American Tripoli: A Natural Abrasive for Friction

COLORS: Rose and Cream

GRADE: Trifil

SCREEN ANALYSES (Typical Cumulative % passing Tyler Screen):

MESH	TRIFIL
35	100.00
48	100.00
65	99.9
100	99.7
150	98.8
200	98.1

CHEMICAL ANALYSIS (%) TYPICAL VALUES		ROSE TRIFIL		CREAM TRIFIL	
SiO_2		94.03		98.33	
TiO_2		0.08		0.04	
Al_2O_3		2.34		0.71	
Fe_2O_3		0.83		0.20	
FeO		0.03		0.02	
MnO		0.01		0.03	
MgO		0.23		0.06	
CaO		0.89		0.24	
Na_2O		0.03		0.04	
K_2O		0.16		0.09	
P_2O_5		0.01		0.02	
CO_2		0.03		0.01	
Unreported		1.33		0.19	
Loss on Ignition		1.85		0.55	
pH		5.3 - 6.0		6.2 - 7.0	
Fusion point (°C)		1640		1707	
Builk density (lb/cu. ft)		45		45	
Oil absorption (g/100g)		40 - 48		40 - 48	

TRIFIL: ABRASIVE REPLACEMENT

100% Replacement

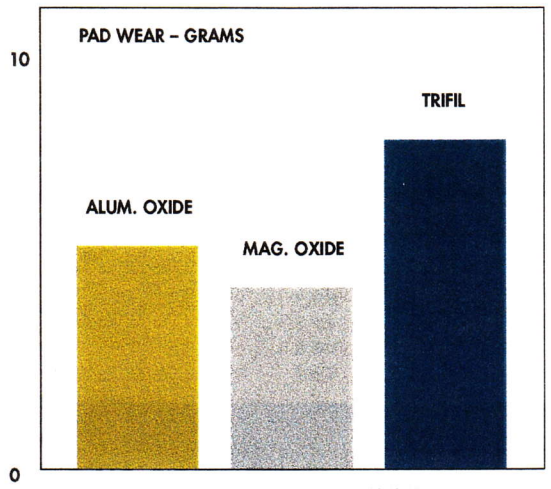
- Trifil polishes the rotor drum, with a tendency for a slightly lower friction
- No scoring as with abrasives
- Greatly reduced cost compared to other abrasives
- This will require reformulating

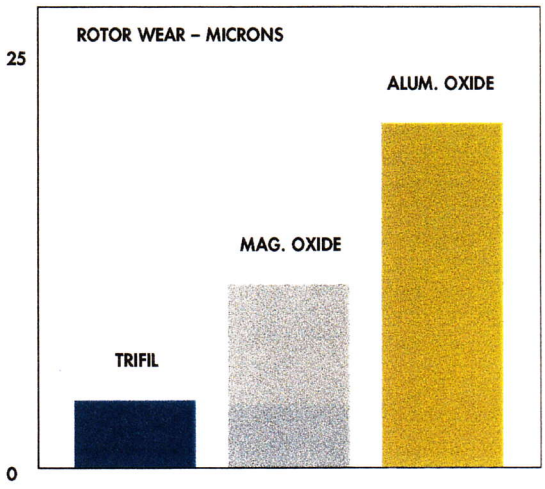
Partial Replacement

- At 50/50 ratio there is little or no change in performance characteristics
- Polishes the surface. No score marks
- Appears to be able to replace 50% of the expensive abrasives in disc brake pads and truck blocks - Aluminum Oxides, Zirconium Oxides and Silicates, Silicon Carbide, etc.
- Lowers cost

