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APPENDIX N

SHUTTLE CAR CONVEYOR MOTOR

Typical nameplate data for the conveyor motor of a Shuttle car can be seen in Table N-1. The conveyor motor measured at both sections was a 9.5 / 19 kW two speed induction motor. The motor is normally connected to the fast speed which is the mean that the motor is rated to consume 15 A at full load

Table N-1: Nameplate data of the conveyor motor on a SC.

Shuttle car Conveyer Motor					
Power	19 / 9.5	kW	Voltage	950	V
Duty	S1		Current	15	A
Ins class	H		RPM	1390 / 695	
			pf	0.86	

Table N-2: Production figures for shifts that the conveyor motor was investigated.

Date	Sect 51		Sect 50	
	Morning	Afternoon	Morning	Afternoon
20-Jun-2005	1200	1890	-	-
21-Jun-2005	**2030**	**2320**	-	-
4-Jul-2005	-	**-**	1800	**2124**

N.1 LOAD PROFILE

The next section focuses on the load profiles of the conveyor motor. Each graph shows the line voltage and the voltage limits, the load current and full load current capacity of the conveyor motor. The morning shifts and afternoon shifts are separated as well as the measurements made at the different sections.

N.1.1 SECTION 50

N.1.1.1 Morning shifts

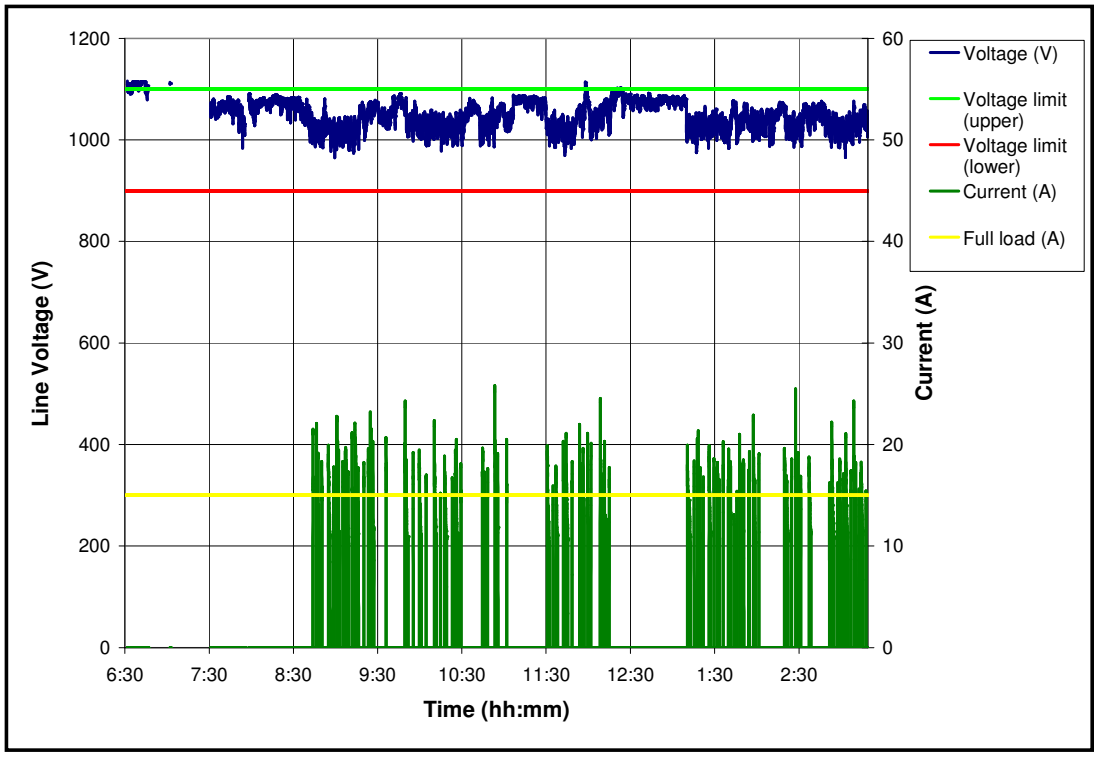

Figure N.1-1: Load current and voltage for a conveyor motor – 04 July 2005.

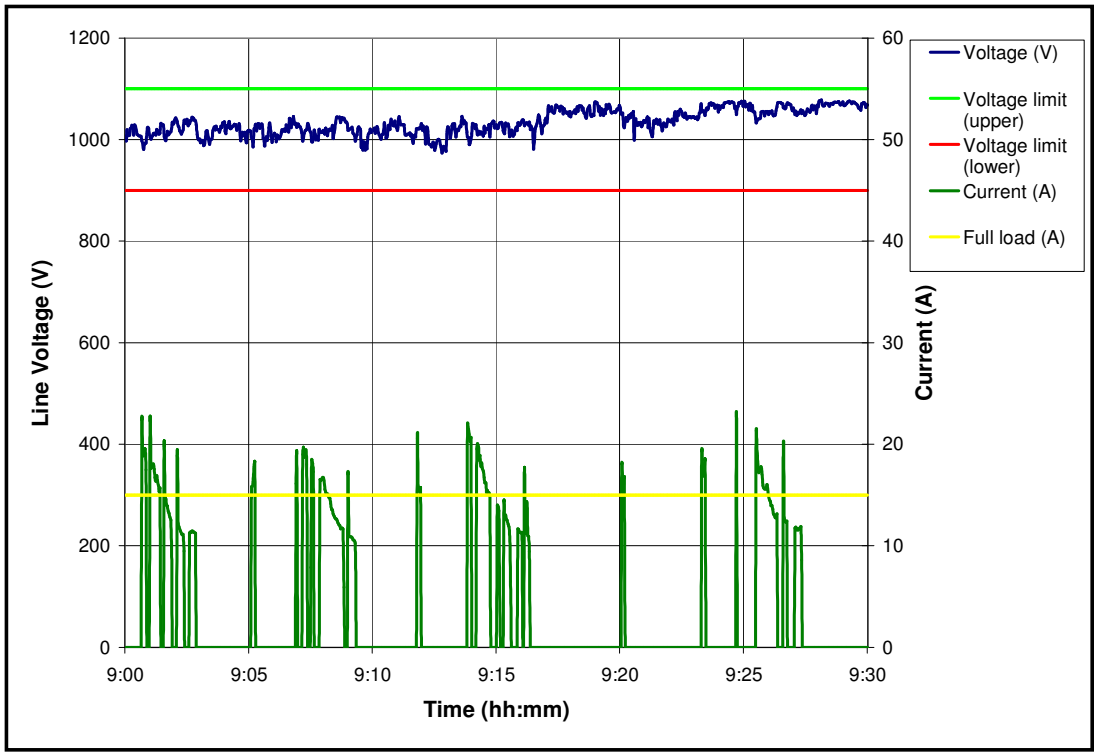

Figure N.1-2: Load current and voltage for a conveyor motor – 04 July 2005 (30 minute period).

