

APPLICATION NOTE

QuickStick 100 Startup using Moving Paths

Purpose

The purpose of this document is to provide methods to implement a startup sequence using Moving Paths in a MagneMotion QuickStick 100 (QS100) system.

Introduction

During startup in QS100 applications, vehicles are required to move to locate while still accounting for collision avoidance. In some instances, startup may fail due to unavailable space in the Path for vehicles to locate. This document presents a method to utilize the Moving Path Node to increase available space required for startup.

Moving Path Node Overview

A Moving Path Node allows the user to temporarily link two Path ends together in a system. The moving Paths are moved by the user, and the user's Host program can then initiate a link request to the MagneMotion system when the Paths are aligned.

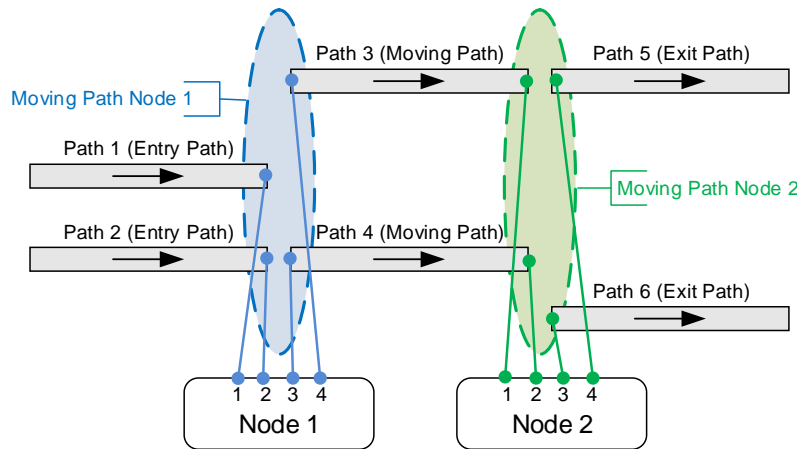


Figure 1: QS100 system with Moving Path Nodes

A Moving Path Node connects the downstream Path ends of one set of Paths (the entry Paths) to the upstream Path ends of another set of Paths (the exit Paths). An external system controls the movement and positioning of the moving Paths. Figure 1 shows a QS100 system with Moving Path Nodes. Path 3 and Path 4 are the moving Paths that can be aligned and linked to the entry or

exit Paths. The moving Paths can be controlled with QS100 technology or with an external actuation system that controls the movement and positioning of the moving Paths.

Linking and Unlinking Moving Path Junctions

When two Path ends are linked to form a junction, motor-to-motor messages are forward by the Node Controller to allow vehicles to navigate the junction. When two Paths are linked, the Node functions as a Relay Node. This allows vehicles to startup across the Node. Vehicles on unlinked Paths wait for permission to enter the Node. Figure 2 show Path 2 and Path 3 linked, while Path 1 is unlinked. Any vehicle on Path 1 would wait for a linked Path before it can proceed. As Path 2 and Path 3 are linked, vehicles can move through the Node.

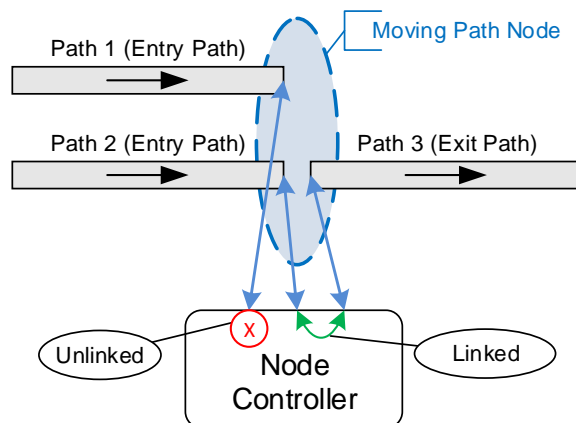


Figure 2: Linked and Unlinked Moving Path Junctions

Entry Gates and Clearance Distance

A Moving Path Node has two configurable parameters that dictate when a vehicle is allowed to move across the Moving Path junction. Figure 3 shows the location of the entry gate and clearance distance parameters. They work together to ensure vehicles are clear of any drive mechanisms or rotating moving Paths to prevent vehicle collisions. A vehicle will wait behind the entry gate until the Node Controller grants permission to enter the Node. Once the vehicle traverses the junction, it must move past the clearance distance. This ensures the Node is free, and a new vehicle can move through. The minimum entry gate and clearance distance is 31 mm from the edge of the motor.