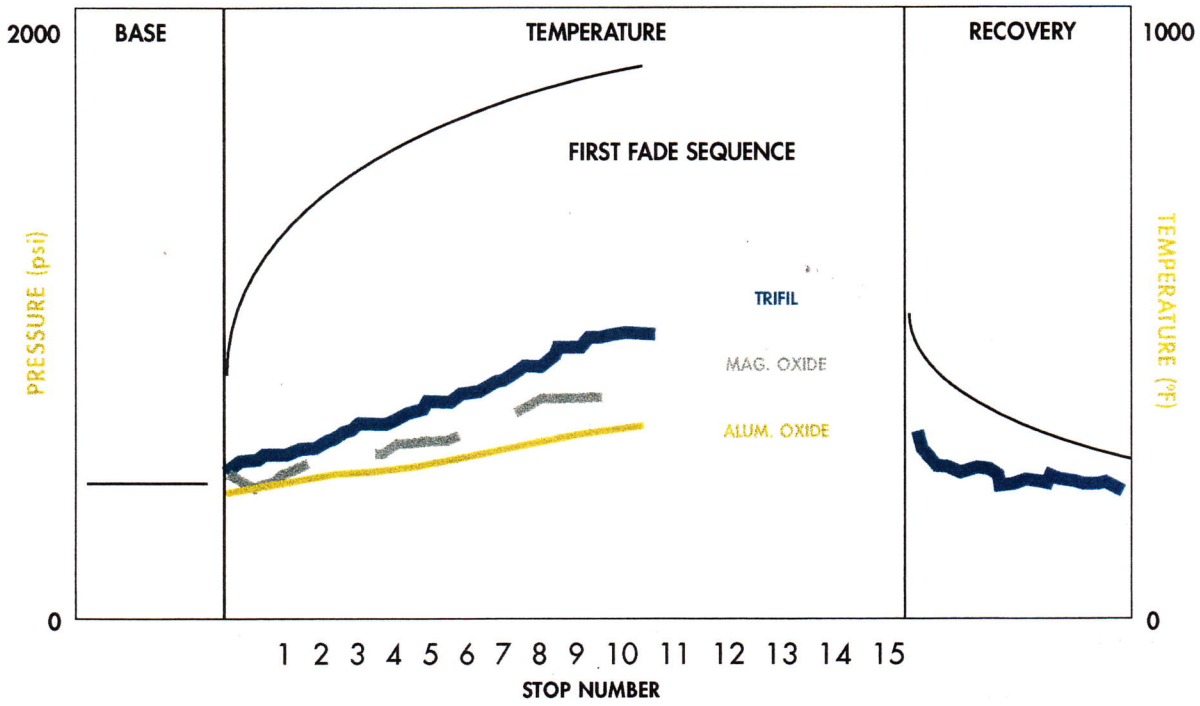
Samples and additional information are available from American Tripoli Inc.
P.O. Box 489, Seneca, Missouri 64865 Tel. (417) 776-2216 Fax (417) 776-2217

TRIFIL: DYNAMOMETER WEAR RESULTS





FADE RECOVERY - INFLUENCE OF ABRASIVE TYPE



PERFORMANCE EFFECTS

- Least Rotor Wear with Trifil
- Trifil Polishes the Rotor with no Scoring

AMERICAN TRIPOLI

100 PERCENT REPLACEMENT OF ALUM. OXIDE
SEMI-METALLIC FORMULATION

FORMULATION:	DENSITY
ABRASIVES	3.45

RAW MATERIALS	SPECIFIC GRAVITY	BATCH WEIGHT	WEIGHT PERCENT	VOLUME	VOLUME PERCENT
Phenolic	1.25	10	10.00	8.00	27.59
Barium Sulfate	4.33	18	18.00	4.16	14.34
Cashew Particles	1.15	3	3.00	2.61	9.00
Steel Wool 205	7.86	32	32.00	4.07	14.04
Iron Sponge	7.82	20	20.00	2.56	8.82
Kevlar®	1.44	2	2.00	1.39	4.79
Aluminum Oxide	3.95	4	4.00	1.01	3.49
Graphite 3226	2.26	6	6.00	2.65	9.16
Antimony Trisulfide	4.6	2	2.00	0.43	1.50
Calcium Carbonate	2.71	1	1.00	0.37	1.27
Reclaim Rubber	1.15	2	2.00	1.74	6.00
TOTAL		**100**	**100.00**	**28.99**	**100.00**