N.1.1.2 Afternoon shifts

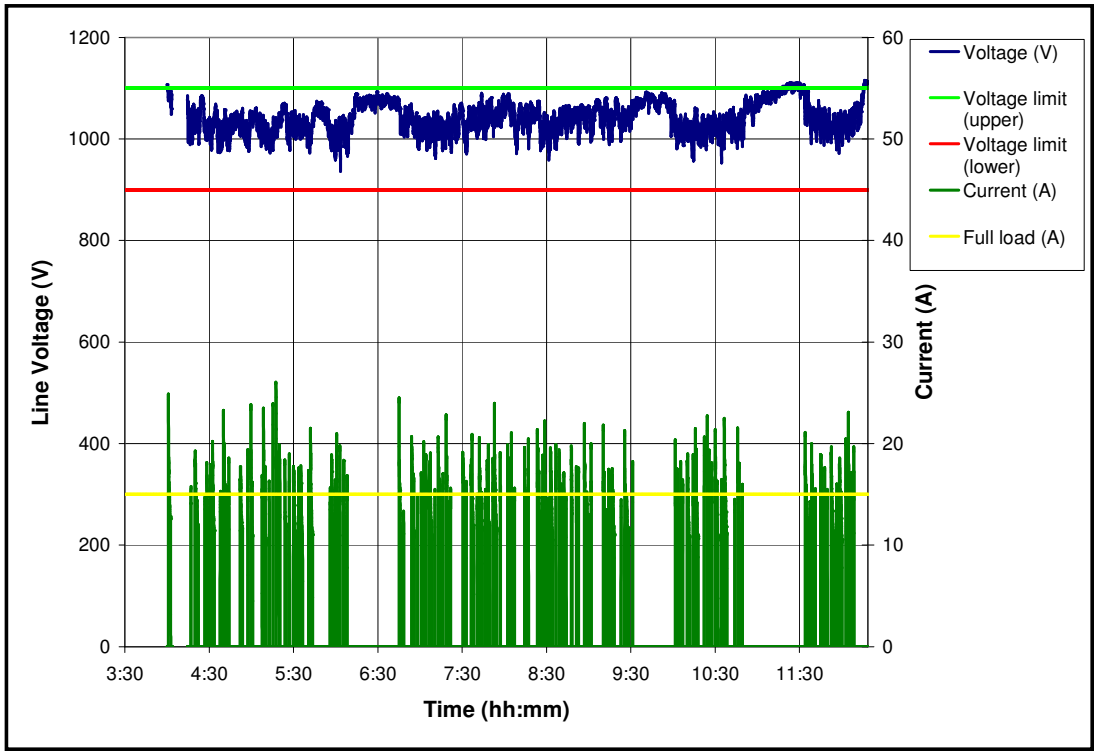

Figure N.1-3: Load current and voltage for a conveyor motor – 04 July 2005.

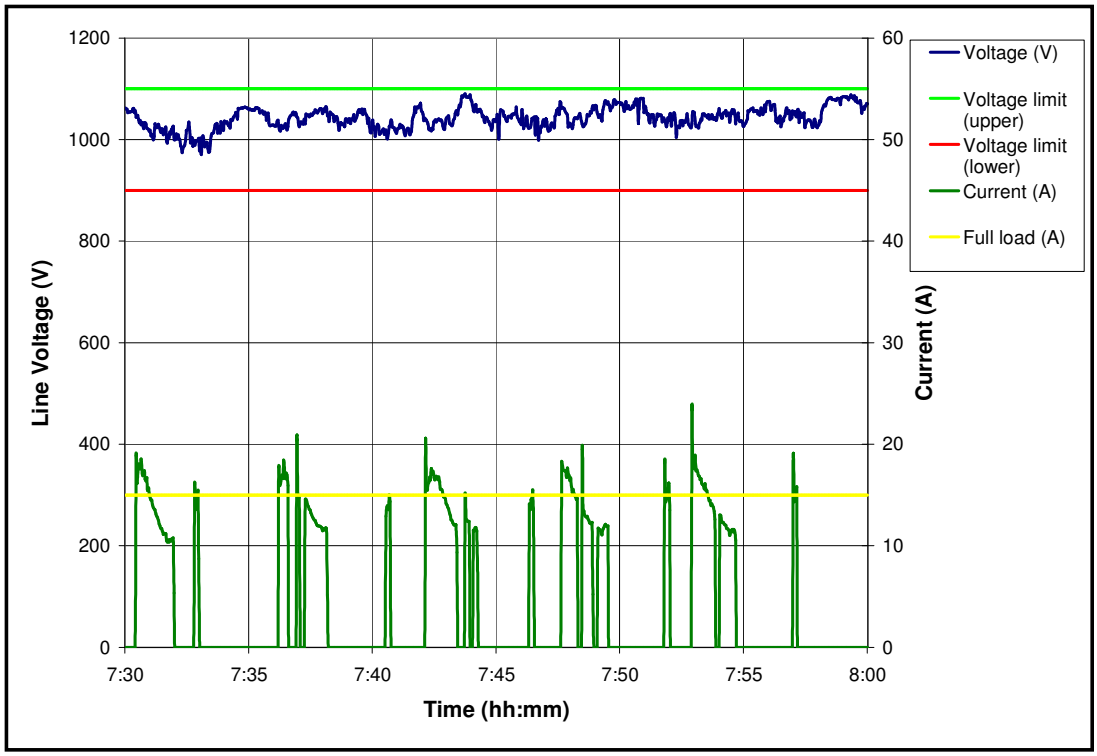

Figure N.1-4: Load current and voltage for a conveyor motor – 04 July 2005 (30 minute period).

