



# BLENDING & MOVEMENT | MOVEMENT CONTROL

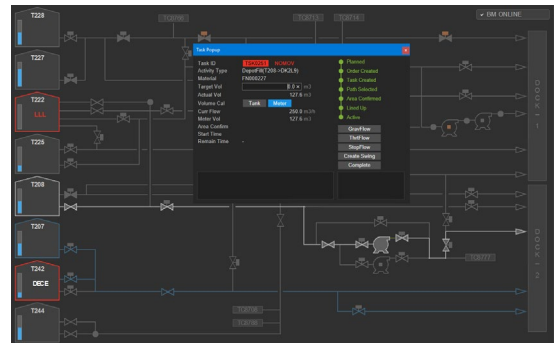
## PRODUCT INFORMATION NOTE

Honeywell's Movement Management - Movement Control (MC) enables operations personnel to safely execute material movements within oil refineries, tank farms and terminals. Movement Control ensures that material compatibility, equipment availability and thermal relief requirements are properly taken into account for safe and effective movement execution.

### Key Capabilities

Movement Control is part of Honeywell's Movement Suite within the Blending and Movement Solution and is built on both the Inventory Monitor and Movement Monitor applications. Movement Control provides the following key capabilities that support movement setup and execution for improved safety, reliability, sustainability and profitability:

- Path Selection & Isolation
- Sequence Generation
- Path Approval
- Sequence Actions Review
- Movement Execution
- Direct Equipment Control
- Field Operator Extension Integration
- Batch Blending
- Tank Quality Integration



Movement Control uses Tank Farm Graphic and pop-up displays for visual representation of equipment and movement information

### Benefits

- **Reduced losses** from tank farm incidents by automatically checking for material and equipment compatibility during movement setup to avoid contamination, or improper equipment use
- **Fewer material downgrades and shipping errors** by tracking line content to ensure that material can continue to be shipped
- **Increased operator effectiveness** through optimized movement set up and execution. This result is achieved from automated path selection that minimizes plant device moves while ensuring material and equipment compatibility and path isolation
- **Improved safety and reliability of manual actions** through integration with MM's Field Operator Extension (FOE)

- Provision for simple property trim control based on analyzer feedback
- Blend header pressure control
- Blend fly-switch - running of consecutive blends without stopping the pumps involved in the current blend
- Blend report generation, containing key blending information, at the completion of every blend

These key capabilities are described below:

## Path Selection and Isolation

The paths the material travel must be selected for each combination of sources and destinations that are defined in the movement order. Path selection includes specification of path selection criteria, selection of paths (dynamically or from a library of predefined paths), reviewing proposed paths and committing to the chosen path all required elements.

This process is repeated for each source-destination pair in the movement. After a path is selected, the system determines how to isolate the selected path from other movements that may be defined. Movement Control supports two approaches for isolating paths:

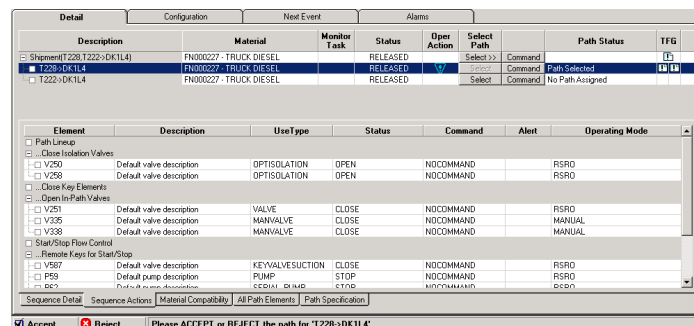
- **Optimal Isolation:** The minimum number of isolation actions is determined by searching each branch of the piping network off the selected path looking for open connections to tanks and manifolds that are not involved in the movement. Isolation valves are identified only as required to close those open connections.
- **Explicit Isolation:** All valves that are not in the flow path but are adjacent to the path line segments are identified, whether they are currently in the correct position to provide isolation or not. This approach enforces the state of all isolation valves, and so is intended to guarantee isolation independent of other movements.

## Sequence Generation

When a path is accepted for presentation to the operator for approval, it is associated with a standard sequence definition that defines how its elements are to be operated from start to finish of the movement. Most paths use a generic sequence definition that defines standard phases and steps for sequence execution. Movement Control provides the flexibility to associate a path with a specific sequence that includes specialized logic through reconfiguration of the standard sequence.

