Fermilab

TS-SSC 91-220
11/12/91
Jim Strait

DCA311 Cooldown Coil Stress Change

Coil stress and end force changes in DCA311 with its first cooldown are summarized in the attached table. These data have been taken from Cryolog files CRYOLOG_DCA311_01 - 04. The temperature histories are shown in the attached figures. The platinum thermometers used are those labeled "SINGLE PHASE (FEED)" and "SINGLE PHASE (RTN.)". The Carbon-Glass thermometers are those labeled "U.R. FLOW HOLE(FEED)" and "U.L. FLOW HOLE(RTN.)". The pre-cooldown data are an average corresponding to hours 15.1 - 19.7 and the post-cooldown data are an average over the time period 60.4 - 75.0. One bad data point has been removed from the post-cooldown series. Two of the four "Return End" outer coil gauges were lost during the mounting of the magnet on the test stand. Averaged over the surviving gauges, the pre-cooldown inner and outer coil stresses were 7.7 and 5.3 kpsi repsectively. The losses with cooldown were 3.1 and 1.7 kpsi. However, one of the "Return End" outer coil gauge had a very low pre-cooldown value and showed an apparent increase with cooldown. If just the "Lead End" outer gauges are considered then the pre-cooldown prestress was 6.5 kpsi and the loss with cooldown was 2.7 kpsi.

The inner coil prestress loss with cooldown is rather modest by recent standards. This may be a result of the relatively low prestress, which in turn implies a lower coil modulus. Alternatively it may be a consequence of the relatively loose yoke-collar fit[1]. With relatively little prestress having been put in by yoke-collar interference, there is little to be lost by the decrease in that interference.

The sum of the four bullet gauges shows an initial end force of 4500 lbs. and an increase with cooldown of almost 3000 lbs.

Distribution:
S.Delchamps, A.Devred, J.Dimarco, W.Koska, J.Kuzminski, M.Lamm, P.Mazur, D.Orris, E.G.Pewitt, J.Tompkins, M.Wake

DCA311 Coil Stress and End Force Change with Cooldown

Pre-cool (data averaged over the time period 11/7/91 15:05 - 19:42)

T(feed)	T(ret.)	L In1	L In2	L In3	L In4	R In1	R In2	R In3	R In4	Average
293.3	298.6	9524	6676	7979	6745	8191	6696	7674	7905	7674

	L Out1	L Out2	L Out3	L Out4		R Out2		R Out4	Average
	7196	8104	5855	4844		2322		3346	5278

				Bul.1	Bul.2	Bul.3	Bul.4	Sum
				1114	1127	1077	1181	4499

Post-cool (data averaged over the time period 11/9/91 12:21 - 11/10/91 03:00;
60.36 - 75.00 hours since 00:00 11/7/91)

T(feed)	T(ret.)	L In1	L In2	L In3	L In4	R In1	R In2	R In3	R In4	Average
4.12	4.39	6433	4201	3972	3356	4852	4606	4537	4545	4563

	L Out1	L Out2	L Out3	L Out4		R Out2		R Out4	Average
	3875	4706	3708	2944		4378		1822	3572