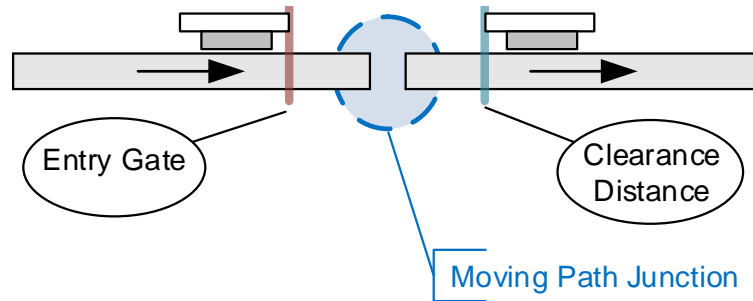


Figure 3: Location of Entry Gate and Clearance Distance relative to a Moving Path Junction

QuickStick Startup

Vehicles in a QuickStick 100 system are required to move to locate. Figure 4 describes the steps involved in the startup sequence for a QS100 system. The distance required to move will depend on the vehicle location, vehicle length and magnet array length. If there is not enough room to locate, previously located vehicles are “pushed” one motor block to create space for a new vehicle to locate. Startup will first attempt to locate vehicles by moving them in the downstream direction. If there is not enough room, the process will attempt to move vehicles in the upstream direction. This will continue until all vehicles are located or fail when there is not enough room to locate a vehicle.

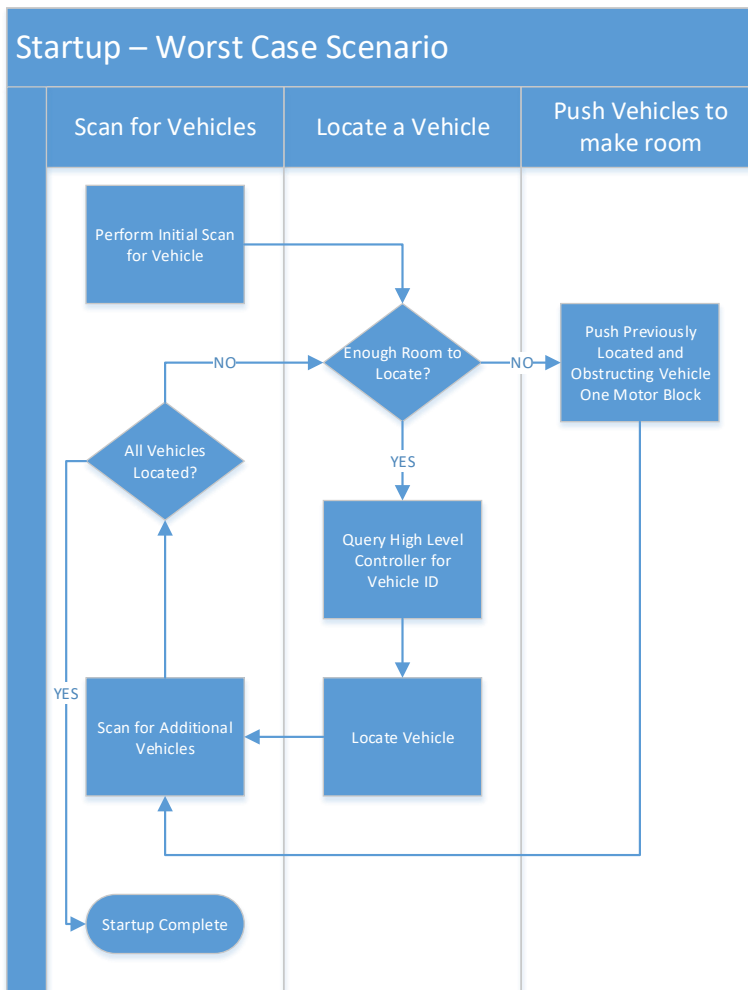


Figure 4: Startup Sequence

Moving Path Startup

For QS100 systems with the Moving Path Node that fail to startup, the moving Paths can be used to assist neighboring fixed Paths for startup. This will increase the available number of blocks used for startup. Figure 5 explains the startup routine and how it should be implemented with Moving Paths.

