

Less periodical braking tests  
with loads  
Verringerung der Bremsproben  
mit Ballast

OITAF seminar April 2015, Innsbruck



# Presentation overview

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- Regulation for the brake tests (dynamic tests)
- Difficulties for the braking tests
- Solution, simulate the loads during the test - Zenis
- Presentation of the solution – Zenis
- Benefits of this solution – Zenis

# Regulation

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❑ European standard EN 1709

Pre commissioning inspection, maintenance, operational inspection and tests »

## 6.3.5 Annual inspections

- b) visual check and operating tests of each individual brake under the various load conditions (including maximum load) and in each of the different modes of triggering mechanism and drive, with the results obtained being recorded. In the case of ski-tows, this inspection shall be carried out on an unloaded installation;

# Regulation

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☐ American code                      ANSI B77.1a

## 3.3 Operation and maintenance

### 3.3.4.1 General inspection

Each aerial lift shall be inspected annually, or after each 2000 hours of operation, whichever comes first, by an aerial lift specialist independent of the owner. The inspection shall verify preservation of original design integrity and cover the requirements of this standard for maintenance, operation, required self-inspections, and record keeping. Items found either deficient or in noncompliance shall be noted. A report signed by the specialist shall be filed with the owner.

### 3.3.4.4 Dynamic testing

Dynamic testing shall be performed at intervals not exceeding seven (7) years.

A written schedule for systematic dynamic testing shall be developed and followed. The owner shall provide experienced personnel to develop and conduct the dynamic test. The schedule shall establish specific frequencies and conditions for dynamic testing. The testing shall simulate or duplicate inertial loadings. The test load shall be equivalent to the design live load. The results of the testing shall be documented in the maintenance log.

# Regulation

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- ❑ French configuration code                      RM1 operation and maintenance

“Dynamic braking tests (service and safety brakes) **annually** for all the operation loads of the lift in order to check the decelerations. They must be compliant with the limits of the code. This dynamic braking test must be done with the vehicle loads or an other solution which is qualified.”

# Difficulties for the braking tests

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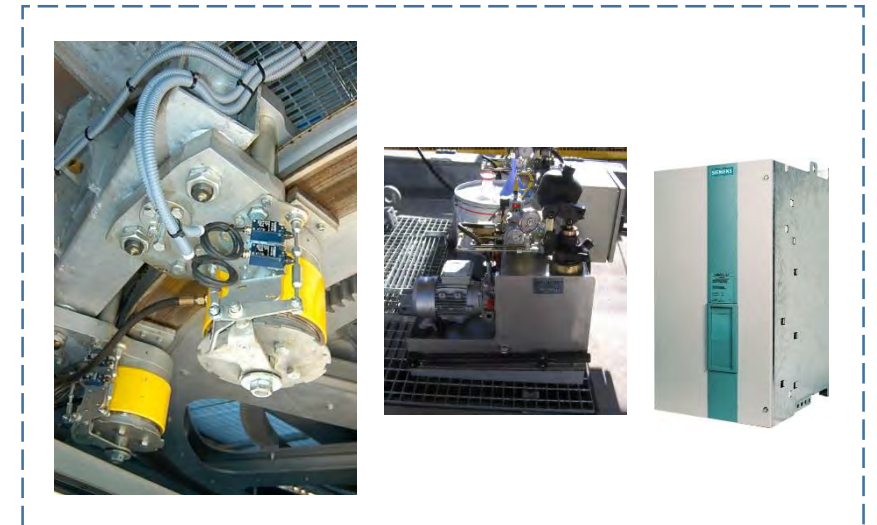
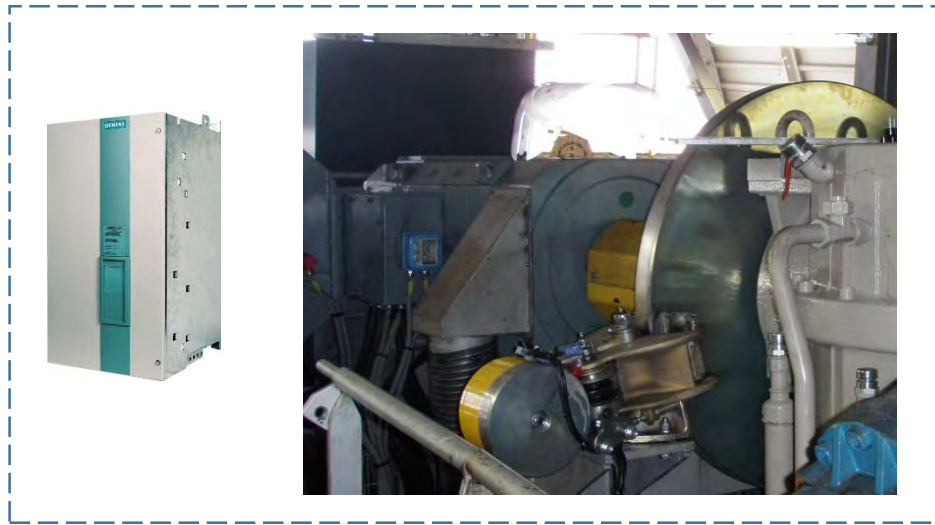
# Solution, simulate the loads during the test - Zenis

