



The Cost Performance Equation For Longlife Roadmarkings

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Topics Covered

- Performance Criteria For Roadmarkings
- Formulation Ingredients = Performance
- Thermoplastic Formulation/Costs
- Comparison Of AUS, NZ, & USA Specifications & Cost Of Conformance
- Performance Adjustments & Affect On Cost
- Conclusion

Performance Criteria

- Quality Road Markings Are A System Of Five Performance Criteria
- Inaccurate To Focus To On **One** Criteria Like Retroreflectivity, Without Considering Other Criteria



It's Like;

**Evaluating A Car On Engine
Size Only, & Ignoring Brakes,
Suspension, Handling & Visibility!**

Performance Criteria

Quality Road Markings Are A System Of
Five Measurable Performance Criteria

- 1. Contrast:** Colour XY Chromacity Co-Ords, Luminance, % Or Luminance Factor under diffuse illumination. $\text{mcd/m}^2/\text{lux}$
- 2. Skid Resistance:** bpn
- 3. Retroreflectivity:** $\text{mcd/m}^2/\text{lux}$
- 4. Wet Retroreflectivity:** $\text{mcd/m}^2/\text{lux}$
- 5. Life:** Vehicle Passes = VPS

Formulation Ingredients Affect Performance

(White Thermoplastic)

- **Resin:** Principle Binder & Adhesion
- **Wax:** Softening Point & Dispersion
- **Polymer:** Improves Impact, Crack Resistance & Cold Temperatures
- **Oil:** Dispersion, Adhesion & Flexibility
- **Glass Beads:** Retroreflectivity
- **Titanium Dioxide:** Colour, UV, Aids Retroreflectivity
- **Aggregates:** Skid Resistance
- **Filler:** Sand/Concrete, Fills Voids & Adds Strength

Specifications

- Thermoplastic White Screed/Extrusion Grade
 - **Australian:** AS4049
 - **New Zealand:** M20
 - **USA:** DOT971
- Same Generic - **White Thermoplastic** Different
 - Conformance
 - Performance

Ingredient	% By Weight	Ingredient Cost NZD/Kg	AS4049 Formulation Component Cost/Ton NZD	M20 % By Weight	M20 Cost/Ton NZD	DOT971 % By Weight	DOT971 Cost/Ton NZD
Resin	12	3.40	408.00	14	476.00	15	510.00
Wax	2	4.00	80.00	2	80.00	2	80.00
Polymer	2	7.00	140.00	2	140.00	2	140.00
Oil	2	2.70	54.00	2	54.00	1	27.00
Binder Total	18			20		20	
Glass Beads	20	0.85	170.00	20	170.00	40	340.00
Titanium Dioxide	5	4.80	240.00	5	240.00	10	480.00
Aggregates	27	0.35	94.50	30	105.00	15	52.50
Filler	30	0.33	99.00	25	82.50	15	49.50
Total	100		1,285.50	100	1,347.50	100	1,679.00
Bags			34.56				
Labour			70.00				
Pallet			25.00				
Electricity			10.00				
Total Cost			1,425.06		1,487.06		1,818.56
Overhead Recovery Approx 10-15% sales			200.00		200.00		200.00
Profit			20.94 (1.5%)		(41.06)		(372.56)
Market Price White Extrusion			NZD1,646.00 AUD1,250.00 (Rate \$0.7595)		NZD1,646.00 AUD1,250.00		NZD1,646.00 AUD1,250.00
Performance White	I=Initial F=Final		Chips 600k 3 mill VPS		3 mill VPS		3 Years
Contrast (QD –mcd) Lum Factor %			I = 80% W F = NCS 250N		I = 75% W F = 45% W		??? 10% TiO
Skid Resistance BPN			45		50		35 Lines 55 Bike Ped X
Dry Retro (mcd)			I = 200 F = 100		I = Drop On F = 100		I = 450 F = 150
Wet Retro(mcd)		Proposed	80		80		

Cost Of Conformance To AUS, NZ & USA Specifications

- **AS4049** - Base
- **M20** - \$60.00 Per Ton
 - 20% Binder
- **DOT971** - \$393.00 Per Ton
 - 20% Binder & 10% TiO₂
 - 40% Glass Beads

Cost Of Conformance Plus Cost Of Performance Expectations

- **AS4049** - \$42.00 Per Ton
 - 100mcd 40bpn
- **M20** - \$157.00 Per Ton
 - 100mcd 50bpn
- **DOT971** - \$393.00 Per Ton
 - 150mcd 35bpn

Additional Performance & Conformance Costs

- **Wet Night Visibility** - \$300.00 Per Ton
 - 80mcd Wet Performance
- **Yellow Organic Pigments** - \$900.00 Per Ton
 - No Lead Chromate
 - Conformance

