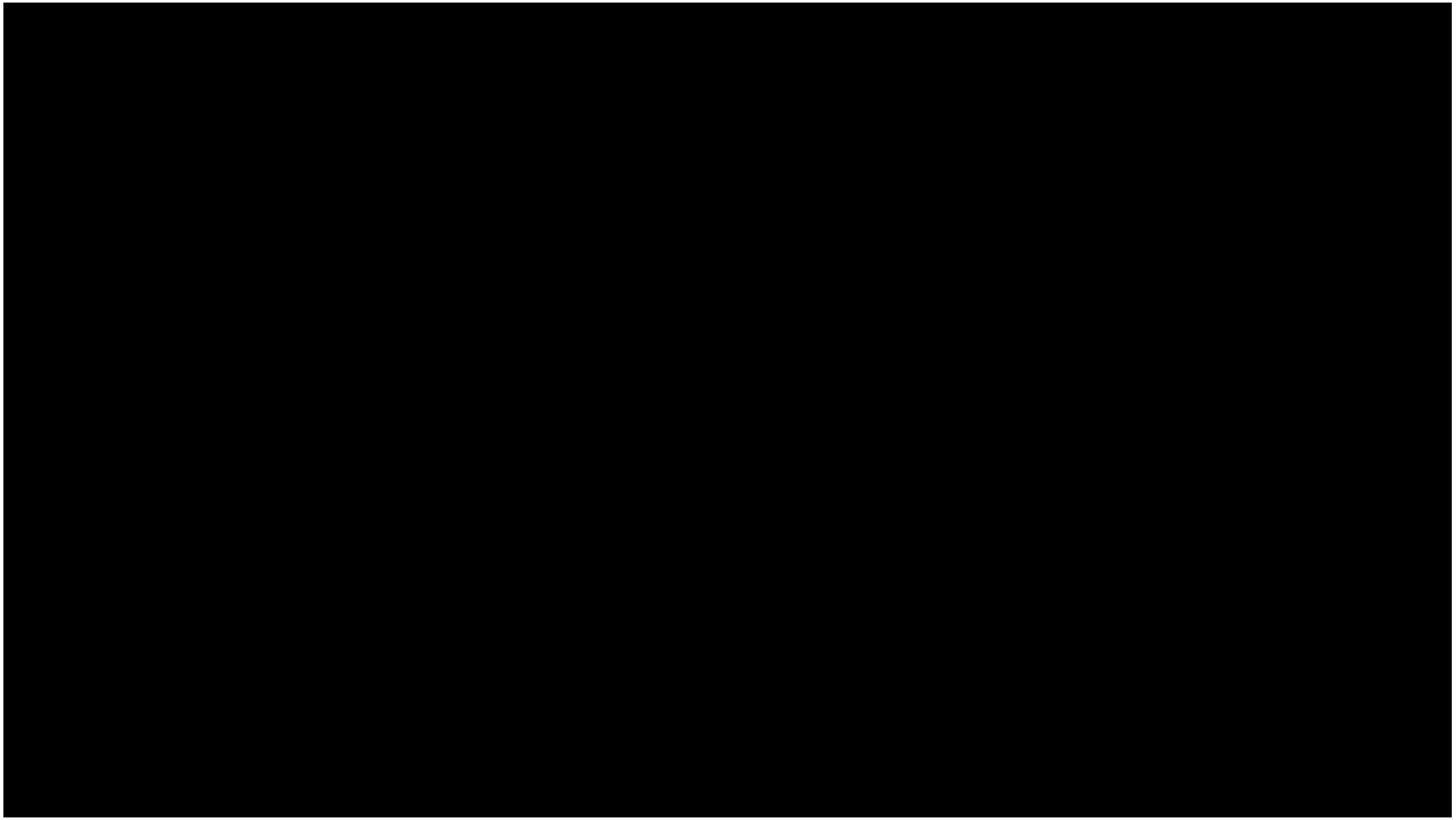
A new way of dealing with trash

TRASH EXCLUSION

- Makes sense to leave trash behind!
  - Contract is typically just for FS, not trash
  - Possible new ways to do business
  - Incentive for behavioral change
- More efficient emptying process
  - Eliminates fishing, possibly also fluidization
- Closed system from pit to transfer tank
- Source separation of sludge and trash
  - Easier downstream treatment

Trash Exclusion

Video?