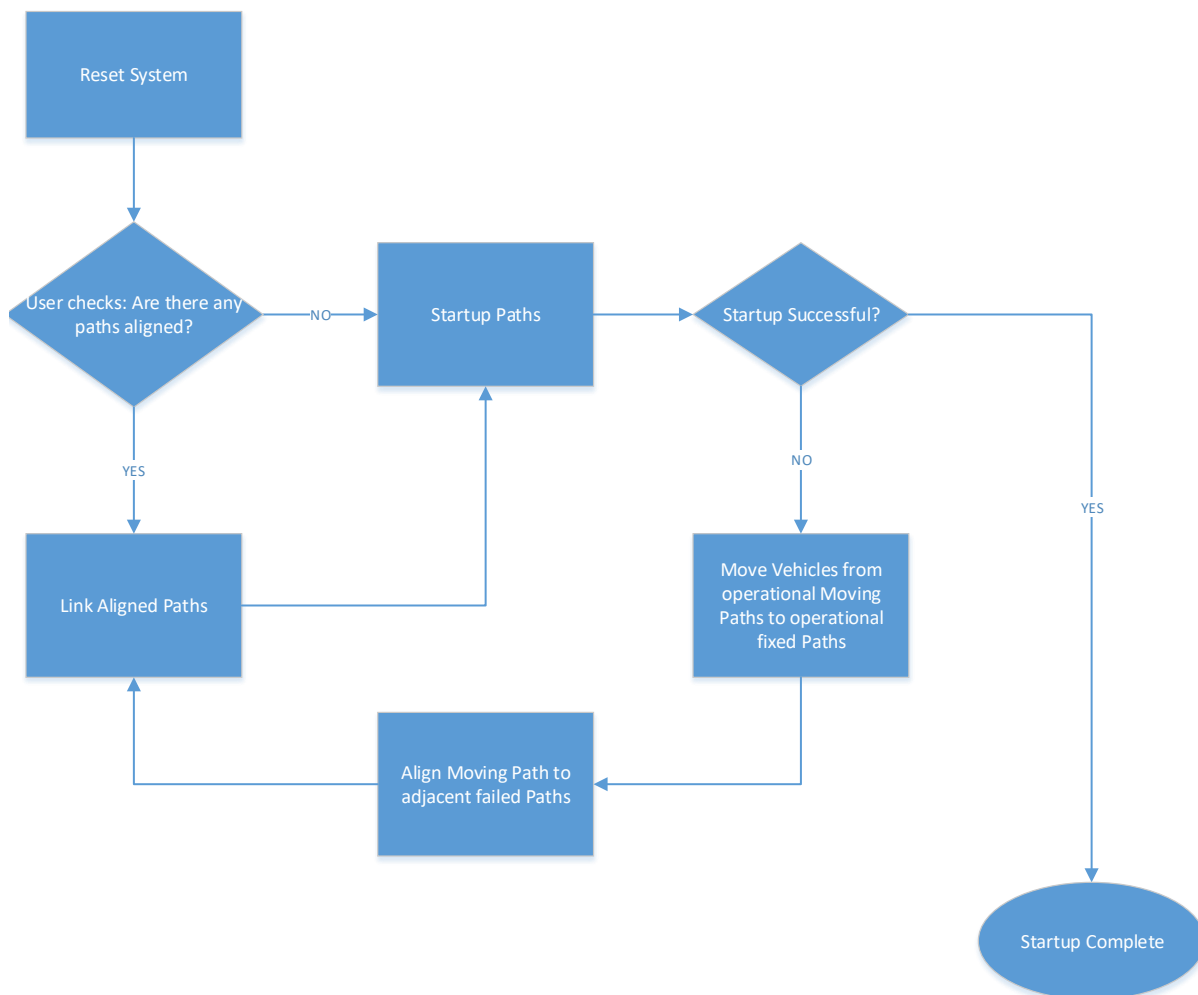


Figure 5: Startup Routine with Assistance from a Moving Path

During a Reset Command, all Nodes go to the unlinked state. The host controller should check the location of all the moving Paths. If there are aligned Paths, a vehicle could be located between Paths. For this reason, it is important to “link” aligned Paths before sending a startup command. If a Path fails startup, moving Paths can be aligned and linked to those Paths and retry the startup routine. Figure 6 show how linking two Paths allow for vehicles to startup across the junction by having more space to locate.