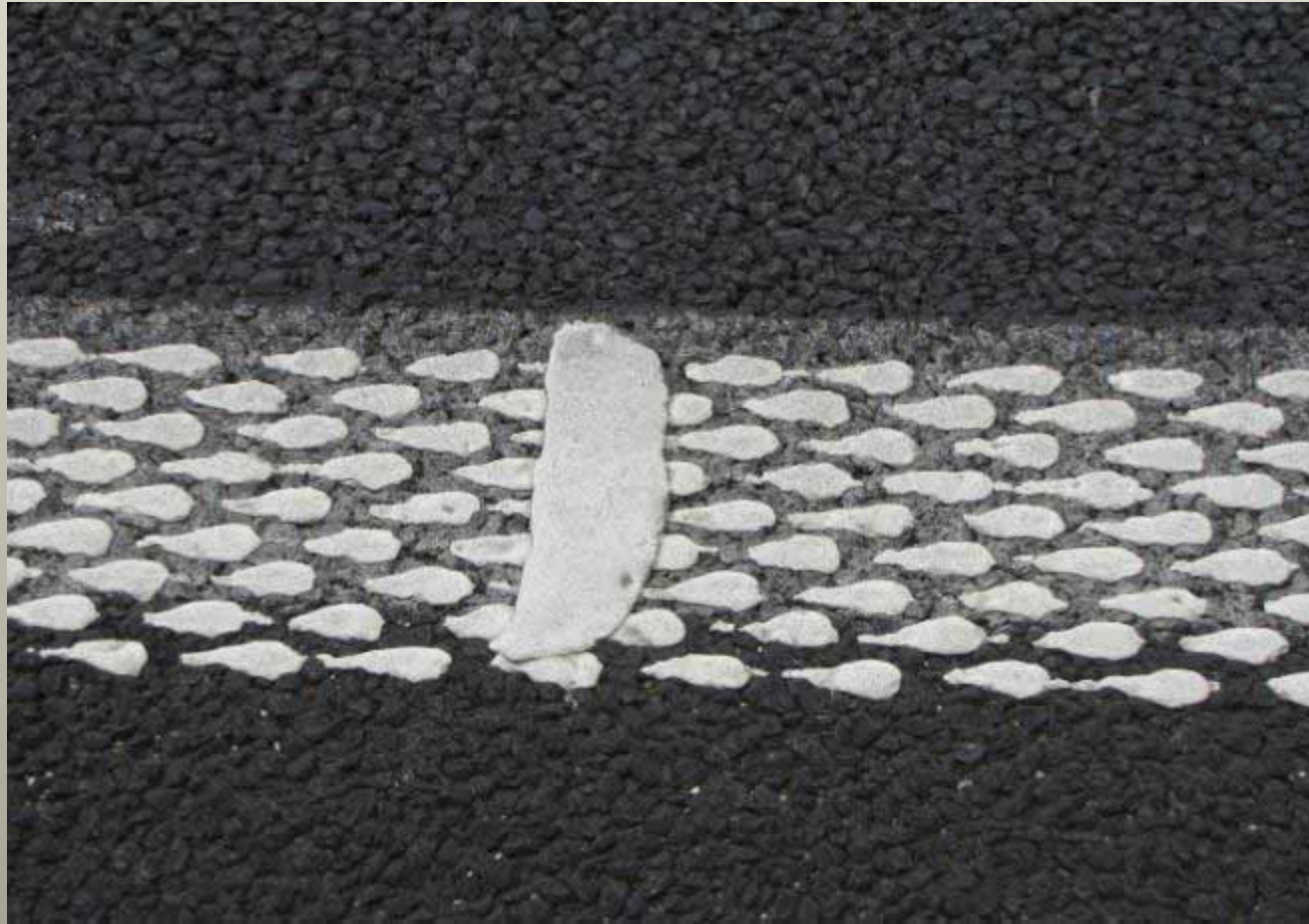
Conclusion & Summary

- **Five Performance Criteria:**
1 Contrast/Colour; 2 Skid Resistance; 3 Retroreflectivity; 4 Wet Retroreflectivity; 5 Life
- **Looking At One Performance Criteria Only** Like Retroreflectivity, Will Not Ensure Quality Road Marking
- **Selecting Lowest Price Only** Without Considering All Five Performance Criteria Will Lead To Long Term Customer Dissatisfaction & Potential Negative Safety Issues
- **Not All Thermoplastics** Are The Same
- **Customer, Engineer, Applicator & Supplier** Know Conformance & Performance Expectations
- Measurable **Link** Between **Cost & Performance**



Smart Lines;

"The Accident You're Concerned About Won't Happen", or;



“Smart Lines” → Engineered Solutions
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