## Path Approval

Proposed paths are presented to the operator for review and, if a path is not suitable (e.g. a pump is down for maintenance), the operator must adjust the path specification and try again. All elements used in the path are made temporarily unavailable to other path selection attempts to prevent conflict conditions.



The Task Detail display provides the operator with the information needed to approve a path

Proposed paths are presented to the operator in the path approval display shown above and as highlighted line segments and elements on the associated Tank Farm Graphic which allows the operator to visually follow the path. Highlight colors differentiate between elements in the proposed paths, elements already committed to other movements, and elements that are not committed to other movements.

## Sequence Actions Review

The operator is presented with a list of intended element commands for the isolation and lineup process and is shown the “key” elements that are to be operated to execute subsequent movement sequence state changes (primarily start and stop flow). As shown below, the operator display includes the type of action, the elements to be operated and their description, current and required states and an indication of auto or manual mode.

Description	Material	Monitor Task	Status	Oper Action	Select Path	Path Status	TFG
<input type="checkbox"/> Transfer(T500,T501,T502,T504)	FN000003 - Default material description		RELEASED		Select Path	Command	ED
<input type="checkbox"/> T500-T504	FN000003 - Default material description		RELEASED		Select Path	Command	ED
<input type="checkbox"/> T501-T504	FN000027 - Default material description		RELEASED		Select Path	Command	ED
<input checked="" type="checkbox"/> T502-T504	FN000003 - Default material description		RELEASED		Select Path	Command	Lineup

Element	Description	Use Type	Status	Command	Alert	Operating Mode
<input type="checkbox"/> Path Lineup						
<input type="checkbox"/> Close Isolation Valves						
<input type="checkbox"/> Close Key Elements						
<input type="checkbox"/> V501	Default valve description	KEYMANVALVEDIS...	OPEN	STAND_BY		MANUAL
<input type="checkbox"/> Open In-Path Valves						
<input type="checkbox"/> V502	Default valve description	MANVALVE	CLOSE	INDACTION		MANUAL
<input type="checkbox"/> V505	Default valve description	PRIDEVALVE	CLOSE	OPTVENTPATH	OPB	MANUAL
<input type="checkbox"/> Start/Stop Flow Control						
<input type="checkbox"/> Manual Keys for Start/Stop						
<input checked="" type="checkbox"/> V503	Default valve description	KEYMANVALVEDIS...	OPEN	STAND_BY		MANUAL
<input type="checkbox"/> Release Keys for Start/Stop						
<input type="checkbox"/> P801	Default pump description	PUMP	STOP	STOP		SIMULATE
<input type="checkbox"/> Terminate Actions						

The Sequence Actions tab of the Task Detail display shows the list of actions for a particular sequence for review by the operator

## Movement Execution

Once approved, the movement sequence execution begins leading up to movement start. The movement monitoring and alarming functions manage the transition of movement states through the movement lifecycle.

Sequences respond to commands issued by the Movement Control application or directly by operators throughout the movement. Sequences are broken into phases that correspond to movement states, such that when the movement commands are issued, the associated sequences execute the appropriate phases. Typically, there is a one-to-one relationship between movement commands and sequence phases.

A sequence phase typically runs to completion, executing all steps and actions along the way. The execution can pause under certain conditions, such as while waiting for operator or field element status confirmation, or for a configured delay time, or for an operator-directed hold.

## Direct Equipment Control

Normally, all element changes are requested and performed under Movement Control’s task control with the operator confirming that demands on equipment without direct detection have been met. It is also possible for the operator to make direct element changes through the Movement Control system but outside of task control.

The Direct Control Analysis (DCA) function evaluates operator requested changes not done under task control (e.g. request a valve to open) against the current piping network status. The system warns against any element changes that would have potentially undesirable effects, for example:

- Joining two movements that were previously isolated
- Opening a movement to a tank or manifold
- Blocking in a line segment, potentially causing a thermal relief problem

The operator is presented with the consequence of the action, asked to verify, and may still complete the operation if desired.

## Filed Operator Extension Integration

In low automation environments, plants rely on a high degree of manual interaction to perform material movements. For example, when executing a transfer of material in such a plant, numerous field operations must be manually communicated to the field operators. Similarly, once the manual operations have been executed the resulting status must be manually communicated back to the control room operator so that the Movement Control system can be updated appropriately.

To support these environments, Movement Control provides an interface to its Field Operator Extension (FOE) which is a mobile application for managing the execution of field operator tasks. This interface can be used to wirelessly transmit manual equipment operation requests from Movement Control to the field operators as soon as they are required. Once the operation has been performed the field operator uses a wireless handheld device to mark the operation as complete, which causes the operation to be logged and allows Movement Control to respond automatically.

