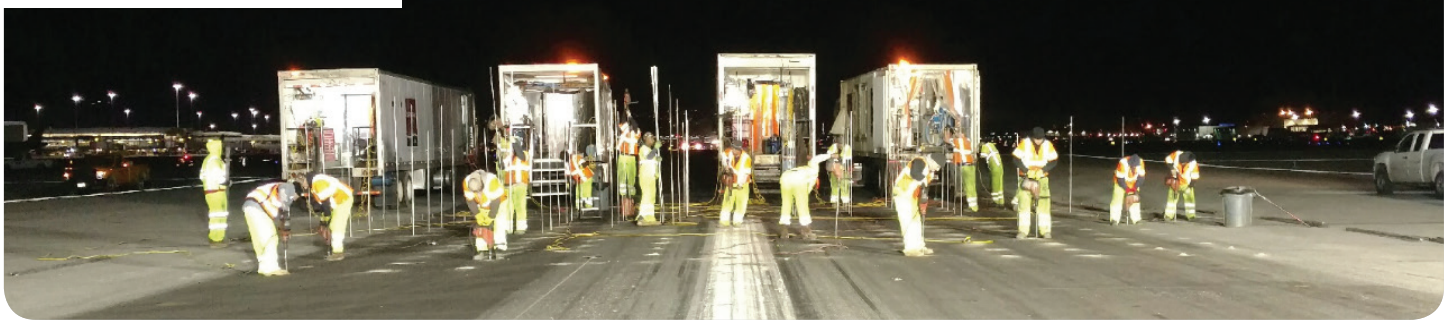
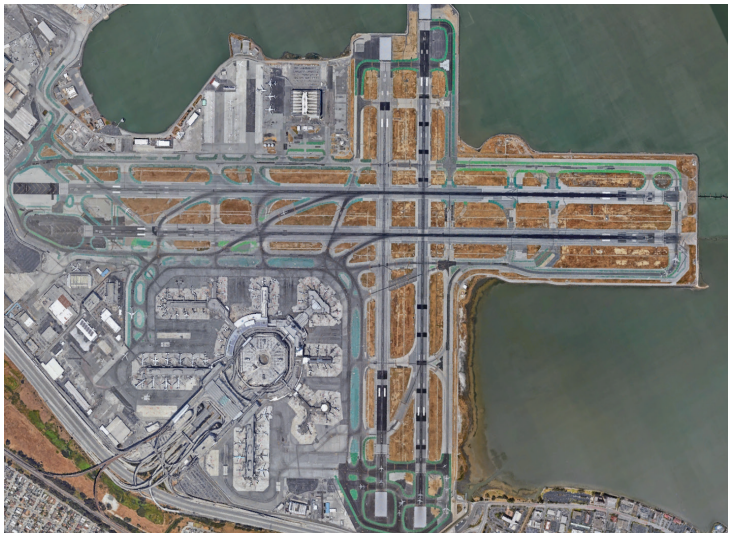
URETEK USA

SAN FRANCISCO INTERNATIONAL AIRPORT



PROBLEM

LOCATION: San Francisco International Airport, California



SITUATION:

URETEK USA was brought in to resolve a pavement preservation problem at one of the major airports in Northern California, San Francisco International Airport. Due to the high volume of aircrafts departing and landing, parts of the 10R-28L asphalt runway were beginning to reach end of life. FAARFIELD, a remaining life pavement analysis, was performed, and the results indicated that action was necessary to restore the pavement to an acceptable remaining life. This information, along with geotechnical field testing, was used to develop a solution.

LEADERSHIP

Leader in cost and time savings, accuracy and precision

Environmentally inert materials and processes

INNOVATION

Inventor of polymer-based technology in use today

Multiple material and process patents

Ongoing engineering research and development

EXPERTISE

Developed the industry's most accurate monitoring process

Developed URETEK 486 STAR material

Pioneered the URETEK Deep Injection Process

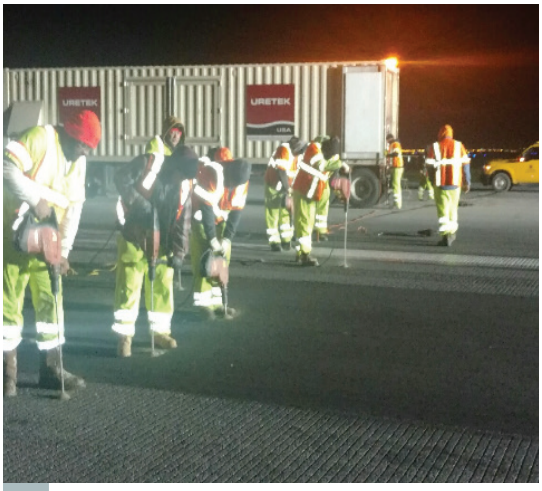
Most experienced technicians and best safety record in industry