N.1.2 SECTION 51

N.1.2.1 Morning shifts

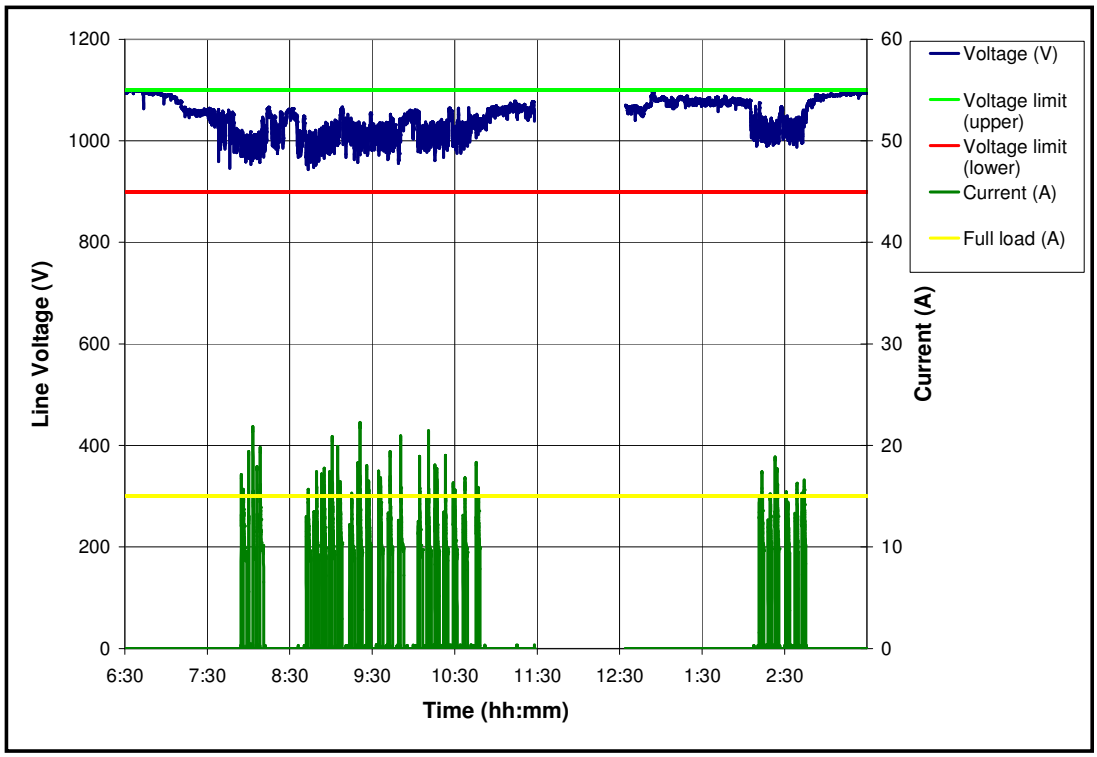

Figure N.1-5: Load current and voltage for a conveyor motor – 20 June 2005.

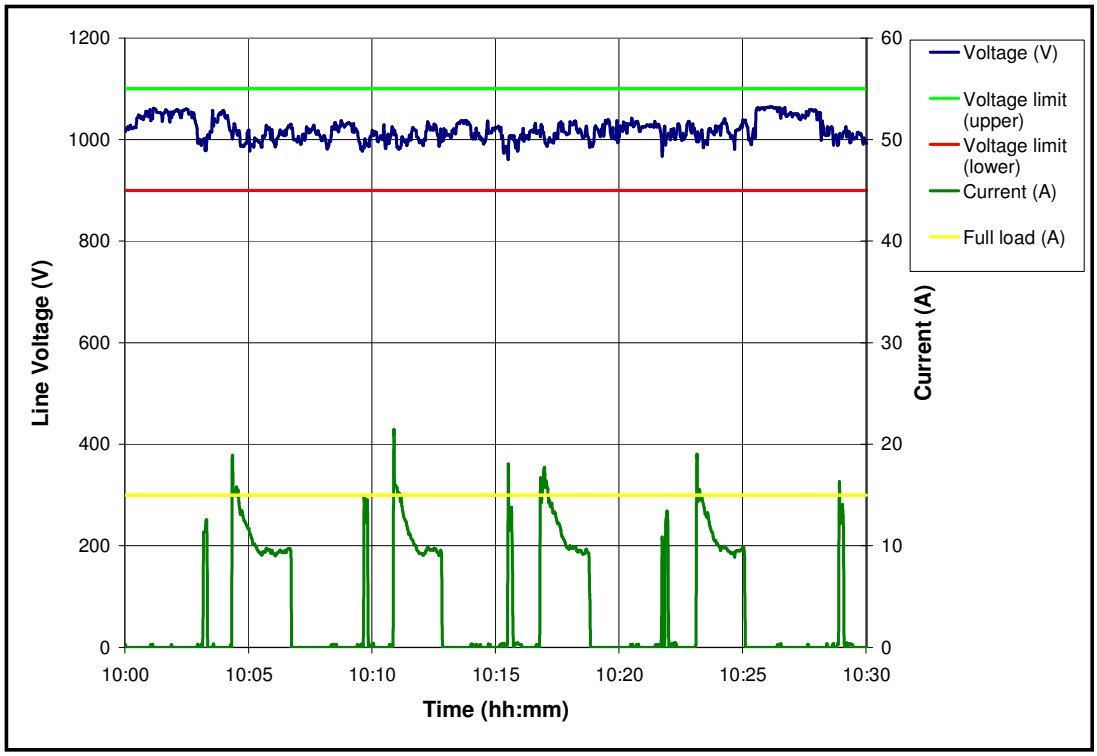

Figure N.1-6: Load current and voltage for a conveyor motor – 20 June 2005 (30 minute period).