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## □ The goal

Check the capacity of the braking system of the lift (dynamic and static).

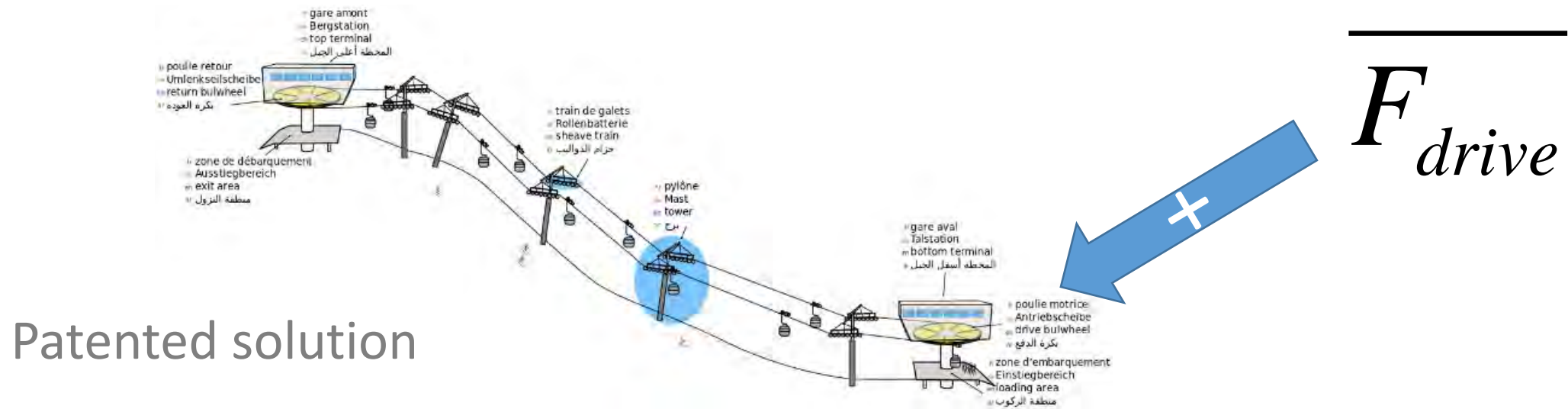
*Service and safety brake*



# Solution, simulate the loads during the test - Zenis

## □ Definition

The dynamic braking tests for the lift is realized in simulating the loads in the vehicles (lift without loads). The simulation of the loads is generated by the drive unit (force). This force “F drive” is determined during the commissioning.





