OMAC
The Organization for Machine Automation and Control

Rockwell Automation

2015 Pack Expo Las Vegas

Rockwell Automation & PackML

John Dart – Industry Program Manager

Presenter

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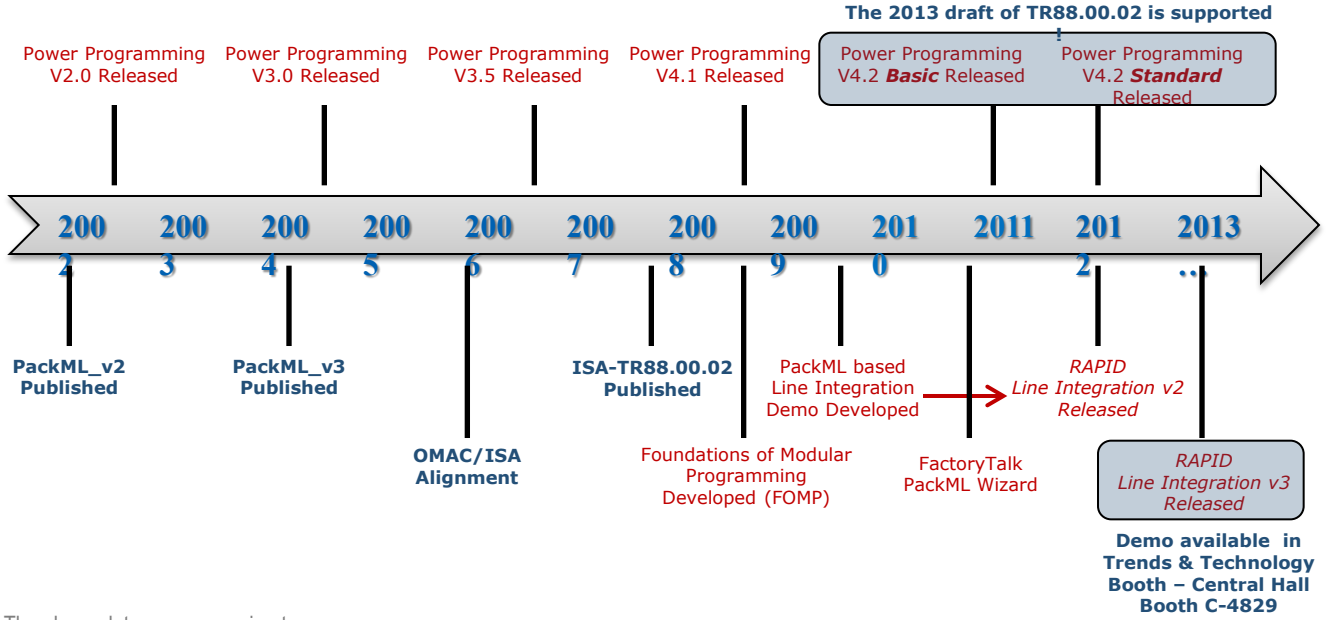
PackML Development History



* The above dates are approximate

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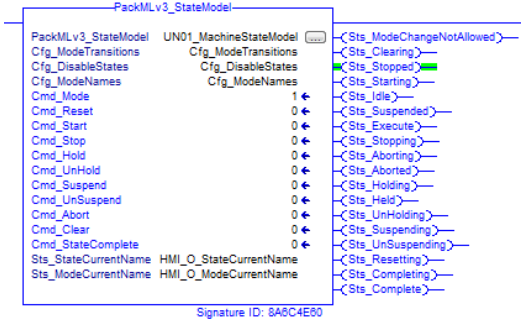
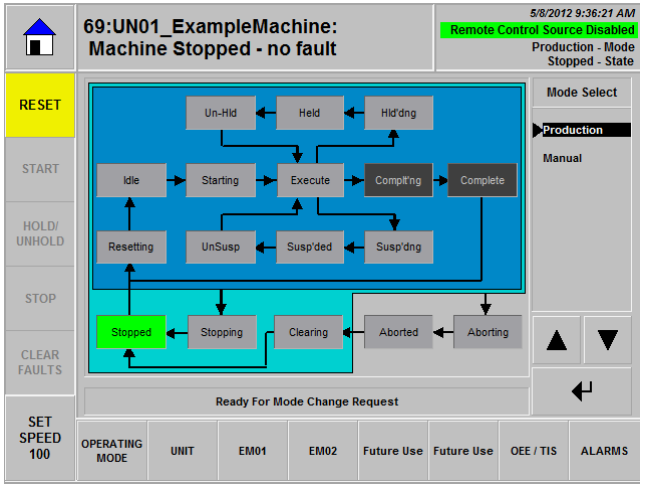
PackML Implementation – State Model

State transition rules defined per ISA-TR88.00.02.