## Batch Blending

Movement Control supports automated batch blending, sequential batch blending and batch re-blending operations. In addition, recycle streams, carrier streams and automated wash operations associated with batch blending are also supported.

## Tank Quality Integration

Tank Quality Integration (TQI) is a feature that tracks product property changes as a result of movement operations for use as part of material certification. This also includes Line Content Tracking (LCT). TQI tracks line content based on tank volume deltas or meter data.

## Movement Control on the Experion Platform

Movement Control is built on the Experion® PKS platform for distributed control of the field equipment used in blending and movement operations. Experion graphics are used as the basis for the Movement Control user interface, and Movement Control makes use of standard Honeywell Experion PKS functions such as messages, logging, as well as alarming and event journaling.

## Movement Control on non-Experion Platforms

For non-Experion DCS, Movement Control integrates easily through OPC connectivity between Movement Control's Experion Application Server and the non-Experion DCS.

## Integration with Honeywell Applications

Movement Control is a key component within Honeywell's Movement Suite, which is part of the Blending and Movement Solution. Other components of the Movement Suite are:

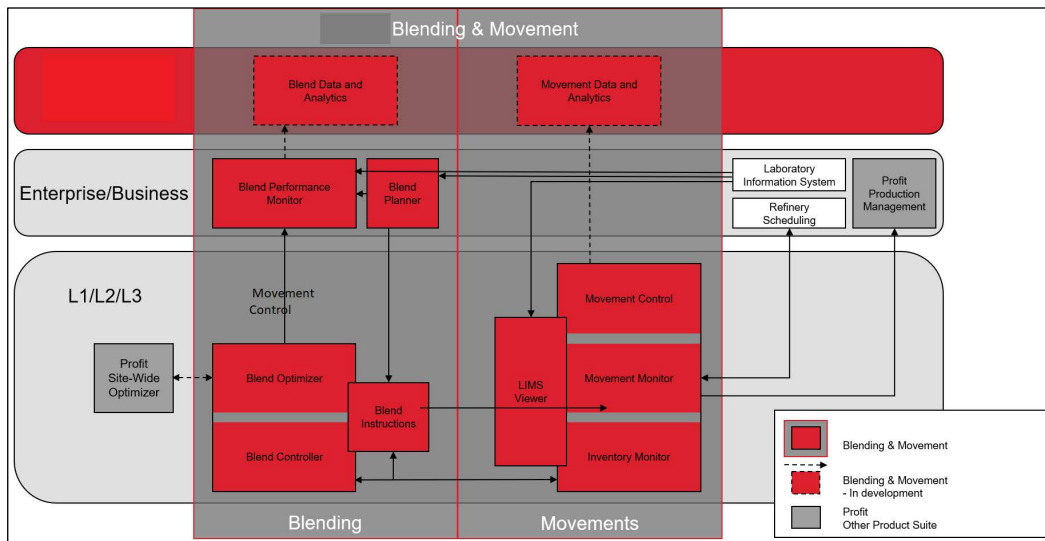
- **Inventory Monitor** – Tank inventory monitoring, alarming and logging
- **Movement Management - Movement Monitor** – Movement planning, logging, monitoring and alarming

Together, these components form Honeywell's Movement Suite, a set of integrated tools for operations staff to accept, create and validate material movement plans, and control and track movements and inventories.

The relationships between Movement Control, the Blending and Movement Solution and other Honeywell applications are shown on the following page. **Inventory Monitor** provides inventory data, alarms and tanks status to the **Movement Control** application and to other applications. **Movement Monitor** provides the order management of movements, as well as the logging, monitoring and alarming functionality.

When **Movement Control** is implemented, planned movements, or movement orders, may be transferred to **Movement Control** from **Blending Instructions** or planning and scheduling applications like Honeywell's **BLEND** application. Movement and inventory data may be transferred to oil accounting and balance applications such as Honeywell's **Production Accounting and Reconciliation** via XML files.

