New Holland NH$^{Drive™}$ Concept Autonomous Tractor

Based on current production New Holland T8 Auto Command tractor

Model shown in the video is a T8.410

Engine	8.7 liter FPT Industrial Cursor 9 engine
PTO power	290hp (216kW)
Rated power	340hp (250kW)
Maximum Engine Power Management power	409hp (301kW)
Maximum torque	1,328lbf (1800Nm) @ 1300-1400rpm
Transmission	Auto Command™ Continuously Variable Transmission
Minimum speed	0.018mph (0.03kph)
Maximum speed	31mph (50kph)
Maximum rear lift capacity	24,090lbs (10,927kg)
Number of hydraulic remotes	Six

NH$^{Drive™}$ Autonomous control systems

Base server connects to the tractor and portable control interface and transmits and receives all operating data, including path planning activities and modifications to tractor and implement parameters using the communication network.

Machine functionality is controlled through a variety of sensors which automatically govern

- Ignition (engine start and stop)
- Acceleration and deceleration
- Engine speed (rpm)
- Steering angle
- Transmission controls. The concept T8.410 tractor features a continuously variable transmission. The autonomous technology is also able to control a Full-Powershift transmission
- Rear linkage raise/lower and engagement of the rear PTO
- Front linkage raise/lower and engagement of the front PTO
- Front and rear hydraulic remote extend-retract-float functionality
- Engagement of the locking differentials
- Horn operation

The NH$^{Drive™}$ autonomous tractor can be controlled via

- Desktop computer
- Portable tablet interface, which can be mounted in another vehicle's cab to enable supervised autonomous activities or used as a standard tablet wherever the operator is.

The interactive user interface enables the operator to modify various implement parameters. In the case of the seeder used in conjunction with the concept tractor these included those parameters contained within the ISO Implement Communication Bus, for example

- Product application control– which starts and stops seed and fertilizer application when working in the field (when conducting headland turns for example)
- Section control monitoring
- Seed rate– the quantity of seed planted per acre
- Air drill fan rpm feedback
- Product blockage monitoring
- Air drill down pressure
- Variable Rate Application via user defined prescription

Critical notifier function on user interface alerts when

- Operating parameters become critical
    - Low fuel
    - Low input (seed, fertilizer etc.)
    - Wheel slip – defined threshold to ensure optimal traction is maintained
- Operating issues such as warning codes
- Invalid GPS position
- Off-path error (when the vehicle deviates a pre-defined distance from the planned path)
- Communication between the vehicle and the base station is lost

Sensing and perception

The sensing and perception technology integrated into the NH^{Drive} autonomous concept to enable obstacle detection activities includes

- LiDAR sensors use range finding laser technology to create a 3D point cloud in front of the tractor and across the entire implement width. As LiDAR does not use visible light, their operation remains unaltered day/night.
- An array of radars is mounted to the front of the tractor which detect objects containing water/metal which reflect the energy back. As radar does not use visible light, their operation remains unaltered day/night and in dusty conditions.
- Forward and rearward facing RGB cameras which provide a live video feed to the operating interface.

The tractor initiates the stopping sequence when an unidentified obstacle is detected within a sensing range. The tractor then either awaits further instruction from the user interface, or if in the instance of an obstacle being subsequently removed from its path, as in the case of a vehicle, the tractor can automatically restart itself, if that setting has been selected.