

K = Knowledge

T = Technology

S = Standards

Coating Application Technologies and Quality Control (Mill Applied)

Group 2

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PRIORITY	KTS	ISSUES	TIMING
1	KTS	There is a need to gather information on pipeline coating failures in order to determine failure mechanisms. A list of required information on each of the incident(s) will have to be developed. Create a database and make accessible to study.	1
2	K	What is the effect of the coating application process on steel pipe properties? <ul style="list-style-type: none"> - Preheat temperature on strain hardening behaviour (important for strain based design) - Abrasive blast cleaning on SCC resistance - Other effects? 	1
2	KS	There is a need to define service conditions as well as other intermediate conditions that may impact the integrity of the coating, i.e. <ul style="list-style-type: none"> - Construction - Storage - Handling - Transportation - Develop plant cutback/end treatment to make plant coating systems compatible with field joint coating, and protection during storage. 	1
2	K	There is not a good understanding of what application parameters affect the long term integrity performance of coatings <ul style="list-style-type: none"> - Lack of knowledge on what coating parameters affect the failure mechanism in the disbondment of 3LPP/PE. - There is no consensus on what is a good surface profile/preparation and how to measure this property - There is lack of understanding of the effect of extrusion of multi-layer coatings on residual stresses. - What affects disbondment of 3LPE/PP coating? How is this property measured on a pipeline coating? 	2

2	S	<p>There is a strong need for a universally accepted standard for pipeline coating.</p> <ul style="list-style-type: none"> - This will result in everyone being on the same page with respect to design, manufacturing and testing parameters - Development of performance/prescriptive based standards <ul style="list-style-type: none"> - Going to performance based may be good for innovation - Difficulty in determining long term performance - End user may not be comfortable with this approach - Conservative nature of industry (use of proven methods) - How to measure long term performance with short term tests - Qualification of coating system <ul style="list-style-type: none"> - Verify critical parameters - Assessment of plant capability - Test equipment to measure parameters 	3
3	KTS	<p>Training of Personnel</p> <ul style="list-style-type: none"> - Training on safety - Address experience and turnover of personnel - Cross-training between all aspects of the industry, including plant and field - Develop training programs specific to pipeline coating application - Provide equipment and tools for knowledge 	2
4	KT	<p>There are many different techniques and equipment for applying coatings. Some are proprietary. It is unclear what the consequences are. There is a need to understand the impact of these parameters on coating performance.</p> <ul style="list-style-type: none"> - There are concerns on the process for applying high temperature FBE. There is a need to develop coatings with lower application temperature to prevent: Melting of multi-layer coatings, Strain aging of steel. - There is a need to research testing techniques to measure critical parameters on a continuous (online) basis: <ul style="list-style-type: none"> - Steel pipe temperature (especially important is the pipe temperature prior to coating application) - Steel surface profile - Steel surface contamination - Coating thickness (over body and weld) 	4

Comment		Define critical parameters and limits, i.e. <ul style="list-style-type: none"> - Profile - Contamination - Application temperature - Powder moisture content - Residual stress (multi-layer) - Adhesion 	
Comment		Once critical parameters and limits are defined, then determine QC program <ul style="list-style-type: none"> - Continuous, intermittent, audit, qualify? - End user will want to monitor - Problems with confidentiality - High risk product can lead to large potential loss - Both end user and coater need to be stakeholders (impact on schedule, construction costs) 	
Comment		It is not clear whether research should be carried out on the entire application process or focus in on perceived key processes such as surface preparation and application temperature. A research strategy has to be formulated.	
Comment		Define Application, i.e. <ul style="list-style-type: none"> - Process - People - Equipment - Training - Quality Control - Materials - Handling & Storage - Environmental conditions - Specifications - Design - Manufacturing - Etc. 	