FORMULATION:	DENSITY
TRIPOLI	**3.41**

RAW MATERIALS	SPECIFIC GRAVITY	BATCH WEIGHT	WEIGHT PERCENT	VOLUME	VOLUME PERCENT
TRIPOLI	**2.9**	**4**	**4.00**	**1.38**	**4.76**
Phenolic	1.25	10	10.00	8.00	27.59
Barium Sulfate	4.33	18	18.00	4.16	14.34
Cashew Particles	1.15	3	3.00	2.61	9.00
Steel Wool 205	7.86	32	32.00	4.07	14.04
Iron Sponge	7.82	20	20.00	2.56	8.82
Kevlar®	1.44	2	2.00	1.39	4.79
Aluminum Oxide	3.95	0	0.00	0.00	0.00
Graphite 3226	2.26	6	6.00	2.65	9.16
Antimony Trisulfide	4.6	2	2.00	0.43	1.50
Calcium Carbonate	2.71	1	1.00	0.37	1.27
Reclaim Rubber	1.15	2	2.00	1.74	6.00
TOTAL		**100**	**100.00**	**29.36**	**101.26**

PERFORMANCE EFFECTS

- Rotor Surface Polishes - No Scoring
- Performance Almost Identical

AMERICAN TRIPOLI 100 PERCENT REPLACEMENT OF ALUM. OXIDE NON-FERROUS FORMULATION

FORMULATION:	DENSITY
ABRASIVES	2.35

RAW MATERIALS	SPECIFIC GRAVITY	BATCH WEIGHT	WEIGHT PERCENT	VOLUME	VOLUME PERCENT
Phenolic	1.25	14	12.09	9.67	22.76
Barium Sulfate	4.33	43	37.13	8.58	20.18
Cashew Particles	1.15	5.8	5.01	4.36	10.25
Vermiculite	2.25	8.6	7.43	3.30	7.77
Reclaim Rubber	1.15	5.8	5.01	4.36	10.25
Kevlar®	1.44	2.9	2.50	1.74	4.09
Aluminum Oxide	3.95	2.9	2.50	0.63	1.49
Graphite 3226	2.26	5.8	5.01	2.22	5.22
Copper Fiber	8.92	2	1.73	0.19	0.46
NYAD® G	2.9	25	21.59	7.44	17.52
Fiberfrax	2.7	5	4.32	1.60	3.76
TOTALS		**115.8**	**100.00**	**42.49**	**100.00**

FORMULATION:	DENSITY
AMERICAN TRIPOLI	**2.28**

RAW MATERIALS	SPECIFIC GRAVITY	BATCH WEIGHT	WEIGHT PERCENT	VOLUME	VOLUME PERCENT
TRIFIL	**2.9**	**2.9**	**2.57**	**0.89**	**2.02**
Phenolic	1.25	14	12.40	9.92	22.64
Barium Sulfate	4.33	43	38.09	8.80	20.08
Cashew Particles	1.15	5.8	5.14	4.47	10.20
Vermiculite	2.25	8.6	7.62	3.39	7.73
Reclaim Rubber	1.15	5.8	5.14	4.47	10.20
Kevlar®	1.44	2.9	2.57	1.78	4.07
Aluminum Oxide	3.95	0	0.00	0.00	0.00
Graphite 3226	2.26	5.8	5.14	2.27	5.19
Copper Fiber	8.92	2	1.77	0.20	0.45
NYAD® G	2.9	25	22.14	7.64	17.43
Fiberfrax	2.7	5	4.43	1.64	3.74
TOTAL		**112.9**	**100.00**	**43.81**	**100.00**