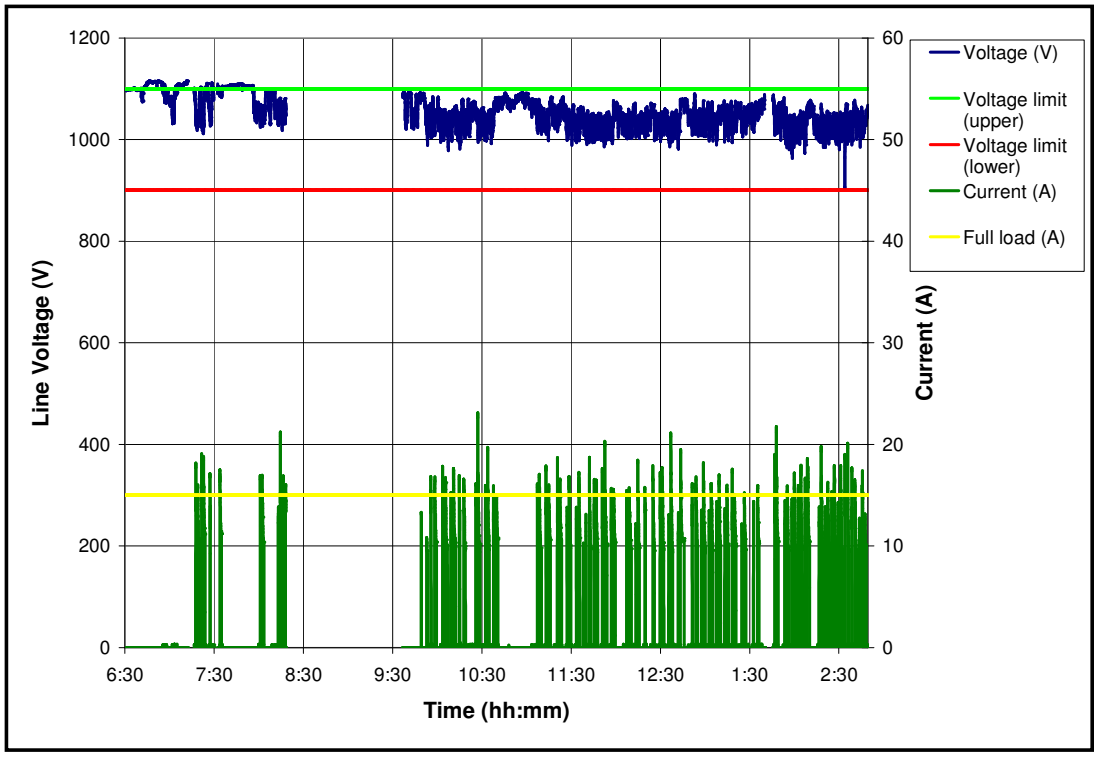

Figure N.1-7: Load current and voltage for a conveyor motor – 21 June 2005.

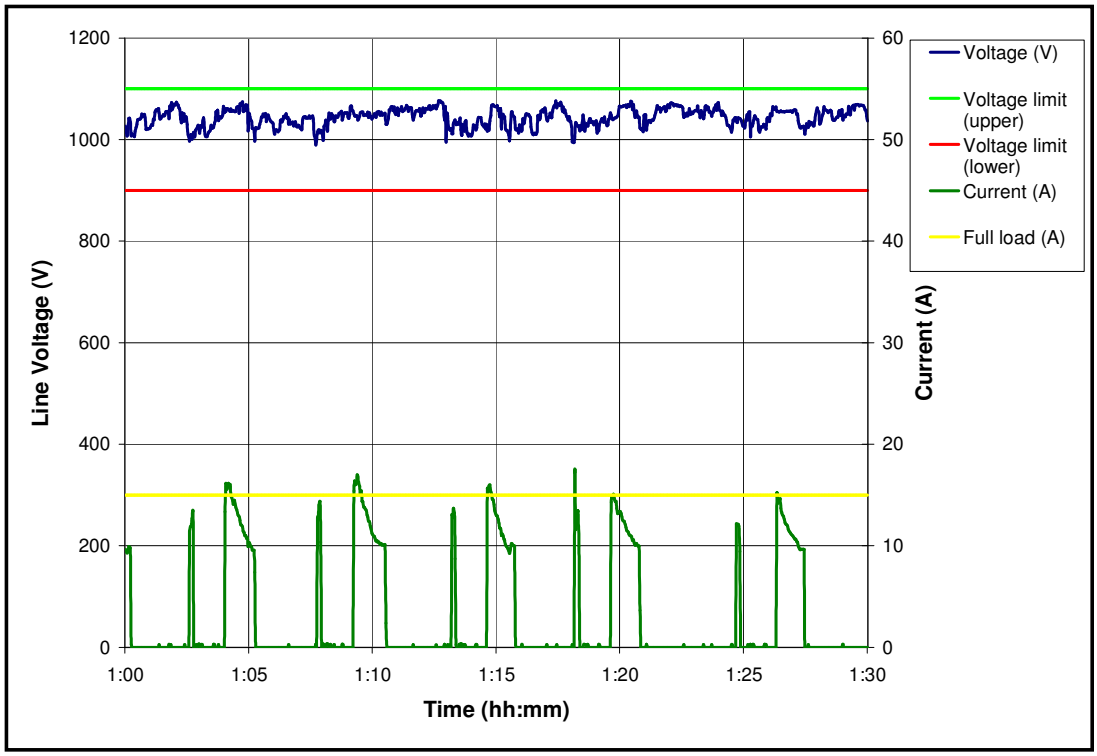

Figure N.1-8: Load current and voltage for a conveyor motor – 21 June 2005 (30 minute period).

N.1.2.2 Afternoon shifts

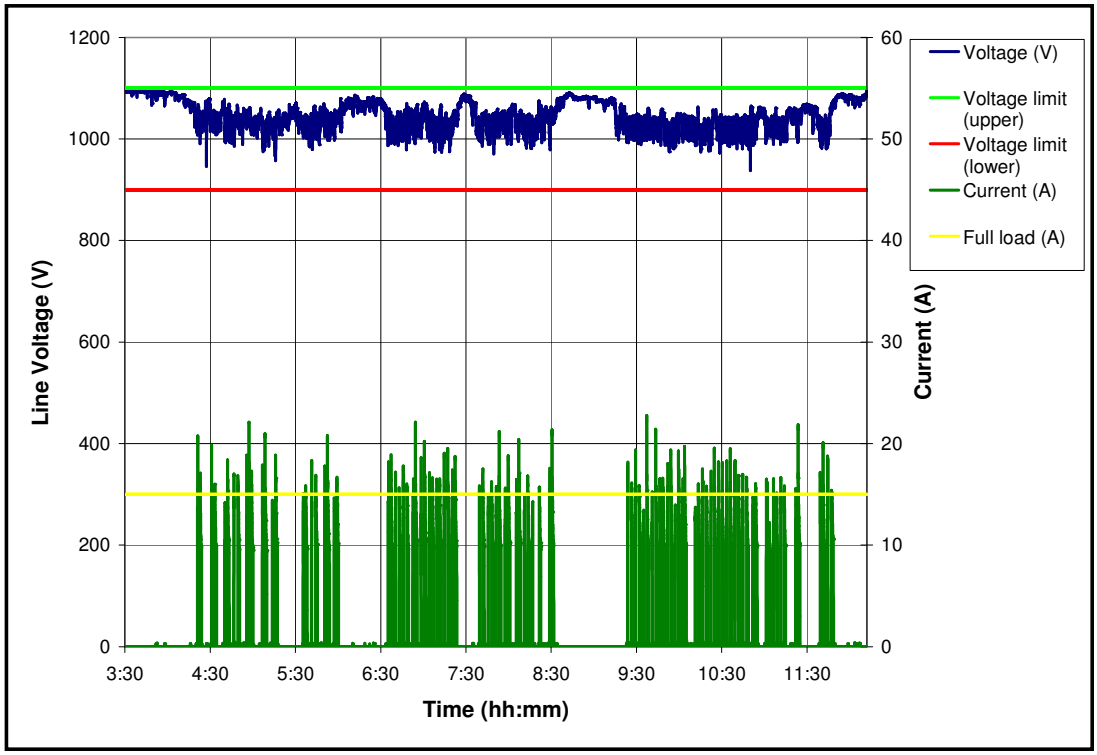

Figure N.1-9: Load current and voltage for a conveyor motor – 20 June 2005.