# Presentation of the solution - Zenis

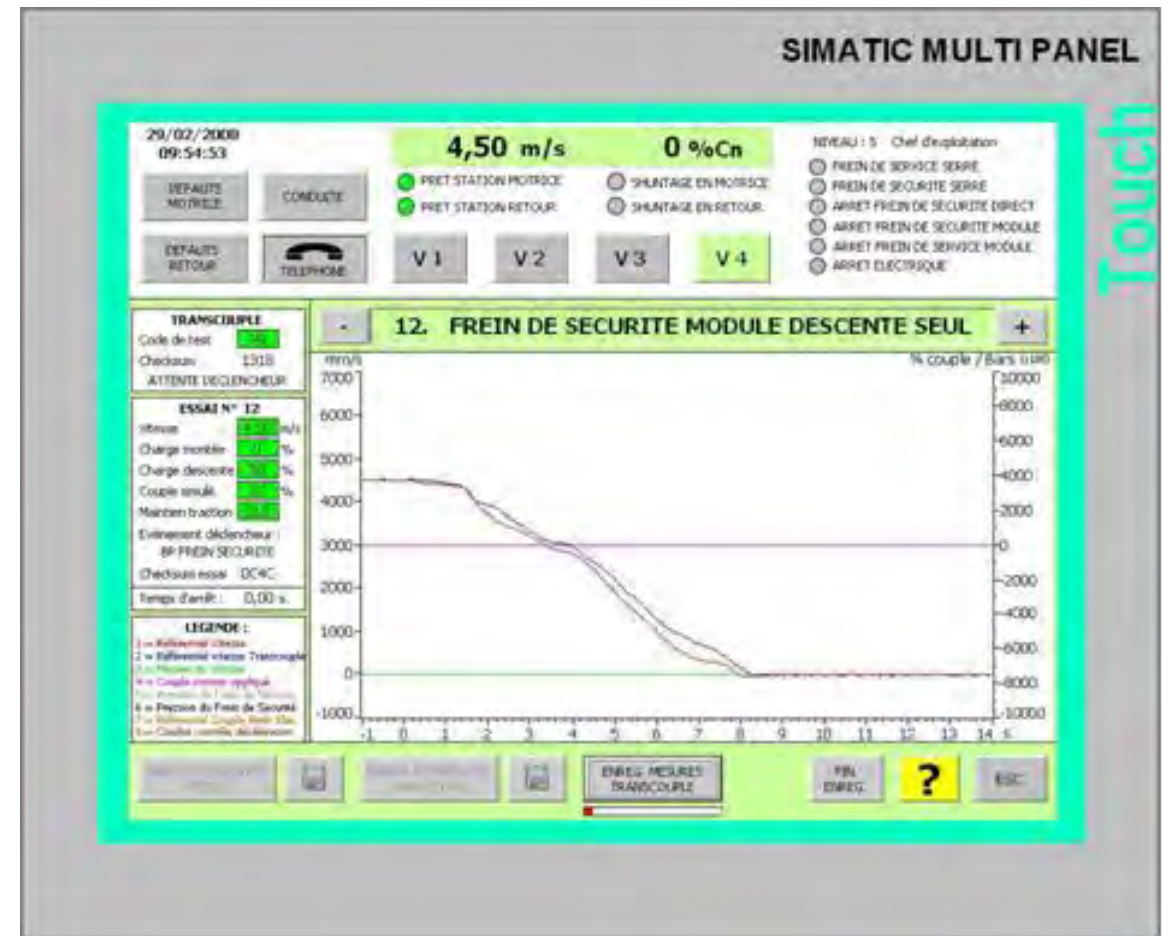
## Step 1 Zenis configuration

For each operation load of the lift and type of stop (service brake, safety brake, inertia), recording

$$\text{Speed} = v(t)$$

$$P_{\text{brake}} = v(t)$$

Vehicles loaded on the lift



Example curve (stop with safety brake)