Mode transition rules set by defining for each mode which states a mode transition will be allowed

For a mode to change, both current and desired mode must both be configured to allow mode transition in the current state





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PackTags Implementation – Commands

- *PackTags are supported in Power Programming.*

PackML_Data.Command	UDT_PackML_Commands	
PackML_Data.Command.UnitName	STRING	
PackML_Data.Command.UnitMode	DINT	Decimal
PackML_Data.Command.UnitModeChangeRequest	BOOL	Decimal
PackML_Data.Command.MachSpeed	REAL	Float
PackML_Data.Command.MaterialInterlocks	DINT	Decimal
PackML_Data.Command.CntrlCmd	DINT	Decimal
PackML_Data.Command.CmdChangeRequest	BOOL	Decimal
PackML_Data.Command.ResetPackMLTimes	BOOL	Decimal
PackML_Data.Command.Heartbeat	BOOL	Decimal
PackML_Data.Command.Product	DINT	Decimal

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PackTags Implementation – Status

PackML_Data.Status	UDT_PackML_Status	
PackML_Data.Status.UnitModeCurrent	DINT	Decimal
PackML_Data.Status.UnitModeCurrentName	STRING	
PackML_Data.Status.UnitModeRequested	BOOL	Decimal
PackML_Data.Status.UnitModeChangeInProcess	BOOL	Decimal
PackML_Data.Status.StateCurrent	DINT	Decimal
PackML_Data.Status.StateCurrentName	STRING	
PackML_Data.Status.StateRequested	BOOL	Decimal
PackML_Data.Status.StateChangeInProcess	BOOL	Decimal
PackML_Data.Status.MachSpeed	REAL	Float
PackML_Data.Status.CurMachSpeed	REAL	Float
PackML_Data.Status.MaterialInterlocks	DINT	Decimal
PackML_Data.Status.RemoteInterface	UDT_PackML_RemoteInterface[1]	
PackML_Data.Status.Parameter	UDT_PackML_Descriptor[1]	
PackML_Data.Status.Product	UDT_PackML_Product[1]	
PackML_Data.Status.RemoteControlEnabled	BOOL	Decimal
PackML_Data.Status.Heartbeat	BOOL	Decimal
PackML_Data.Status.ResetPackMLTimesDone	BOOL	Decimal

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PackTags Implementation – Administration

PackML_Data.Admin	UDT_PackML_Administration	
PackML_Data.Admin.UnitName	STRING	
PackML_Data.Admin.Parameter	UDT_PackML_Descriptor[1]	
PackML_Data.Admin.Alarm	UDT_Event[32]	
PackML_Data.Admin.AlarmExtent	DINT	Decimal
PackML_Data.Admin.FirstOutFault	UDT_Event	
PackML_Data.Admin.AlarmScroll	UDT_Event	
PackML_Data.Admin.Event	UDT_Event[256]	
PackML_Data.Admin.EventExtent	DINT	Decimal
PackML_Data.Admin.ModeCurrentTime	DINT	Decimal
PackML_Data.Admin.ModeCumulativeTime	DINT[32]	Decimal
PackML_Data.Admin.StateCurrentTime	DINT	Decimal
PackML_Data.Admin.StateCumulativeTime	UDT_PackML_CummulativeStateTime[32]	
PackML_Data.Admin.ProdConsumedCount	UDT_PackML_CntDescrip[1]	
PackML_Data.Admin.ProdProcessedCount	UDT_PackML_CntDescrip[1]	
PackML_Data.Admin.ProdDefectiveCount	UDT_PackML_CntDescrip[1]	
PackML_Data.Admin.AccTimeSinceReset	DINT	Decimal
PackML_Data.Admin.MachDesignSpeed	REAL	Float
PackML_Data.Admin.AlarmHistory	UDT_Event[1]	
PackML_Data.Admin.AlarmHistoryExtent	DINT	Decimal
PackML_Data.Admin.PACDateTime	LINT	Decimal