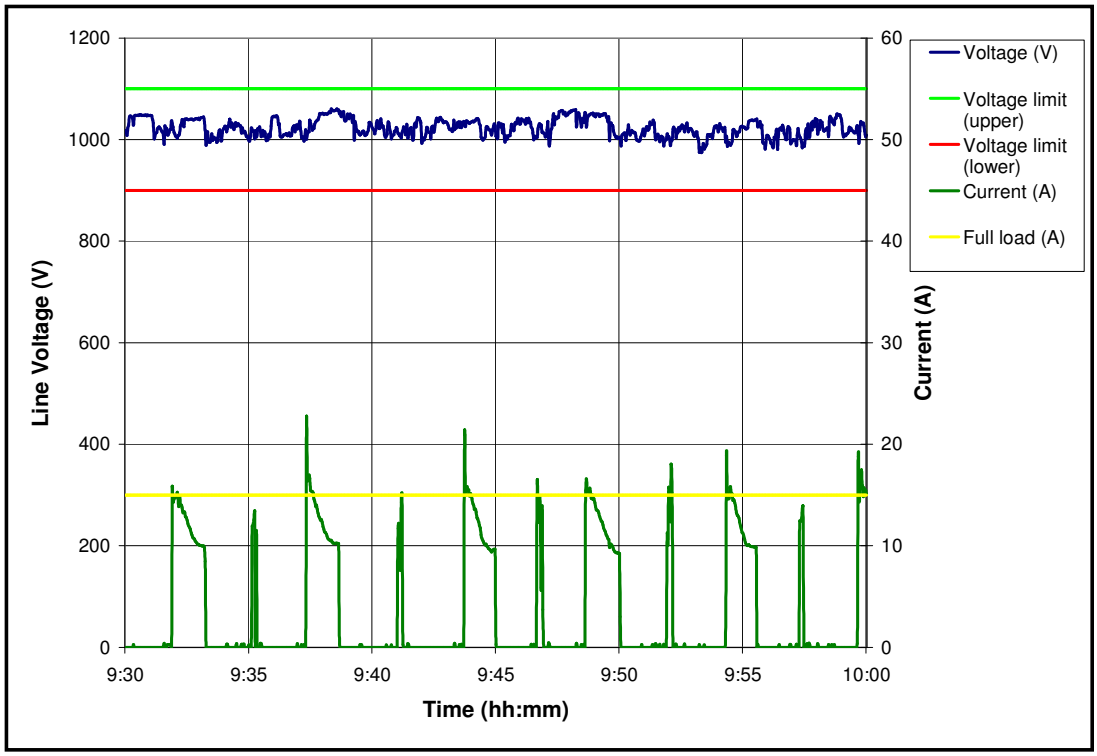

Figure N.1-10: Load current and voltage for a conveyor motor – 20 June 2005 (30 minute period).

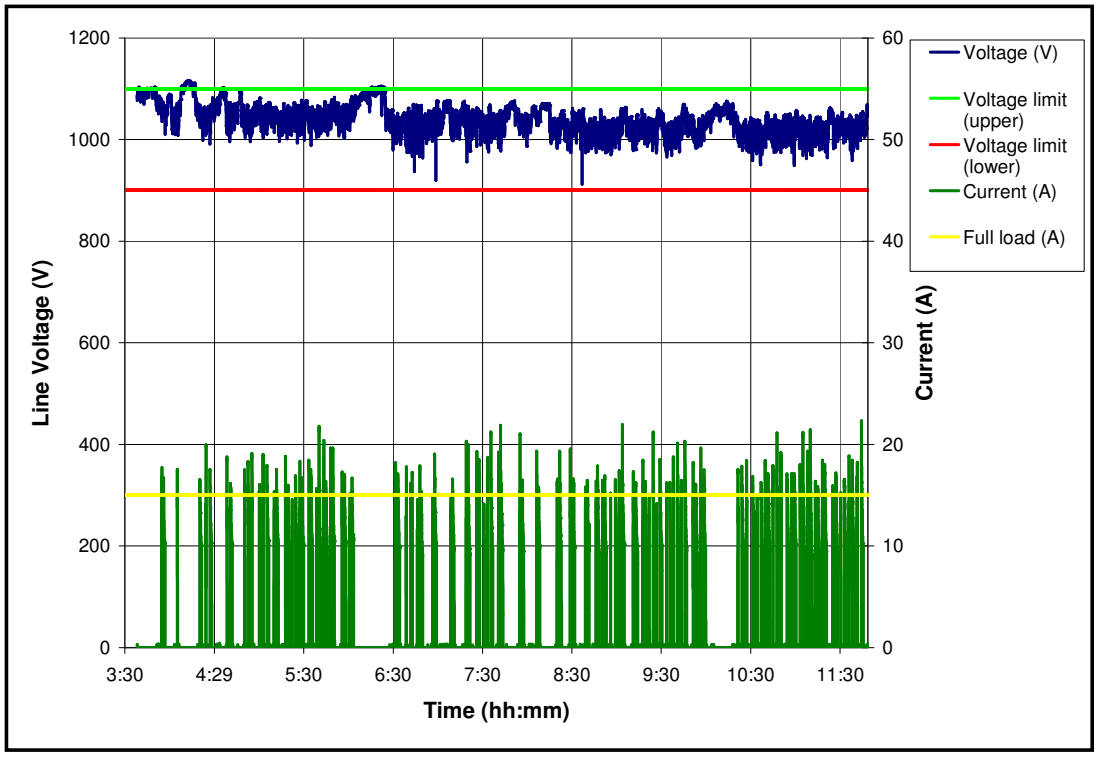

Figure N.1-11: Load current and voltage for a conveyor motor – 21 June 2005.