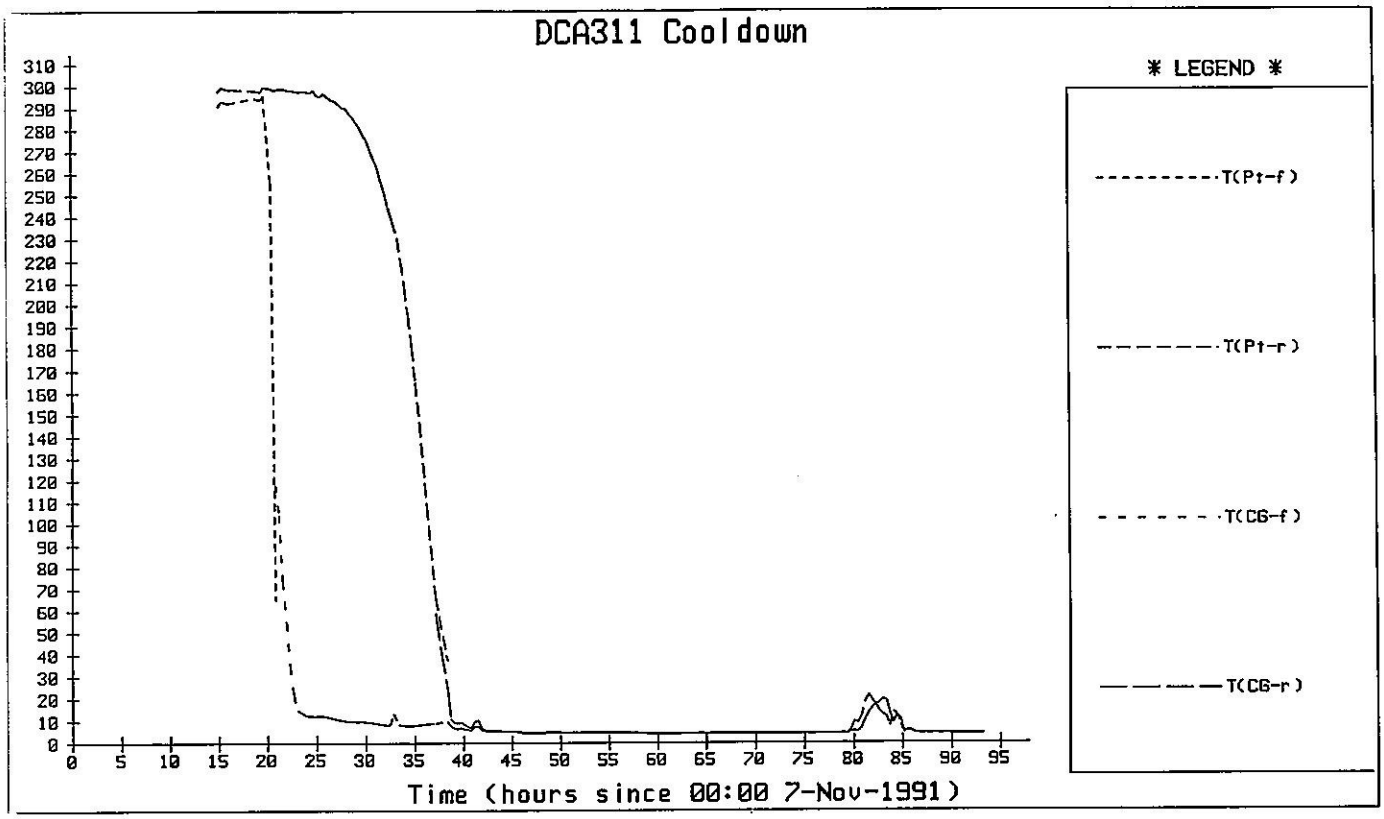
				Bul.1	Bul.2	Bul.3	Bul.4	Sum
				1853	1581	1815	2133	7382