# Presentation of the solution - Zenis

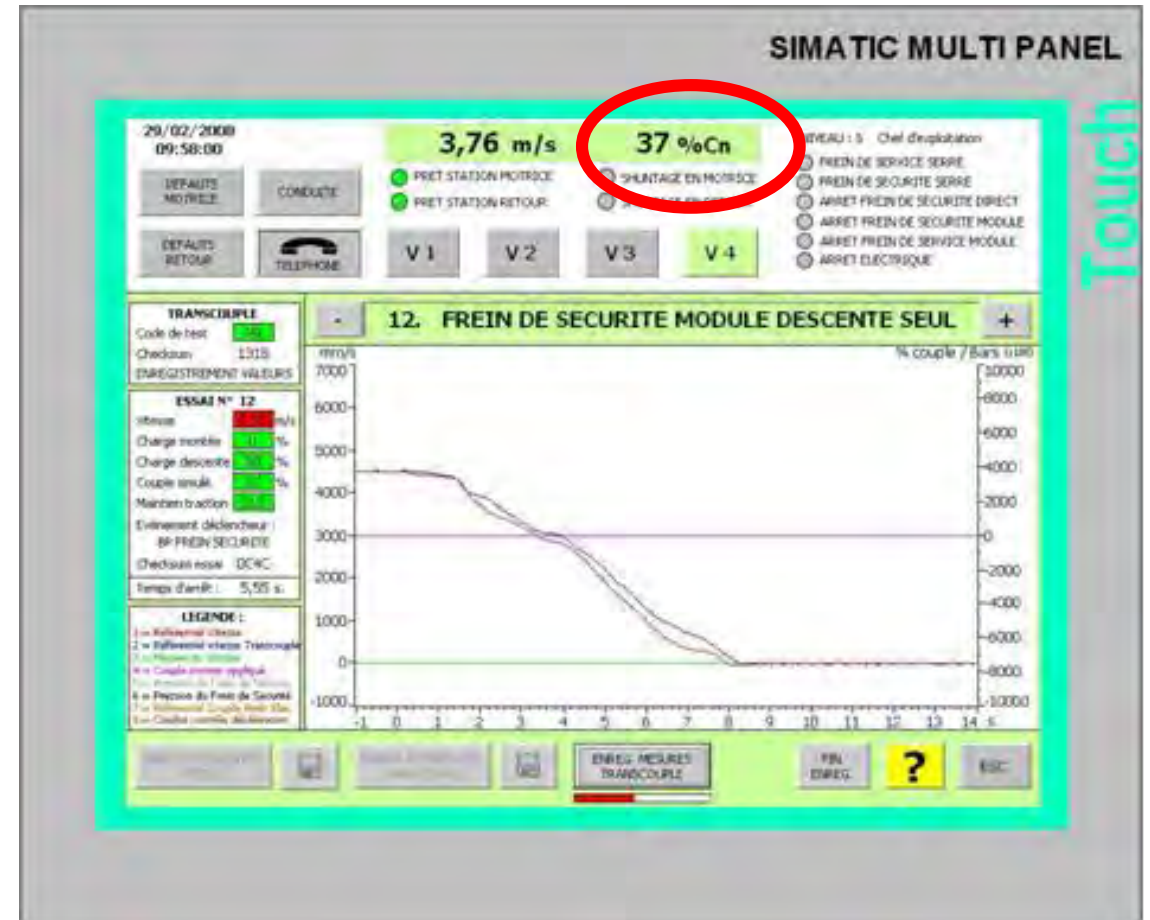
## Step 2 Zenis configuration

Use the set “speed =  $v(t)$ ” for each operation load of the lift and type of stop (service brake, safety brake, inertia), recording

F drive =  $v$  (time)

P brake =  $v$  (time)

