

# Static Stability Tilt Test

Millbrook Proving Ground Ltd.	
Project	VG348-001-01
Datapak	MBK16/0229
Test Date	26th February 2016
Issue Date	29th February 2016



## Test Vehicle Details

<b>Vehicle Make:</b>	Scarab
<b>Vehicle Model:</b>	MCS 2500
<b>Vehicle Identification No.:</b>	258010357
<b>Total Permissible Mass (kg):</b>	8 040
<b>Permissible Front Axle Load (kg):</b>	4 000
<b>Permissible Rear Axle Load (kg):</b>	5 000
<b>Tyre Make and Model:</b>	Continental Contract AC70G
<b>Tyre Size:</b>	425/55 R17 MPT
<b>Tyre Pressures (psi):</b>	40
<b>Camera Boom Arm:</b>	Alpha Grip SuperTechno 50
<b>Vehicle Test Load:</b>	75 kg Driver, 75 kg Passenger
<b>Vehicle Test Setup:</b>	Neutral, Park Brake OFF



Figure 1 - Test Vehicle



Figure 2 - VIN Plate

## Result Overview

Configuration	Configuration Description	Result
1	Crane column straight, 896 kg weight on crane	20.5°
2	Crane column leant over, 896 kg weight on crane	29.2°
3	Crane column straight, no weights on crane	30.7°
4	Crane column leant over, no weights on crane	36.1°
5	Crane column straight, 896 kg weight in stowage	34.7°
6	Crane column leant over, 896 kg weight in stowage	38.2°

Issue No.	Effective Date:	MBK16/0229
1	29th February 2016	Page 1 of 6



## Tilt Test Results

### Configuration 1

Crane column straight vertically.  
28x 16 kg weights located on each side of crane.

RH Tilt Test	Rear Wheel Lift (°)
Platform	20.5
Body Front	21.1
Body Rear	22.5



Figure 3 - Config. 1, Front View, 20.5° Platform



Figure 4 - Config. 1, Rear View, 20.5° Platform

### Configuration 2

Crane column leant away from tilt, at maximum.  
28x 16 kg weights located on each side of crane.

RH Tilt Test	Rear Wheel Lift (°)
Platform	29.2
Body Front	29.9
Body Rear	31.7



Figure 5 - Config. 2, Front View, 29.2° Platform



Figure 6 - Config. 2, Rear View, 29.2° Platform

## Tilt Test Results

### Configuration 3

Crane column straight vertically.  
No weights on crane.