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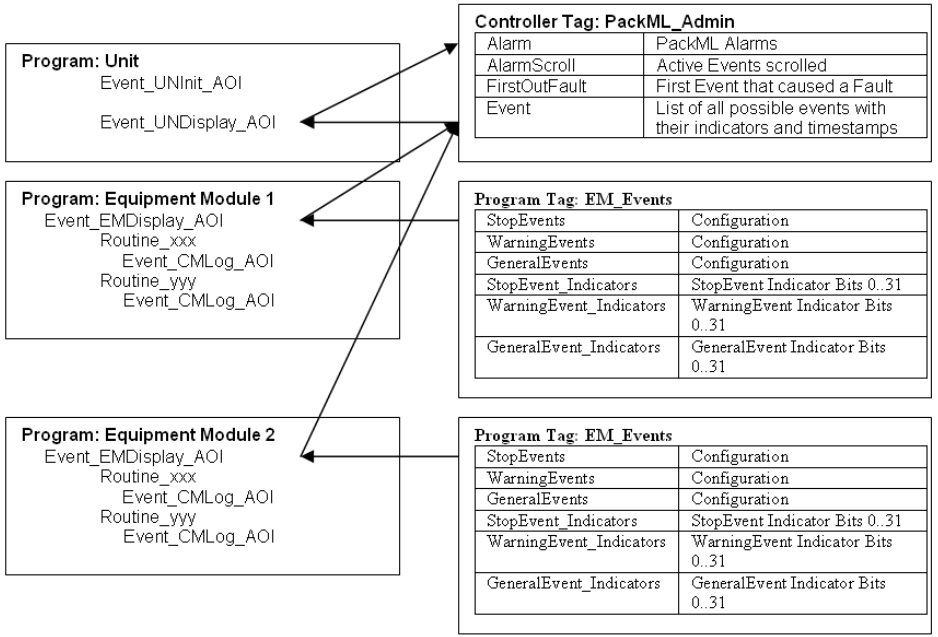
PackML Implementation – Event Hierarchy

Alarms and "First Out Faults" are recorded in the PackML data structure as shown.

Alarms and Events are aggregated from the equipment level (EM) to the Unit level as shown in this diagram.

Tools are provided for import/export of event ID's & Message Strings. This tool also facilitates Language support.



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PackML Implementation – ISA-88 Modularity

Power Programming Capability Matrix	PP Standard	PP Basic	Notes
ISA-88 Modular Structure	●	●	Some Procedural Control in EM's
ISA-88 PackML State Model	●	●	Identical
ISA-88 PackML Data Model (PackTags)	●	●	Identical
Performance Tracking (OEE) Functionality	●	●	Identical
Command Condition UDT Interface to EM Level	●	○	
Mode/State Condition Interface to EM Level	○	●	
Fault Handling - Unit Level Summary	●	●	
Fault Handling - ISA-88 Modularity (CM/EM)	●	○	
Fault Handling - Multi-Language Support	●	○	
Fault Handling - Level 1 Diags/Message Hierarchy	●	○	
Global OEM Application Library Compatible	●	●	
Scalable to large or complex applications	●	●	Memory use info available
Scalable to small applications (lower cpu mem)	●	●	

Key:
- ● Full Capability
- ● Partial Capability
- ○ No Capability

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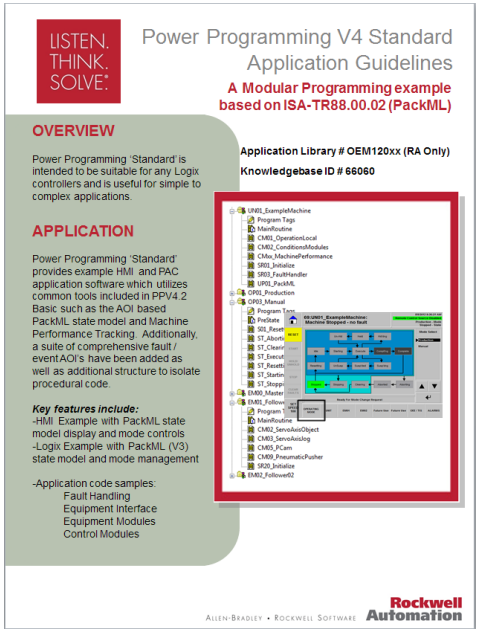
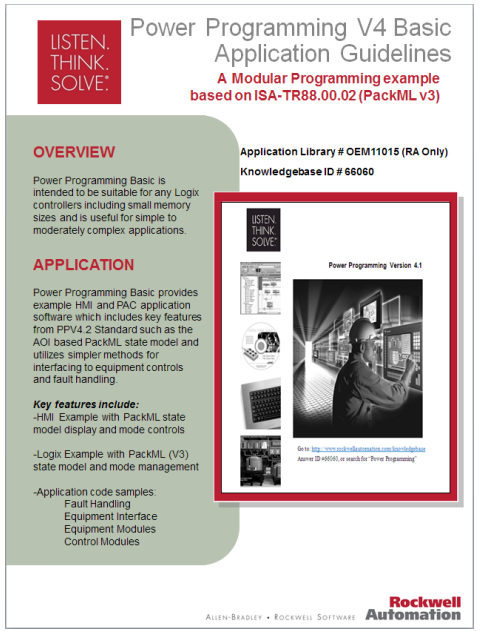
PackML Implementation - Documentation

- Power Programming "Application Guidelines"





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PackML Implementation – Future Plans

- **Continue to work on solving customer integration challenges.**
- Most changes in the new revision are already reflected in the current version of Power Programming.
- Fully re-evaluate ISA-TR88.00.02 Revision 2 (2015).

Questions?