Vehicle unloaded on the lift



Example curve (safety brake) “F drive” recording

# Presentation of the solution - Zenis

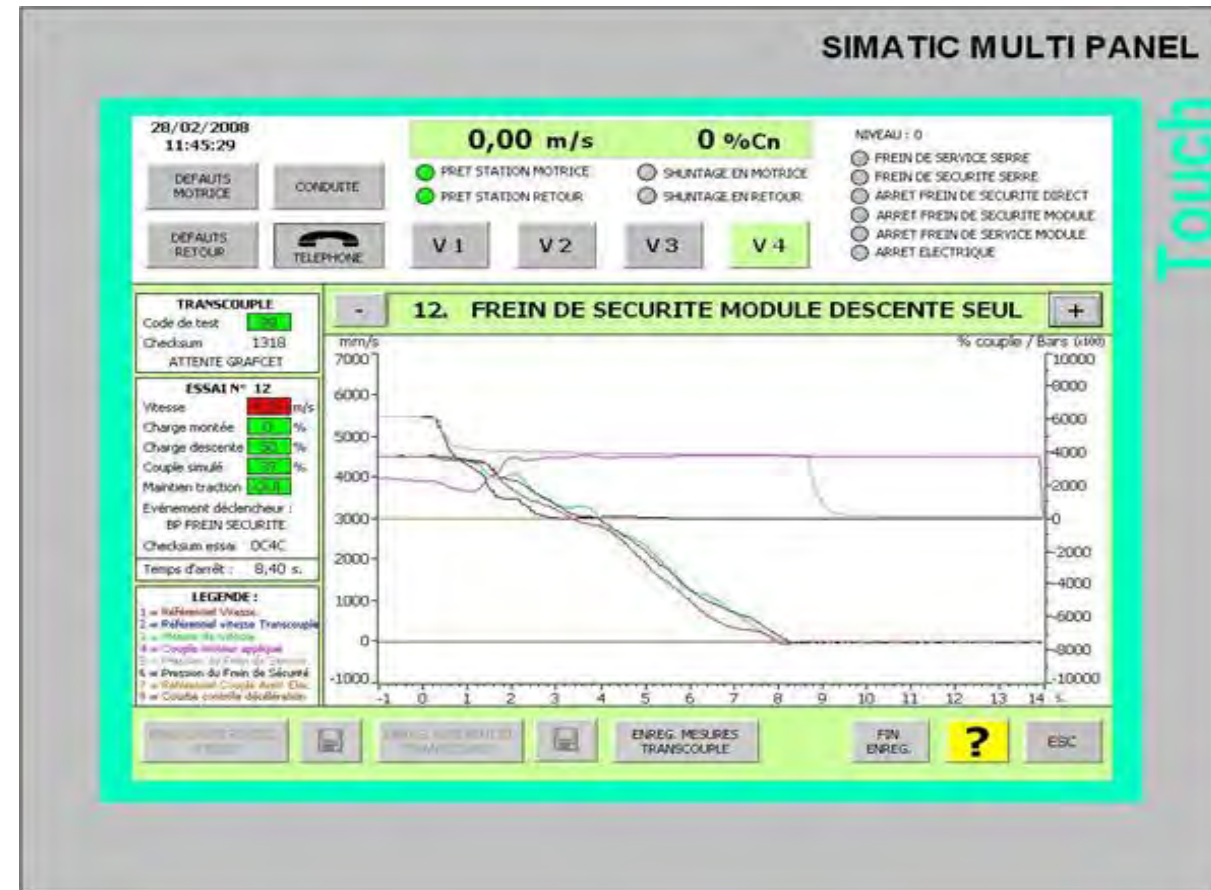
## Step 3 Zenis configuration

Use the set “F drive = f(t)” for each operation load of the lift and type of stop (service brake, safety brake, inertia), recording

Speed = v (time)

P brake = v (time)

Vehicle unloaded on the lift



Example curve (safety brake)

# Presentation of the solution - Zenis

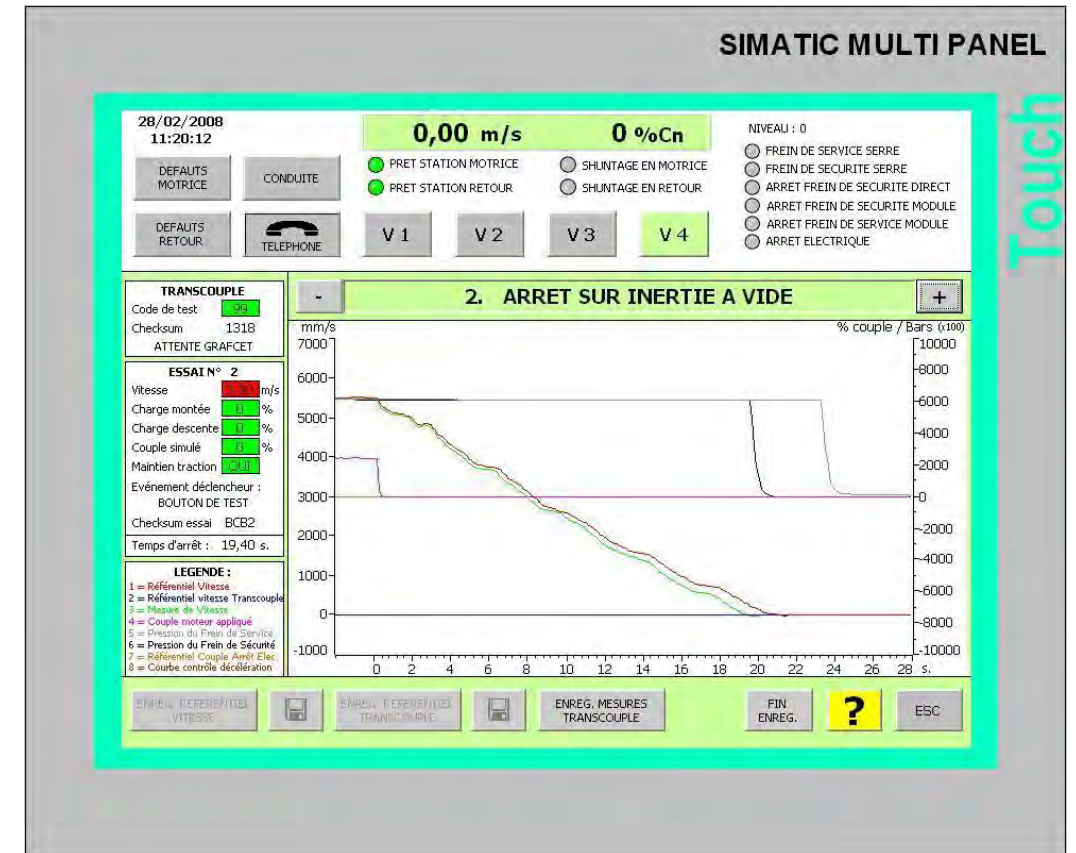
## Step 4 Zenis validity

For the empty load case (without “F drive”) realize the stops with inertia and electrical motor,

$$\text{Speed} = v(\text{time})$$

$$P_{\text{brake}} = v(\text{time})$$

Comparison with the references and check if modification on software, inertia or drive unit.