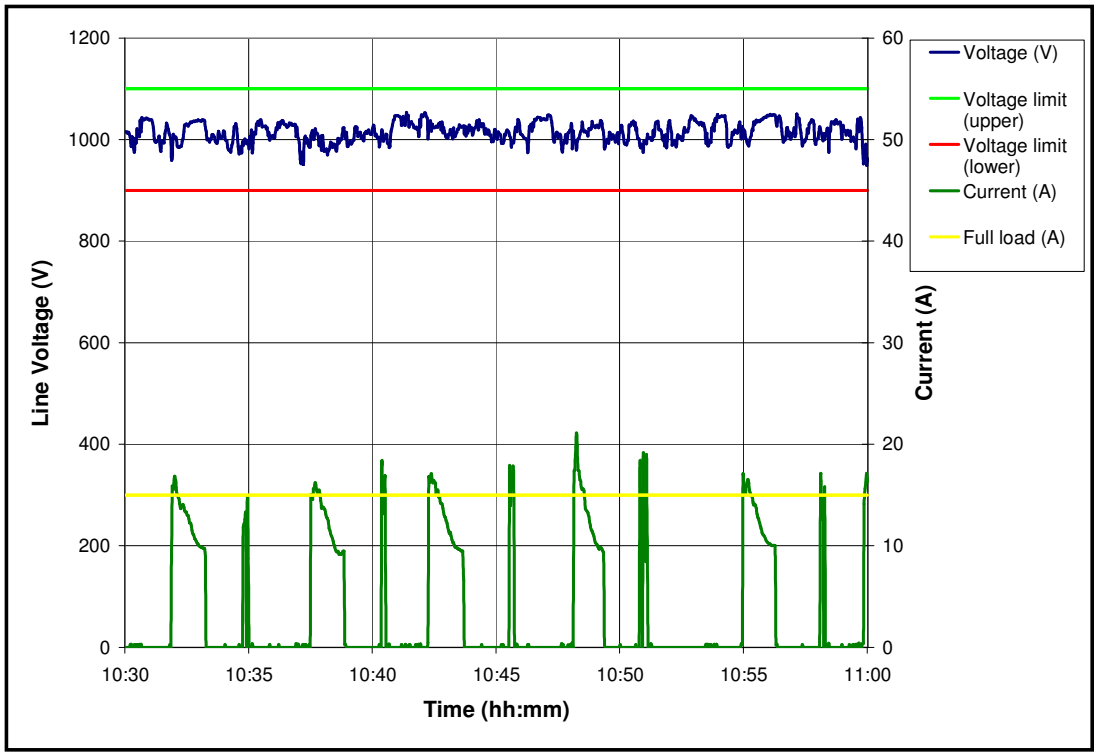

Figure N.1-12: Load current and voltage for a conveyor motor – 21 June 2005 (30 minute period).

N.2 HISTOGRAM

The next section focuses on the frequency with which a Shuttle cars conveyor motor consumed a certain load power and current. The graphs show the number of times a certain power or current has been consumed. The tables give data about the tonnes produced during the shift and the percentage time of the shift that the motors were producing. The time that the motors have been over loaded or loaded within the full load rating of the motor is given as a percentage of the actual producing time. The morning shifts and afternoon shifts are separated as well as the measurements made at the different sections.

N.2.1 SECTION 50

N.2.1.1 Morning shifts

Table N-3: Data for the total consumption of a conveyor motor in section 50.

	04-Jul-05
Tonnes/CM/Shift	1800
% Time of shift producing	11.87%
% of Production time underloaded	55.35%
% of Production time overloaded	44.65%

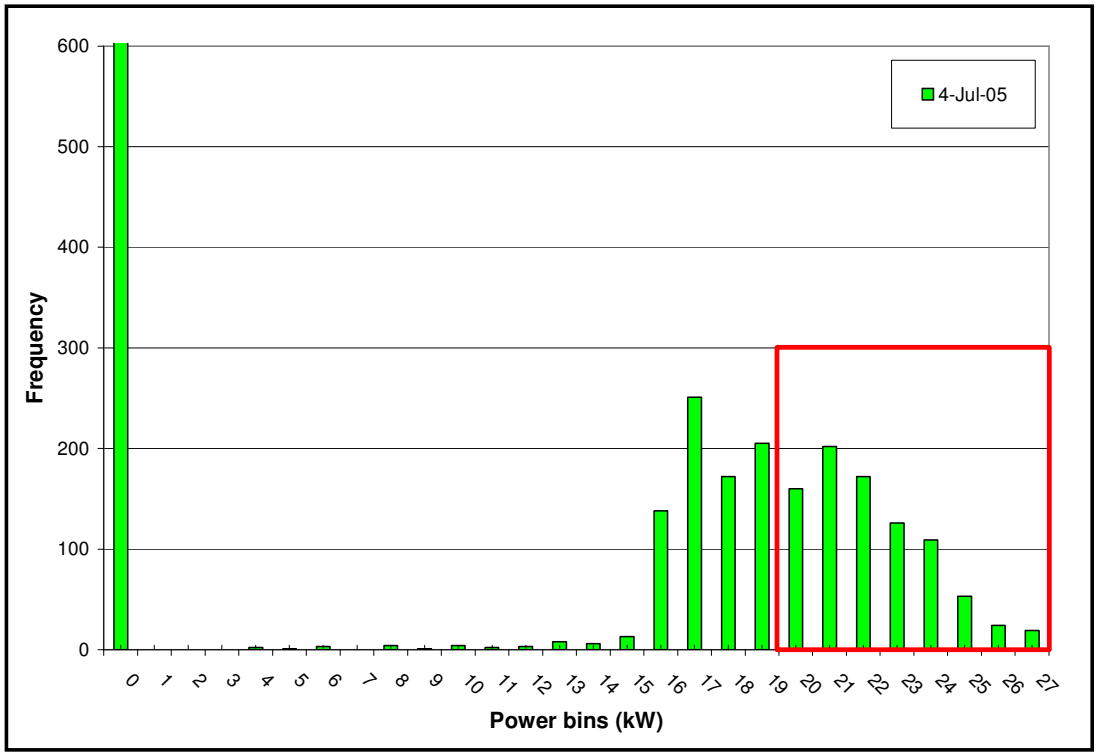

Figure N.2-1: Histogram for power consumed by a conveyor motor.