Flex-X

Flexcrevator Extension- to any vacuum system

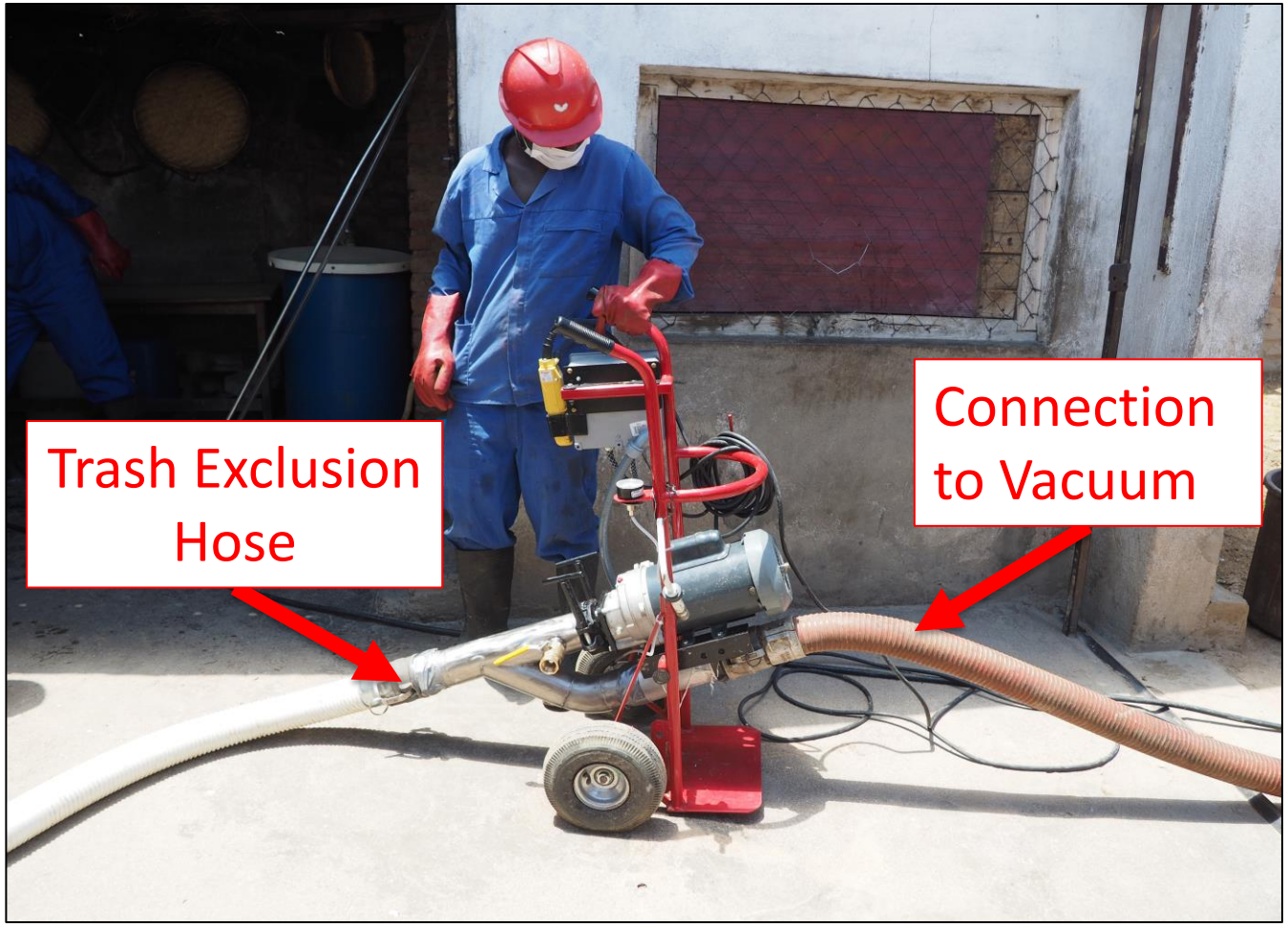
Complementary to vacuum technologies

Flex-X

Provides trash exclusion

Flex-X

Provides trash exclusion



Flex-X

Small mobile unit

Flexcrevator

Field Testing

- Hyderabad, India August 2016
- 10 Train toilets- Indian railways
- Old method – take apart entire toilet

Flexcrevator

Field Testing

- Hyderabad, India
  August 2016

- Flexcrevator
  - 15 minutes

Flexcrevator

Field Testing

- 8 pour flush latrines
  - With vacuum and auger for trash rejection
- Maximum flow rate observed of 3 L/s

Flexcrevator

Field Testing of Pour Flush Latrines

Flexible hose and auger provided maneuverability

Flexcrevator

Field Testing of Pour Flush Latrines

No trash entered the system

Flex-X

Field Testing

- Blantyre, Malawi
  - Dec 2016, Feb 2017
- Tested with ROM vacuum system
- 12 Pit latrines

Flex-X

Field Testing

Flex-X

Field Testing

- Only one clog after adjustments
- Comparable flow rates with liquid sludge
- Drop off in flow rates with thicker sludge
- Time-motion study ongoing, comparison with old approach

Summary

- Trash exclusion – a new way of dealing with trash
  - can provide several benefits
- Field Testing in India and Malawi have shown positive results
- Optimization and subsequent field testing in spring 2017

Next Steps

Flexcrevator

- Reduce weight
- Increase maneuverability of equipment to the pit side

Flex-X

- More work into Flexible shaft
- Trash rejection head development

Commercialization

Thank you!

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