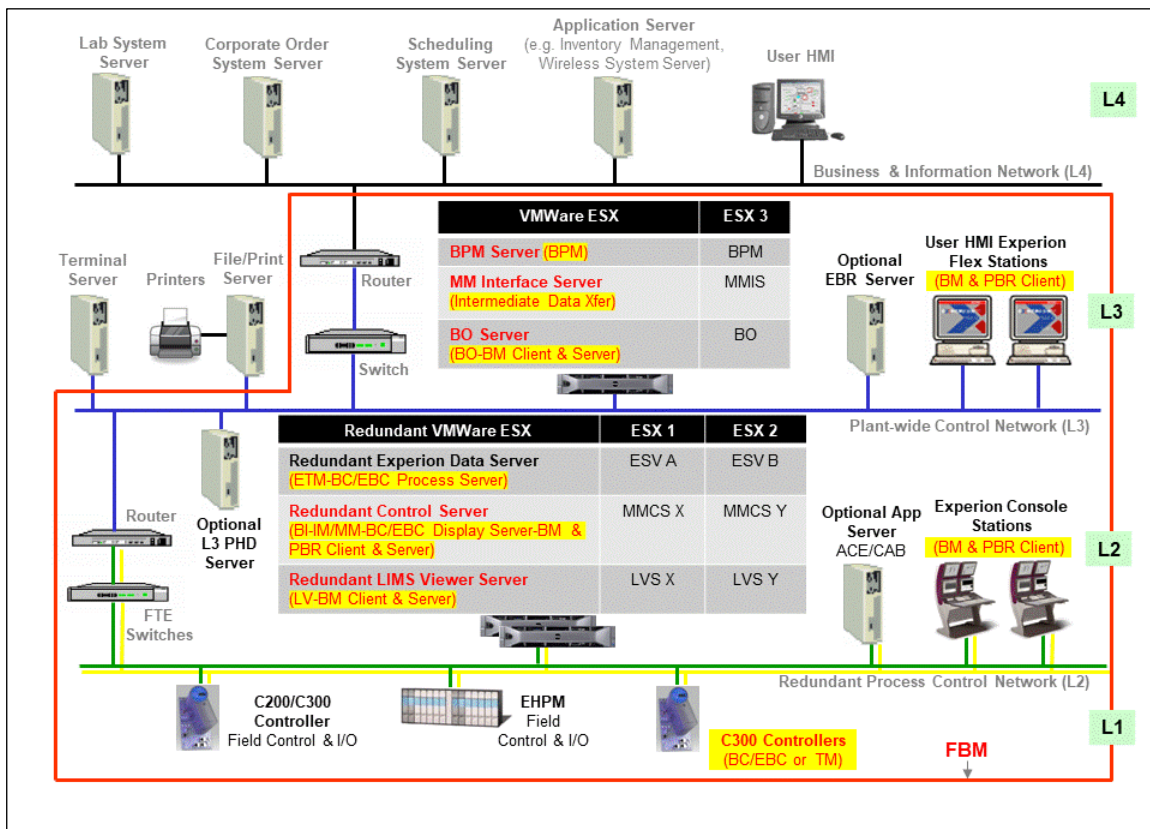
When **Movement Control** is used with Honeywell's **Blend Controller** (BC) application for control of blends, component volumes and flows may be uploaded from **BC** to **Movement Control** for controlled execution of blend movements. **Movement Control** handles opening/closing of valves and starting/stopping of pumps while **BC** controls flow rates.



Movement Control is a key component of Honeywell's Movement Suite and integrates with other Honeywell applications

## System Requirements and Architecture

As described earlier, Movement Control leverages the Experion® PKS platform. Contact Honeywell for the latest list of supported Experion PKS releases. The illustration on the previous page shows a typical Blending and Movement system architecture where Movement Control is installed in the context of a combined Experion PKS and business information system in a virtualized environment for on-process use.



Sample Blending and Movement System Architecture

Movement Monitor is installed on the MM Control Server as illustrated. This server runs Windows Server 2019 (64-bit) and SQL Server 2019 (64-bit). The MM Control Server typically requires one Intel Xeon E-2124, 3.3GHz, 4 Core or faster processor with at least 16GB RAM and 2 x 1TB hard disk space. For specific Honeywell computer platforms and supported software that meet these requirements, please contact your Honeywell representative.

## Support Services

This product comes with worldwide, premium support services through our Benefits Guardianship Program (BGP). BGP is designed to help our customers to improve and extend the usage of their software and the benefits they deliver, ultimately maintaining and safeguarding their advanced software.

## Training Services

Training courses addressing Blend Controller implementation, use and maintenance are available through Honeywell's Automation College ([www.automationcollege.com](http://www.automationcollege.com)). On-site courses are also offered upon request.

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## For More Information

Learn more about Honeywell's Movement Control software can improve your material movement operations, visit [www.honeywellprocess.com/software](http://www.honeywellprocess.com/software) or contact your Honeywell Account Manager.

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