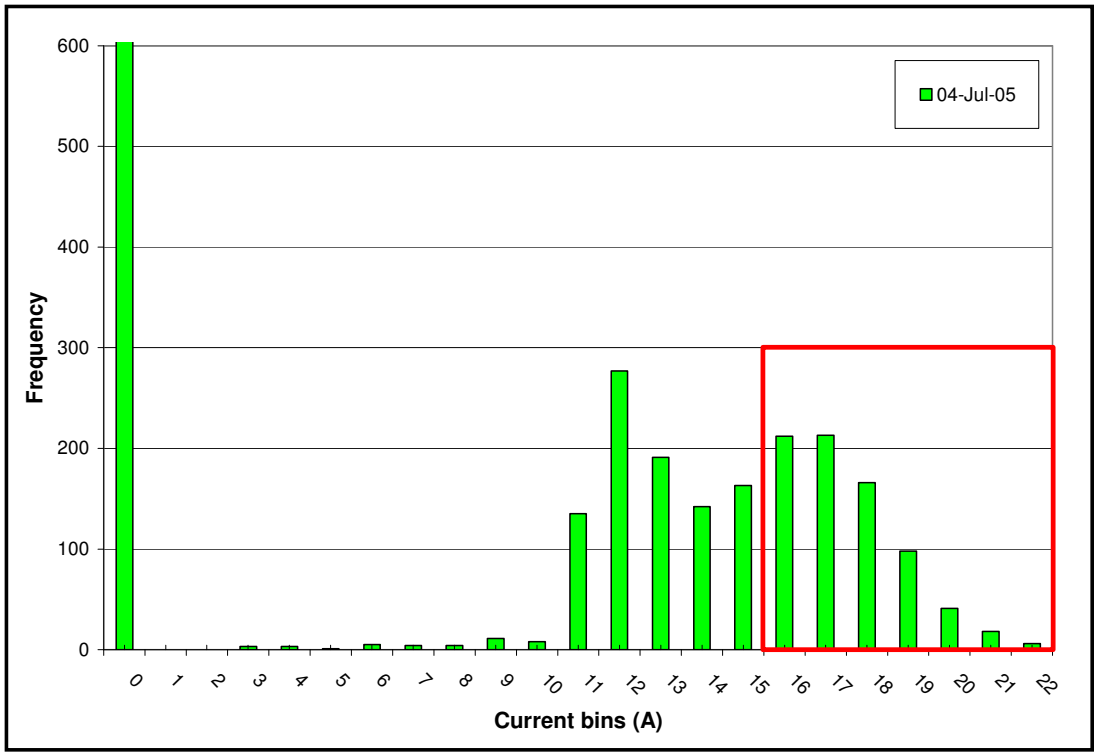

Figure N.2-2: Histogram for current consumed by a conveyor motor.

N.2.1.2 Afternoon shifts

Table N-4: Dat Data for the total consumption of a conveyor motor in section 50.

	04-Jul-05
Tonnes/CM/Shift	2124
% Time of shift producing	18.09%
% of Production time underloaded	63.28%
% of Production time overloaded	36.72%

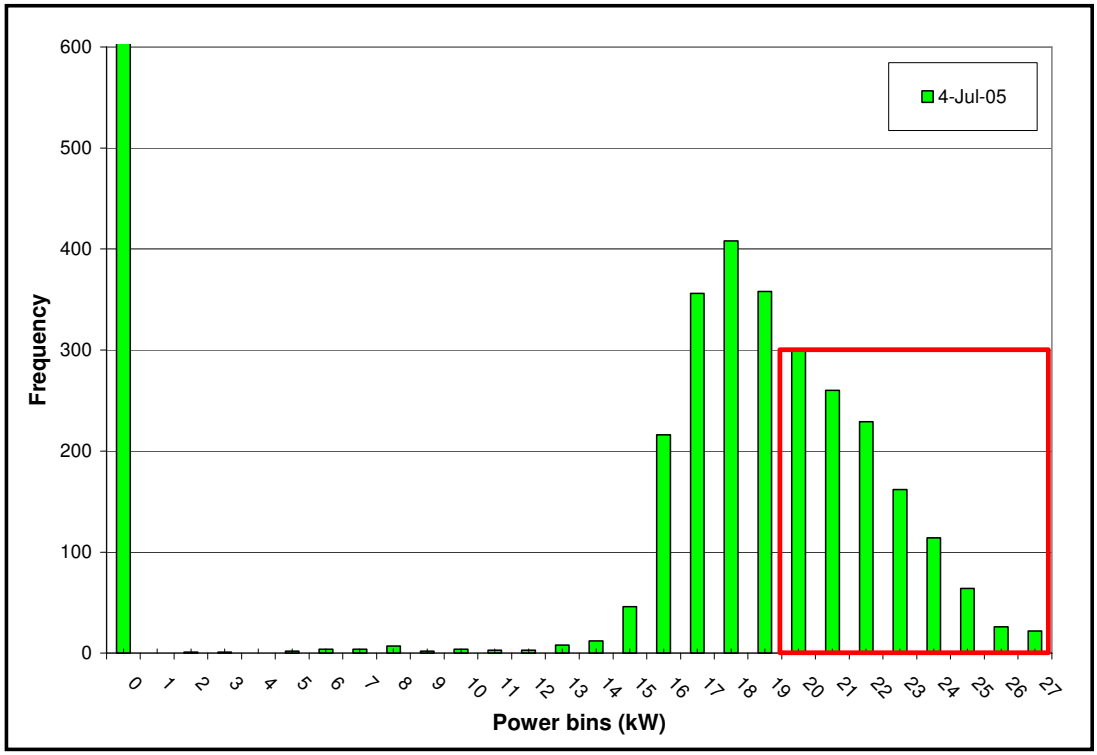

Figure N.2-3: Histogram for power consumed by a conveyor motor.

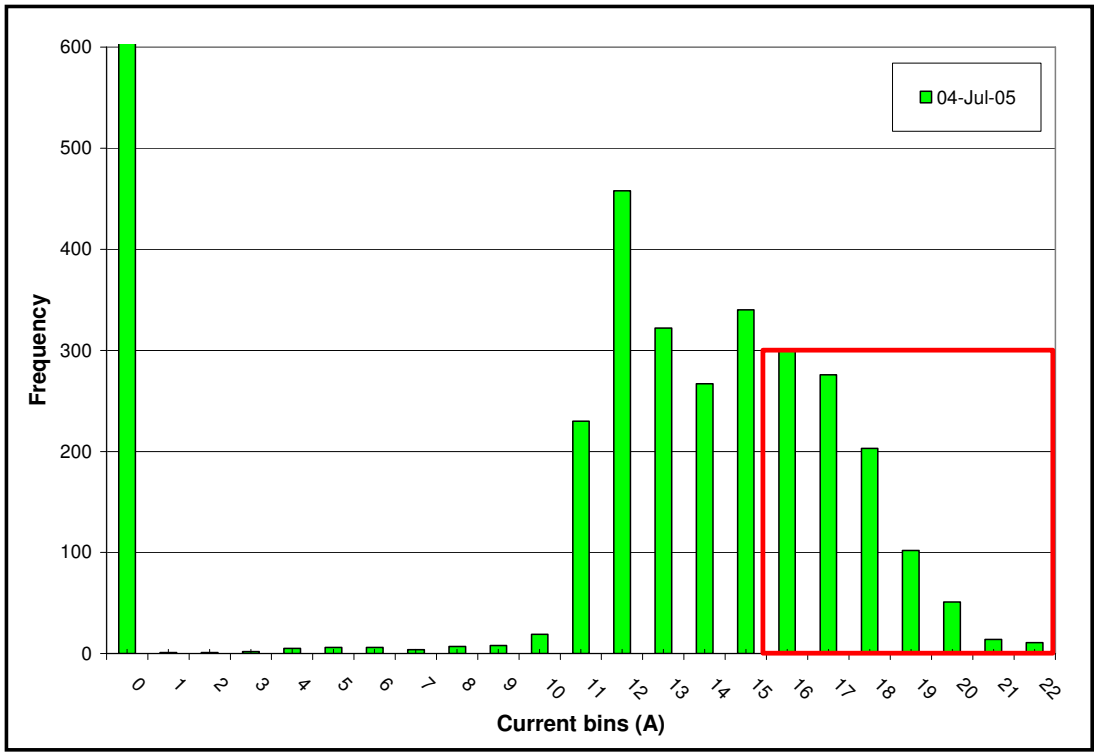

Figure N.2-4: Histogram for current consumed by a conveyor motor.