PERFORMANCE EFFECTS

- Rotor Surface Polishes - No Scoring
- Slightly More Fade

AMERICAN TRIPOLI 50 PERCENT REPLACEMENT OF ALUM. OXIDE NON-FERROUS FORMULATION

FORMULATION:	DENSITY
ABRASIVES	2.35

RAW MATERIALS	SPECIFIC GRAVITY	BATCH WEIGHT	WEIGHT PERCENT	VOLUME	VOLUME PERCENT
Phenolic	1.25	14	12.09	9.67	22.76
Barium Sulfate	4.33	43	37.13	8.58	20.18
Cashew Particles	1.15	5.8	5.01	4.36	10.25
Vermiculite	2.25	8.6	7.43	3.30	7.77
Reclaim Rubber	1.15	5.8	5.01	4.36	10.25
Kevlar®	1.44	2.9	2.50	1.74	4.09
Aluminum Oxide	3.95	2.9	2.50	0.63	1.49
Graphite 3226	2.26	5.8	5.01	2.22	5.22
Copper Fiber	8.92	2	1.73	0.19	0.46
NYAD® G	2.9	25	21.59	7.44	17.52
Fiberfrax	2.7	5	4.32	1.60	3.76
TOTALS		**115.8**	**100.00**	**42.49**	**100.00**

FORMULATION:	DENSITY
AMERICAN TRIPOLI	**2.32**

RAW MATERIALS	SPECIFIC GRAVITY	BATCH WEIGHT	WEIGHT PERCENT	VOLUME	VOLUME PERCENT
TRIFIL	**2.9**	**1.4**	**1.22**	**0.42**	**0.98**
Phenolic	1.25	14	12.25	9.80	22.72
Barium Sulfate	4.33	43	37.62	8.69	20.14
Cashew Particles	1.15	5.8	5.07	4.41	10.23
Vermiculite	2.25	8.6	7.52	3.34	7.75
Reclaim Rubber	1.15	5.8	5.07	4.41	10.23
Kevlar®	1.44	2.9	2.54	1.76	4.08
Aluminum Oxide	3.95	1.4	1.22	0.31	0.72
Graphite 3226	2.26	5.8	5.07	2.25	5.21
Copper Fiber	8.92	2	1.75	0.20	0.45
NYAD® G	2.9	25	21.87	7.54	17.49
Fiberfrax	2.7	5	4.37	1.62	3.76
TOTAL		**114.3**	**100.00**	**43.13**	**100.00**

PERFORMANCE EFFECTS

- Rotor Surface Polishes - No Scoring
- Slightly More Fade

AMERICAN TRIPOLI 100 PERCENT REPLACEMENT OF MAGNESIUM OXIDE NON-FERROUS FORMULATION

FORMULATION:	DENSITY
ABRASIVES	2.35

RAW MATERIALS	SPECIFIC GRAVITY	BATCH WEIGHT	WEIGHT PERCENT	VOLUME	VOLUME PERCENT
Phenolic	1.25	14	12.09	9.67	22.73
Barium Sulfate	4.33	43	37.13	8.58	20.16
Cashew Particles	1.15	5.8	5.01	4.36	10.24
Vermiculite	2.25	8.6	7.43	3.30	7.76
Reclaim Rubber	1.15	5.8	5.01	4.36	10.24
Kevlar®	1.44	2.9	2.50	1.74	4.09
Mag Oxide	3.6	2.9	2.50	0.70	1.63
Graphite 3226	2.26	5.8	5.01	2.22	5.21
Copper Fiber	8.92	2	1.73	0.19	0.46
NYAD® G	2.9	25	21.59	7.44	17.50
Fiberfrax	2.7	5	4.32	1.60	3.76
TOTALS		**115.8**	**100.00**	**42.55**	**100.00**

