

## Engineering solutions in agriculture

# Soil compaction

***How do engineers and farmers attempt to solve the problem of soil compaction?***

### Task

Design a solution to compare the soil compaction of different wheels/tracks on soil compaction.

*Why is soil compaction significant to a farmer?*

- *How can we show soil compaction?*
- *What are the variables that can affect soil compaction?*

*How can engineers answer the call to prevent soil compaction and still meet the needs of the farmer?*

- *How can we engineer a solution around the problem?*
- *How do we use models to represent real world scenarios?*
- *What are the limitations of using models?*

### Background

If you take a look at the equipment farmers use (tractors, combines, planters, etc), one word comes to mind: BIG! Those big machines are heavy and exert a lot of force on the ground. The soil is a farmer's best resource, so it is unfortunate that these machines compact the soil with their weight and the number of times they travel across the field.

Tractors are comprised of many moving parts with an incredible amount of engineering in the engine, transmission, hitch and the wheels/tracks. In this design exercise we are assuming that all things are constant except for the wheels/tracks. The size and orientation of the wheels/tracks are specific to the needs of the farmer and the conditions of the fields they are operating in.

### Materials

Topsoil  
Bins for soil  
Makeblock robot with different options for wheels/tracks  
Screwdriver

### Reflection

1. What other design solutions might help address the needs of farmers?
  
  
  
  
  
  
  
  
  
  
2. What are some other ways that farmers might reduce soil compaction?

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## Reflection

1. How can equipment manufacturers reduce the effect of the weight of a machine on the compaction of the soil?
2. Which tread does a better job of reducing soil compaction?
3. How can we measure soil compaction?
4. How do soil types affect the choice of tractor and wheels/track choice?
5. How do the conditions in the field influence the choice by the farmer?
6. How does the task that is being performed influence the farmer?
7. Does the choice of tillage or no-till practice influence the choice of the farmer?