UPDATE, COMPARING DIFFERENT PLATE TREATMENTS AND DESIGN

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I will try to keep this as brief as possible. This is an update of a paper I presented last year comparing different plate treatments and designs. For those who weren't here last year, and to refresh everybody's memory, including my own, I will first discuss the different designs, briefly.

(Figure 6-19)

The group 1 cells were the control, and they represent present aerospace practices and processes with no extra treatments, nonwoven nylon separator. They are PQ treated positives, then they went through decarbonation process, and they had the IUE loading metals, 31 percent KOH.

The group 2 had teflon treatment, and they were the same as the controls, except they had the teflon treatment.

Group 3 were the same as the controls, except they had a silver treatment.

Group 4 were a lightly loaded plate, and they were from a different spiral than the control.

Group 5 was also from a different spiral, and they did not receive the PQ treatment.

Group 6 was also identical to the control, except it had polypropylene separator.

Group 7 was the old plate design that they used during the '60s, and they also used the old ECT process and there was no depower.

Group 8 was an AK plate also, except that it used the present aerospace processes.

Also listed are the typical thicknesses for positive, negatives.

The loading levels, the final KOH quantity and the precharge adjustment.

To date, we have seen them under test at Crane and they have completed six months of tests. We ran a capacity check after 2900 cycles.

(Figure 6-20)

The way these cells are cycled, it was a 90-minute orbit at 20°C, 40-percent DOD, and we had a voltage-limit charge control. We tried to maintain a certain return at about 115 percent. The discharge rate during this test, and also during the cycling was 9.6 amperes.

Just for comparison, there are some capacities, some precycling capacities. Unfortunately, it wasn't until the first cell came down to 27 volts, so not all the cells were discharged down. So we don't have an accurate comparison, although it does give you a feel for what the capacity of each cell is. During capacity check, we only discharged the one cell.

As you can see, the solid line is your controls, and you can see all of them pretty well follow the same profile, although it does look like the polypropylene had a little more capacity fade than the other cell groups.

Possibly the lightly loaded one had a little more fading, too. I would expect them to have a little less capacity to begin with, so it is rather hard to tell.

(Figure 6-21)

Now, the other half of the test is a little more revealing. These are all tested the same.

This is the old plate, and you can see it has very little capacity loss. In fact, there is a little bit of gain. The X's are not PQ treating. That had very little capacity fading also. And the voltage was higher on all three of them.

It had a higher discharge profile, but it did seem to have a lot of capacity fade. It is the old plate with the new process.

I am not sure why that is, but we did have quite a bit of trouble with that pack. We had voltage divergence, and we couldn't maintain a percent return, so we had to remove two of the cells. So that pack had a problem.

Granted, we cannot draw too many conclusions from a discharge of one cell from each group in just the one capacity check, but it sure looks like the plates without the cadmium treatment in the positives have a higher discharge profile, and there is some evidence here that indicates you aren't getting as much capacity failing either. These are GE 12-ampere hour cells, by the way.

DISCUSSION

DUNLOP: Is there teflon treatment in that last group?

BAER: No, teflon treatment was in the first qroup, and it pretty well followed the control profile.

It is rather hard to tell whether there is any capacity fading between the control and the teflon and the silver treatments. They all seem to be in the same area as far as the capacity goes and voltages pretty well fell on top of each other.

DUNLOP: The temperature was what?

BAER: 20°C.

CELL DESIGN VARIABLES - GE 12 AH CELL

VARIABLE	GROUP #	TYPICAL POSITIVE THICKNESS cm	TYPICAL NEGATIVE THICKNESS cm	POSITIVE LOADING gm/dm^3 OF SINTER	NEGATIVE LOADING gm/dm^3 OF SINTER	FINAL KOH QUANTITY cc N/V3rd**	PRECHARGE ADJUST*** Ah
CONTROL*	1	0.069	0.079	2095	2180	40/40	4.6
TEFLON TREATMENT	2	0.069	0.079	2095	2180	48/49	4.6
SILVER TREATMENT	3	0.069	0.079	2095	2180	43/44	4.6
LIGHT LOADING	4	0.069	0.079	1840	1833	45/46	4.6
NO P.Q. TREATMENT	5	0.069	0.079	2113	2180	40.3/41.5	4.6
POLYPROPYLENE SEPARATOR	6	0.069	0.079	2095	2180	39/40	4.6
A.K. PLATE-1968 DESIGN, NO PQ OLD ECT PROCESS, NO DECARB PROCESS	7	0.081 (UNSIZED)	0.066	2130	2542	38/39	0
A.K. PLATE-1968 DESIGN, NO PQ PRESENT AEROSPACE CELL PROCESSES	8	0.081 (UNSIZED)	0.066	2130	2542	39/40	1.8

*CONTROL CELL REPRESENTS PRESENT AEROSPACE DESIGN AND PROCESSES WITH NO EXTRA TREATMENTS: NONWOVEN NYLON SEPARATOR, P.Q. TREATED POSITIVES, DECARBONATION PROCESS, IUE LOADING LEVELS, 31% KOH.