FORMULATION:	DENSITY
AMERICAN TRIPOLI	**2.28**

RAW MATERIALS	SPECIFIC GRAVITY	BATCH WEIGHT	WEIGHT PERCENT	VOLUME	VOLUME PERCENT
TRIFIL	**2.9**	**2.9**	**2.57**	**0.89**	**2.02**
Phenolic	1.25	14	12.40	9.92	22.64
Barium Sulfate	4.33	43	38.09	8.80	20.08
Cashew Particles	1.15	5.8	5.14	4.47	10.20
Vermiculite	2.25	8.6	7.62	3.39	7.73
Reclaim Rubber	1.15	5.8	5.14	4.47	10.20
Kevlar®	1.44	2.9	2.57	1.78	4.07
Mag Oxide	3.6	0	0.00	0.00	0.00
Graphite 3226	2.26	5.8	5.14	2.27	5.19
Copper Fiber	8.92	2	1.77	0.20	0.45
NYAD® G	2.9	25	22.14	7.64	17.43
Fiberfrax	2.7	5	4.43	1.64	3.74
TOTAL		**112.9**	**100.00**	**43.81**	**100.00**

PERFORMANCE EFFECTS

- Rotor Surface Polishes - No Scoring
- Slightly More Fade

VOLUME OF RAW MATERIALS

COUNTRY	MILLIONS OF POUNDS		TONS	
USA - OEM	50		25,000	
USA - After Market	200		100,000	
USA - Heavy Duty	150		75,000	
Europe	350		175,000	
South America	110		55,000	
Korea	60		30,000	
Japan	250		125,000	
India	40		20,000	
TOTAL	**1210**		**605,000**	

COMMENTS: VOLUME USAGE

All formulations world wide – OEM and Aftermarket

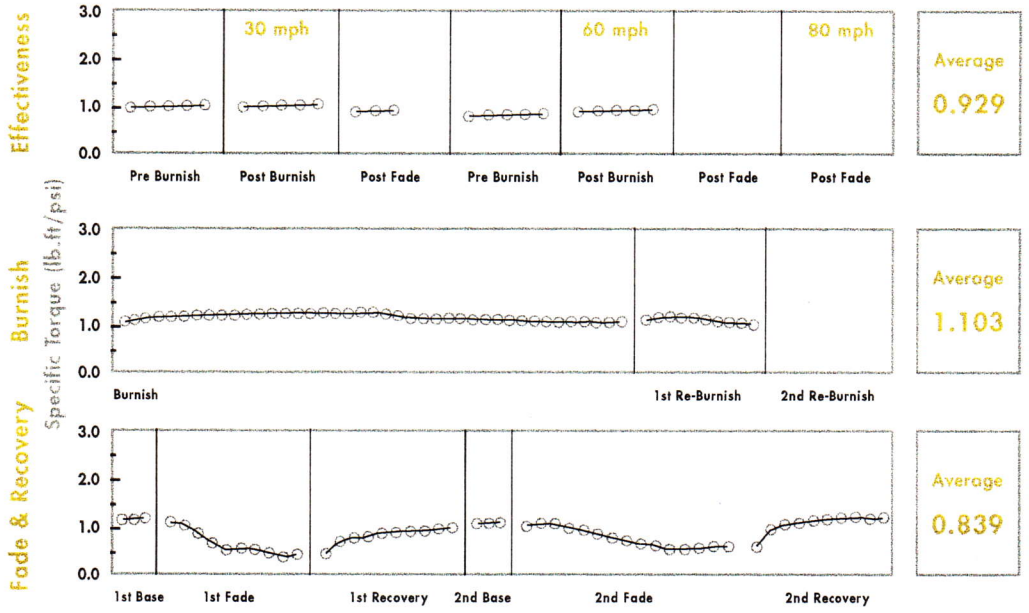
DISC & DRUM BRAKES:		**CONCENTRATION RANGE**
	BARIUM SULFATE	4 - 40%
	CALCIUM CARBONATE	4 - 30%
	ABRASIVES	1 - 8%
NAO TRUCK BLOCKS:		**CONCENTRATION RANGE**
	GLASS FIBER	4 - 20%