RH Tilt Test	Rear Wheel Lift (°)
Platform	30.7
Body Front	31.7
Body Rear	32.6

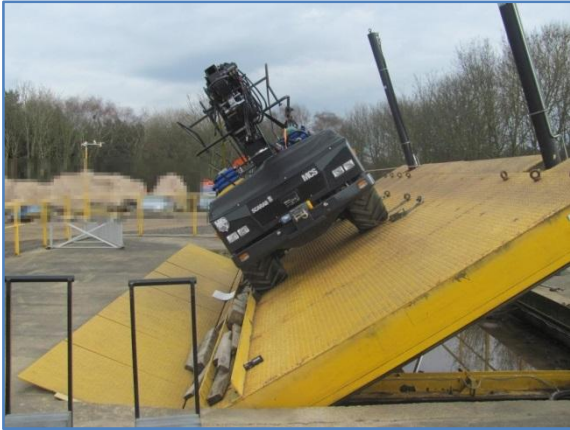


Figure 7 - Config. 3, Front View, 30.7° Platform

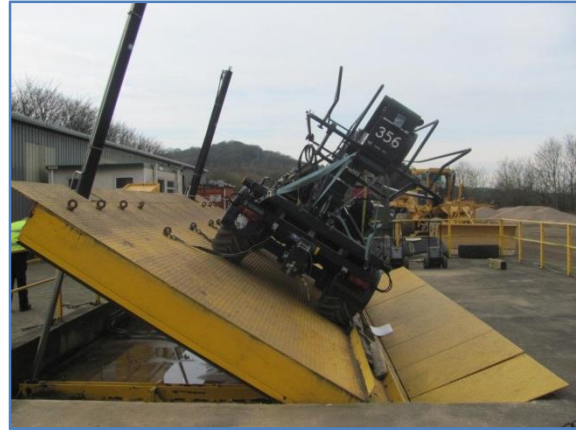


Figure 8 - Config. 3, Rear View, 30.7° Platform

### Configuration 4

Crane column leant away from tilt, at maximum.  
No weights on crane.

RH Tilt Test	Rear Wheel Lift (°)
Platform	36.1
Body Front	37.1
Body Rear	37.6



Figure 9 - Config. 4, Front View, 36.1° Platform



Figure 10 - Config. 4, Rear View, 36.1° Platform

## Tilt Test Results

### Configuration 5

Crane column straight vertically.  
All weights (896 kg) in stowage above rear axle.

RH Tilt Test	Rear Wheel Lift (°)
Platform	34.7
Body Front	35.7
Body Rear	36.5



Figure 11 - Config. 5, Front View, 34.7° Platform

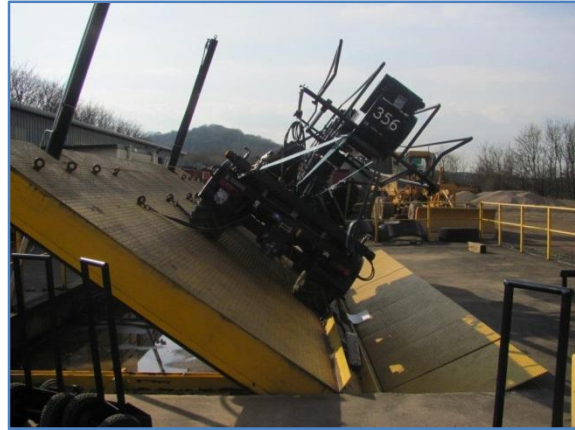


Figure 12 - Config. 5, Rear View, 34.7° Platform

### Configuration 6

Crane column leant away from tilt, at maximum.  
All weights (896 kg) in stowage above rear axle.

RH Tilt Test	Rear Wheel Lift (°)
Platform	38.2
Body Front	39.1
Body Rear	39.8



Figure 13 - Config. 6, Front View, 38.2° Platform



Figure 14 - Config. 6, Rear View, 38.2° Platform

## Conclusions

Tilting the crane column away from the direction of tilt resulted in an increase in rear wheel lift angle of 8.7 degrees with the weights attached to the crane, and by 5.4 degrees without the weights.

Removing the weights attached to the crane resulted in an increase in rear wheel lift angle of 10.2 degrees with the crane column straight, and by 6.2 degrees with the crane column leant over at its maximum away from the direction of tilt.

Moving all weight from the crane into stowage boxes above the rear axle resulting in an increase in rear wheel lift angle of 14.2 degrees with the crane column straight, and by 9.0 degrees with the crane column leant over at its maximum away from the direction of tilt.

An overall increase in rear wheel lift angle of 17.7 degrees was achieved as a result of moving weight from the crane into the rear stowage lockers, and tilting the crane column away from the angle of tilt.

*During all tests, the rear wheel was the only one to lift. The vehicle was articulated between the front and rear axles, and as a result when the rear axle lifted, it was not held down by the front wheels, so all platform angles referred to as "rear wheel lift" should also be considered as the vehicle's roll over angle.*

## Recommendation

Millbrook would recommend that the weights are removed from the crane and placed within the rear stowage lockers, and that the crane is tilted away from the angle of tilt, whenever the vehicle is traversing a side slope.

It is not possible for Millbrook to recommend safe operating conditions for the vehicle, as all tests have been conducted statically. However, a suitable safety factor should be incorporated when determining the safe operating conditions of the vehicle.