**TWO CELLS IN EACH GROUP CONTAINED SIGNAL ELECTRODES.

***BASED ON 228 cc O^2/Ah.

Figure 6-19

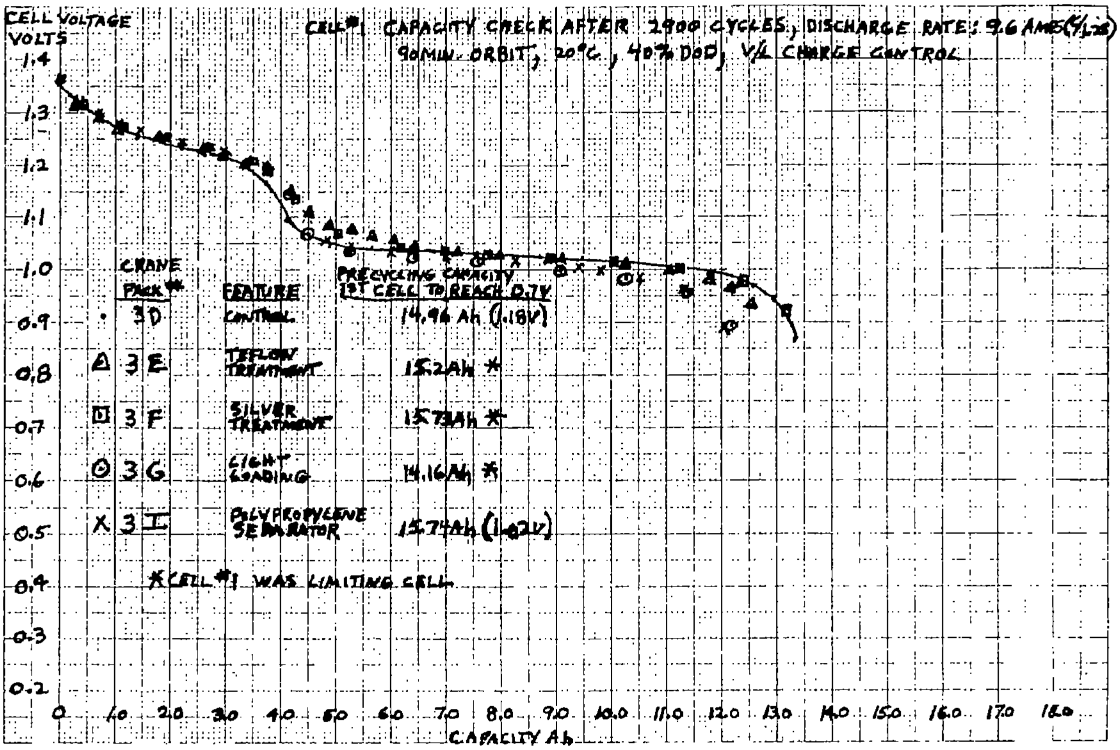

Figure 6-20

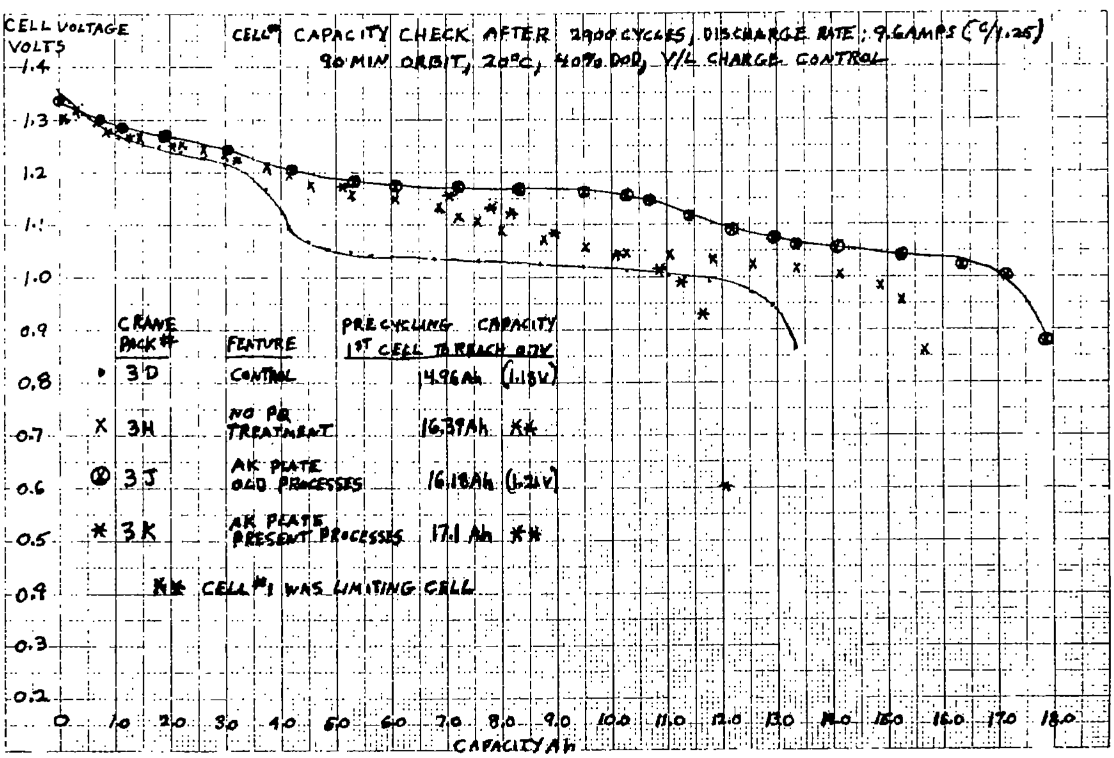

Figure 6-21