Japan is the main user of Potassium Titanate 8 - 24%

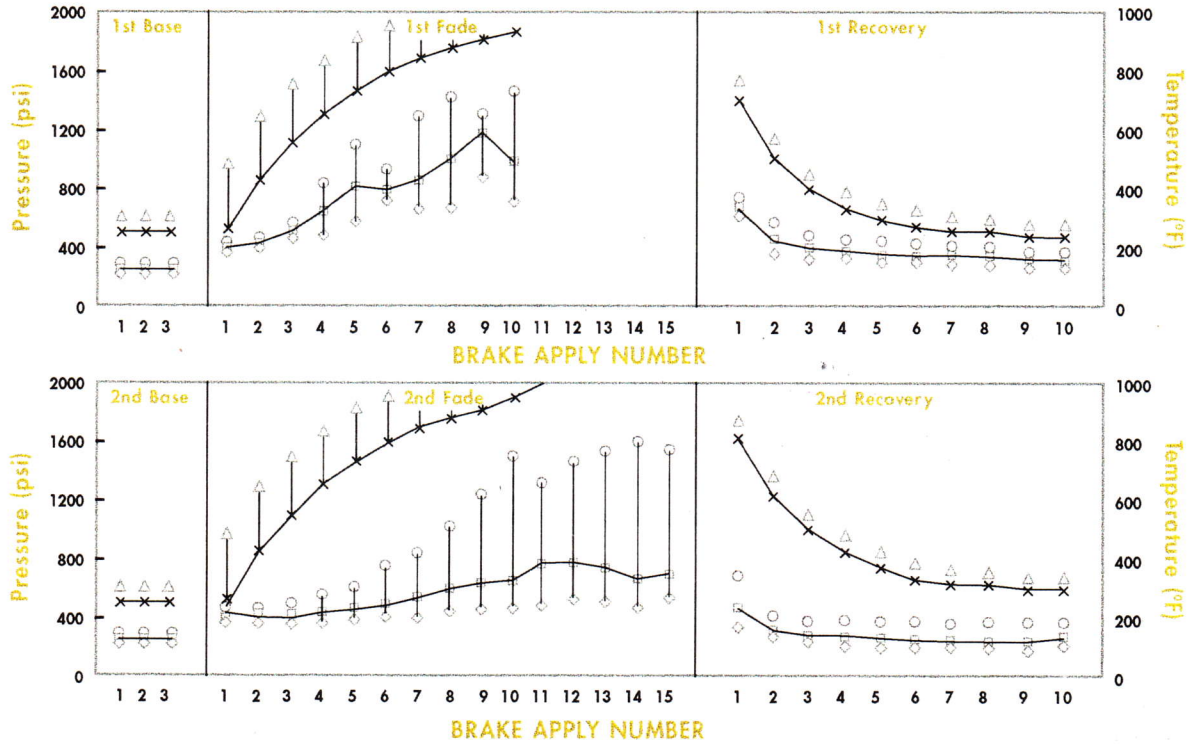
Non-Asbestos Formulations – World Wide

MAN-MADE MINERAL FIBERS 2 - 20%

LINK FRICTION MATERIALS SCREENING TEST



Test #	94A253-A	Inertia Req (slug/ft²)	28.9
Procedure	LST-101A	Inertia Act (slug/ft²)	28.0
Brake Type	Escort	Rolling Radius (in.)	11.45
Wheel Load Req (lb)	1019.0	Inner	NYOC1
Wheel Load Act (lb)	988.9	Outer	NYOC1



Test #	94A253-A	Inertia Req (slug/ft²)	28.9	PRESSURE
Procedure	LST-101A	Inertia Act (slug/ft²)	28.0	◇ Minimum □ Average ○ Maximum
Brake Type	Escort	Rolling Radius (in.)	11.45	
Wheel Load Req (lb)	1019 0	Inner	NYOC1	TEMPERATURE
Wheel Load Act (lb)	988 9	Outer	NYOC1	× Initial △ Final