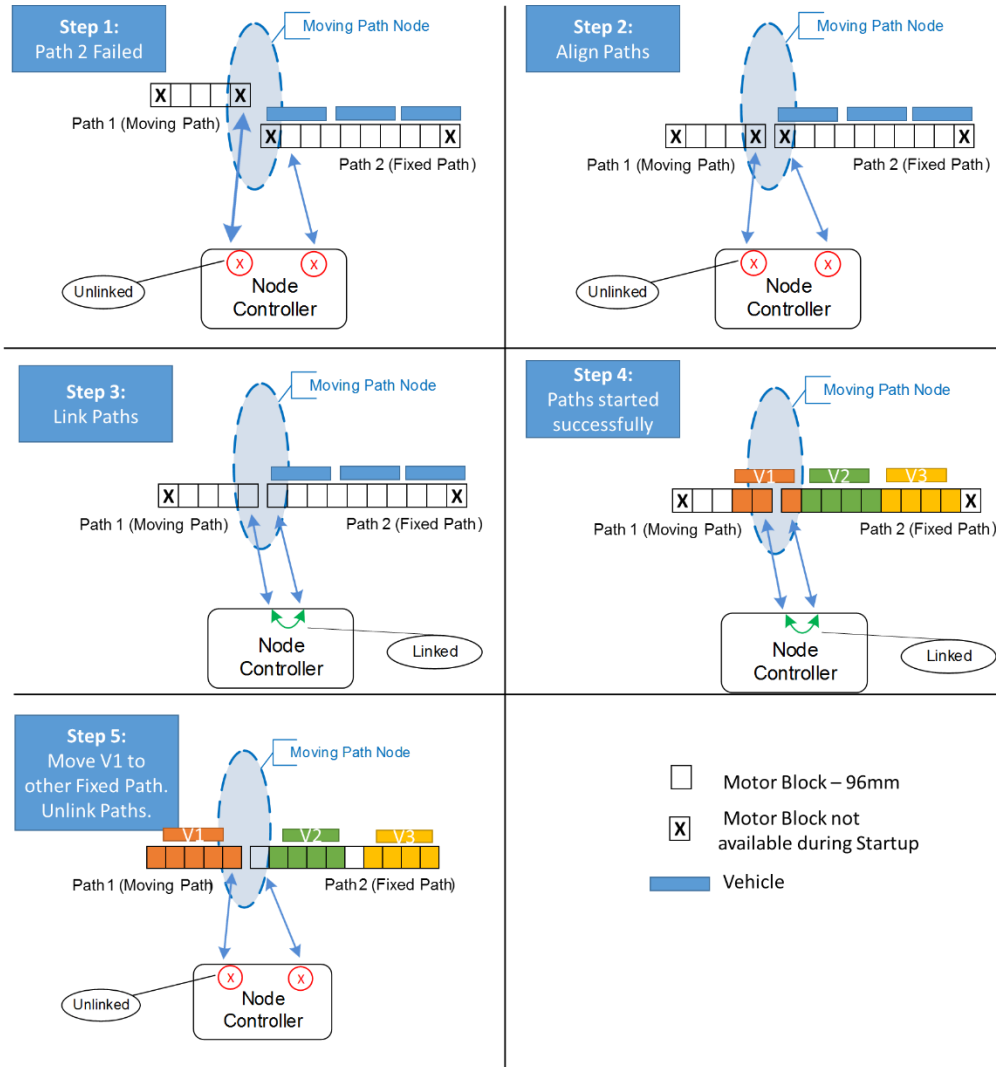


Figure 6: Startup Sequence for a Packed Path using a Moving Path for assistance. The X in the motor blocks show unavailable blocks due to entry gate/clearance distance or vehicle overhang.

Summary

The startup routine for a QS100 system requires available motor blocks for vehicles to move to locate. When there is not enough space for vehicles in a Path to locate, the Moving Path Node can link adjacent Paths to create additional space for startup to be successful. A moving Path can then move vehicles to other operational Paths or help adjacent Paths to complete the startup sequence.

TECHNICAL SUPPORT NOTICE

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Rev. A

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Related Documents:

990000460 – Manual, QuickStick 100

990000603 – Application Note, QuickStick Startup Delay

More Information

MagneMotion Website: www.magnemotion.com

Questions & Comments: www.magnemotion.com/about-magnemotion/contact.cfm

Revision History

Rev.	Change Description
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A	Initial release
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