PROVEN SUCCESS

85,000+ successful projects

25+ years experience solving complex soil/pavement problems

Industry-leading warranty and customer care



SOLUTION

Full depth repair was impractical due to the extended length of runway down time required to complete this traditional repair method, so other alternatives were investigated. Because of the proposed cost and time savings, San Francisco Airport engineers chose to use URETEK's Deep Injection (UDI) process to stabilize the subgrade below the pavement and fill voids between the Cement Treated Base (CTB) and the subbase, coupled with a mill & overlay to remove weakened asphalt and create a smooth pavement surface.

URETEK USA used Dynamic Cone Penetrometer (DCP) tests to determine areas of void between the CTB and the subbase which varied throughout the length of the runway. The DCP tests also revealed a very weak saturated layer of soils down at approximately -8'. The injection plan involved shallow injections wherever void was detected and injections down at -10' to help stabilize the weak subgrade.

URETEK USA hired Dynatest Consulting to perform Heavy Weight Deflectometer (HWD) testing and back calculation of the deflection results to determine Resilient Modulus (material stiffness) values for pre-treatment and post-treatment conditions. HWD testing was also performed in control areas where no polyurethane injections were performed.

SFO RUNWAY 10R/28L DCP SUMMARY .2 is value for Weight of Rod .6 is value for weight of Hammer			DCP	DCP POST
in	ft	cm	Blow	Blow
depth	depth	depth	Count	Count
3.94	0.33	10	_	DRILL
7.87	0.66	20	_	DRILL
11.81	0.98	30	_	DRILL
15.75	1.31	40	1	NO VOID
19.69	1.64	50	32	NO VOID
23.62	1.97	60	90	NO VOID
27.56	2.30	70	44	NO VOID
31.50	2.62	80	37	DRILL
35.43	2.95	90	77	DRILL
39.37	3.28	100	93	DRILL
43.31	3.61	110	83	14
47.24	3.94	120	55	24
51.18	4.26	130	36	31
55.12	4.59	140	20	41
59.06	4.92	150	20	30
62.99	5.25	160	18	31
66.93	5.58	170	15	27
70.87	5.90	180	10	36
74.80	6.23	190	8	71
78.74	6.56	200	8	59
82.68	6.89	210	8	71
86.61	7.22	220	7	67
90.55	7.54	230	4	47
94.49	7.87	240	8	43
98.43	8.20	250	5	28
102.36	8.53	260	2	16
106.30	8.86	270	0.2	22
110.24	9.18	280	0.2	32
114.17	9.51	290	1	21
118.11	9.84	300	2	17
122.05	10.17	310	0.6	15
125.98	10.50	320	0.6	11
129.92	10.82	330	0.6	6
133.86	11.15	340	0.6	4
137.80	11.48	350	0.6	3
141.73	11.81	360	2	5
145.67	12.14	370	2	5
149.61	12.46	380	2	18
153.54	12.79	390	0.6	17
157.48	13.12	400	0.6	13
161.42	13.45	410	ENDED	ENDED

RESULTS

San Francisco experienced record rainfall between the pre-injection and post-injection testing which showed up in the control area data – on average the subgrade modulus worsened 18.7% and the CTB modulus worsened 34.7%. In significant contrast, the subgrade modulus and CTB modulus in the areas injected with polymer improved by an average of 15.7% and 21.1% respectively.

These remarkable results were supplemented with a post injection DCP test to compare to the pre-injection DCP test. It can be seen in side by side comparison that the single digit blowcounts (orange) were improved tremendously. The same pavement remaining life analysis (FAARFIELD) was performed following the polymer injections with mill & overlay and indicated a pavement remaining life of >20 years for all areas injected.

Average % Improvement in Resilient Modulus		
Areas	Subgade Improvement (%)	CTB Improvement (%)
Polymer Stabilized Area	15.70	21.15
Control Area	-18.72	-34.74

URETEK USA, Inc.
P.O. Box 1929
Tomball, TX 77377-1929

13900 Humble Rd.
Tomball, TX 77375

www.uretekusa.com

888-2-URETEK
888-287-3835
281-351-7800
281-351-0884 Fax

NAICS: 237990, 237110, 237310, 238910
DUNS: 556910990

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sales@uretekusa.com

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