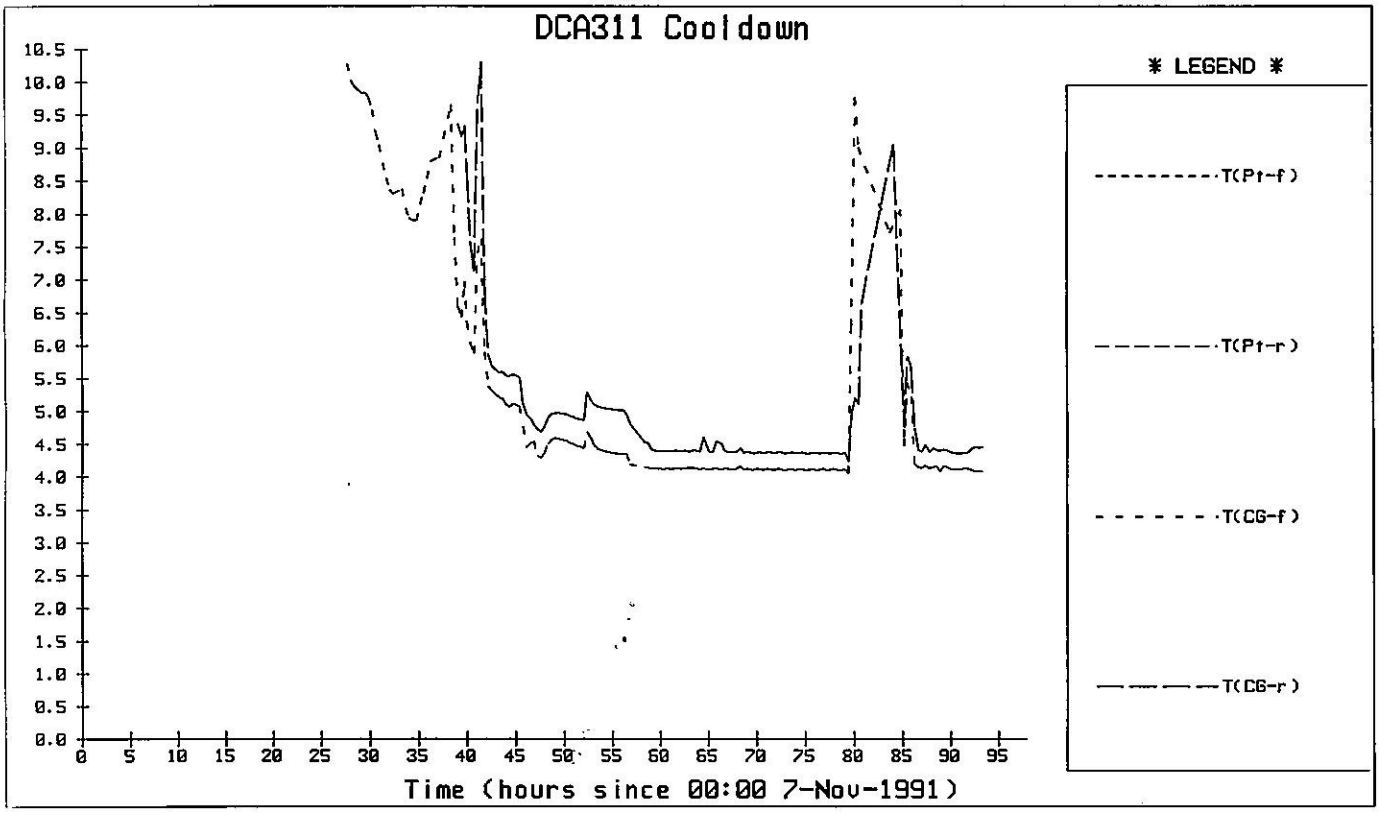
Change with cooldown

L In1	L In2	L In3	L In4	R In1	R In2	R In3	R In4	Average
-3091	-2475	-4007	-3388	-3340	-2090	-3137	-3360	-3111

L Out1	L Out2	L Out3	L Out4		R Out2		R Out4	Average
-3320	-3398	-2147	-1900		2055		-1524	-1706

			Bul.1	Bul.2	Bul.3	Bul.4	Sum
			739	455	738	952	2883


DCA311 Cooldown
* LEGEND *
T(Pt-f)
T(Pt-r)
T(CG-f)
T(CG-r)
Time (hours since 00:00 7-Nov-1991)


DCA311 Cooldown
* LEGEND *
T(Pt-f)
T(Pt-r)
T(CG-f)
T(CG-r)
Time (hours since 00:00 7-Nov-1991)