Example curve (stop on inertia)



# Presentation of the solution - Zenis

## Step 4 Braking test

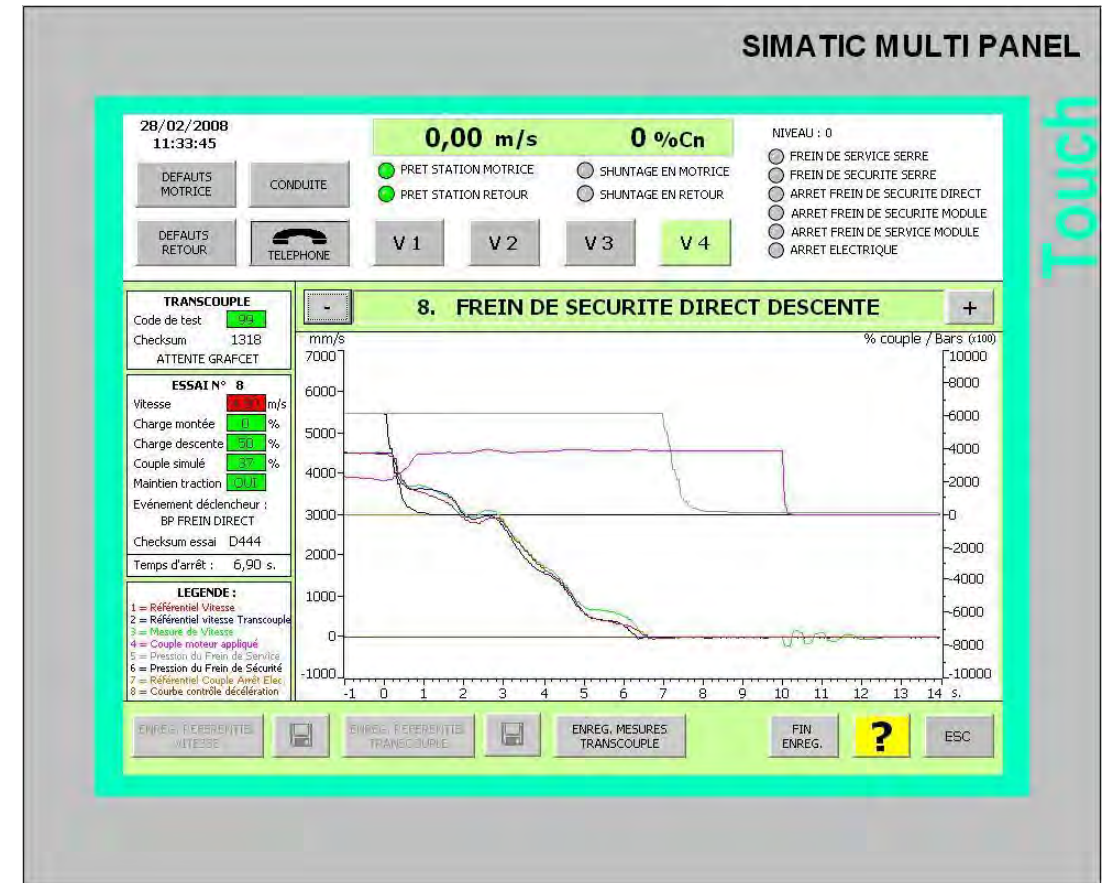
Use the set “F drive = v (time)” to realize the different stops (service brake, emergency brake and inertia), recording

Speed = v (time)

P brake = v (time)

Vehicle unloaded on the lift

In comparison with the reference curves adjust the brakes (service and / or safety) if necessary.



Example curve (stop with safety brake)

# Benefits - Zenis

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- Less time during the periodical braking tests (annual test)
- More safety for the maintenance operator (OHSAS 18001)
- Possibility to use the same loads for different lifts
- Check the brakes capacity when modification during the operation period



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