N.2.2 SECTION 51

N.2.2.1 Morning shifts

Table N-5: Data for the total consumption of a conveyor motor in section 51.

	20-Jun-05	21-Jun-05
Tonnes/CM/Shift	1200	2030
% Time of shift producing	11.54%	17.09%
% of Production time underloaded	89.38%	82.91%
% of Production time overloaded	10.62%	17.09%

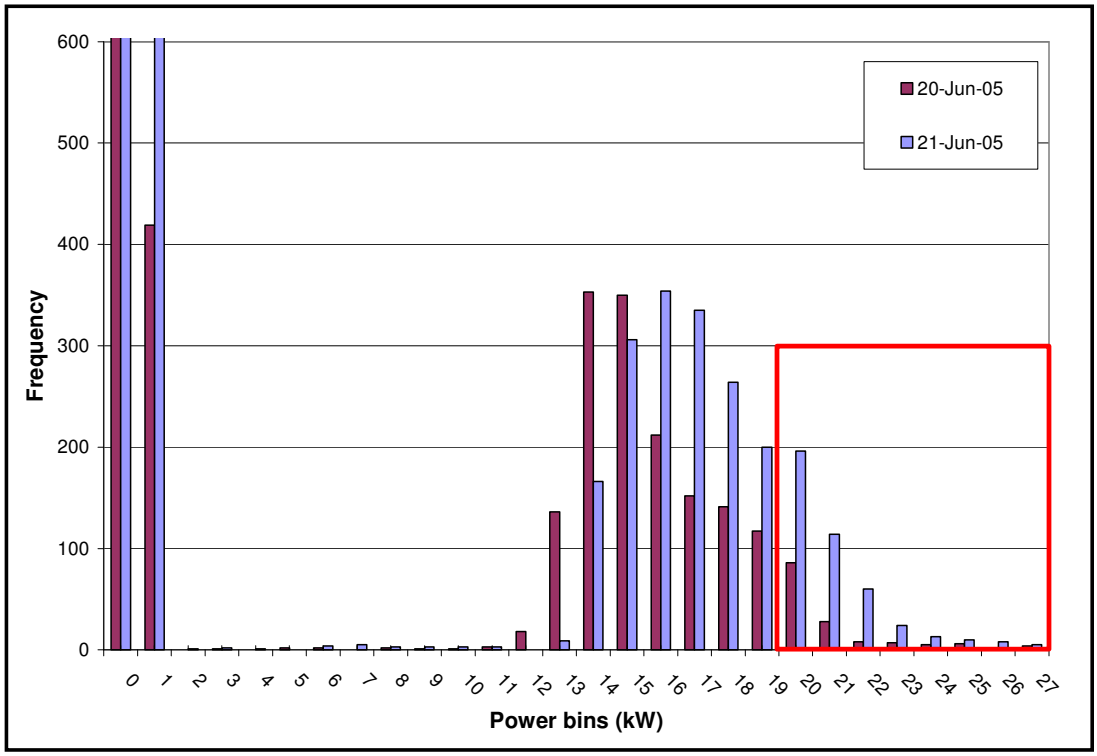

Figure N.2-5: Histogram for power consumed by a conveyor motor.

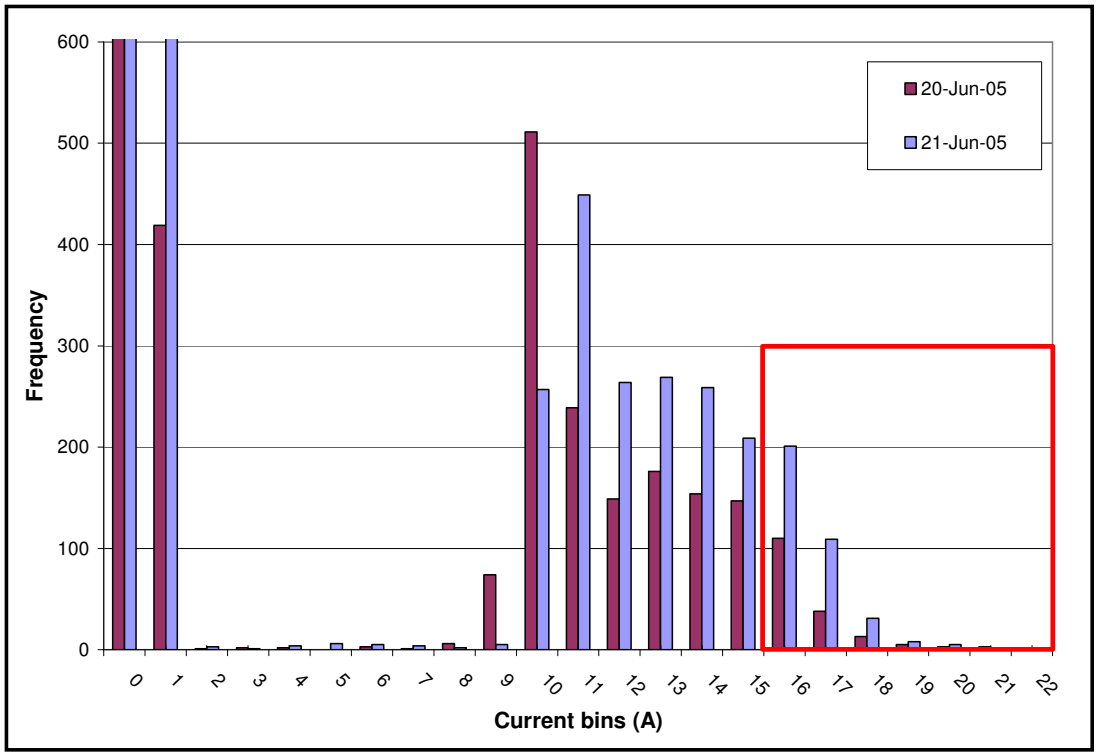

Figure N.2-6: Histogram for current consumed by a conveyor motor.

N.2.2.2 Afternoon shifts

Table N-6: Dat Data for the total consumption of a conveyor motor in section 51.

	20-Jun-05	21-Jun-05
Tonnes/CM/Shift	1890	2320
% Time of shift producing	14.61%	17.59%
% of Production time underloaded	82.04%	78.82%
% of Production time overloaded	17.96%	21.18%

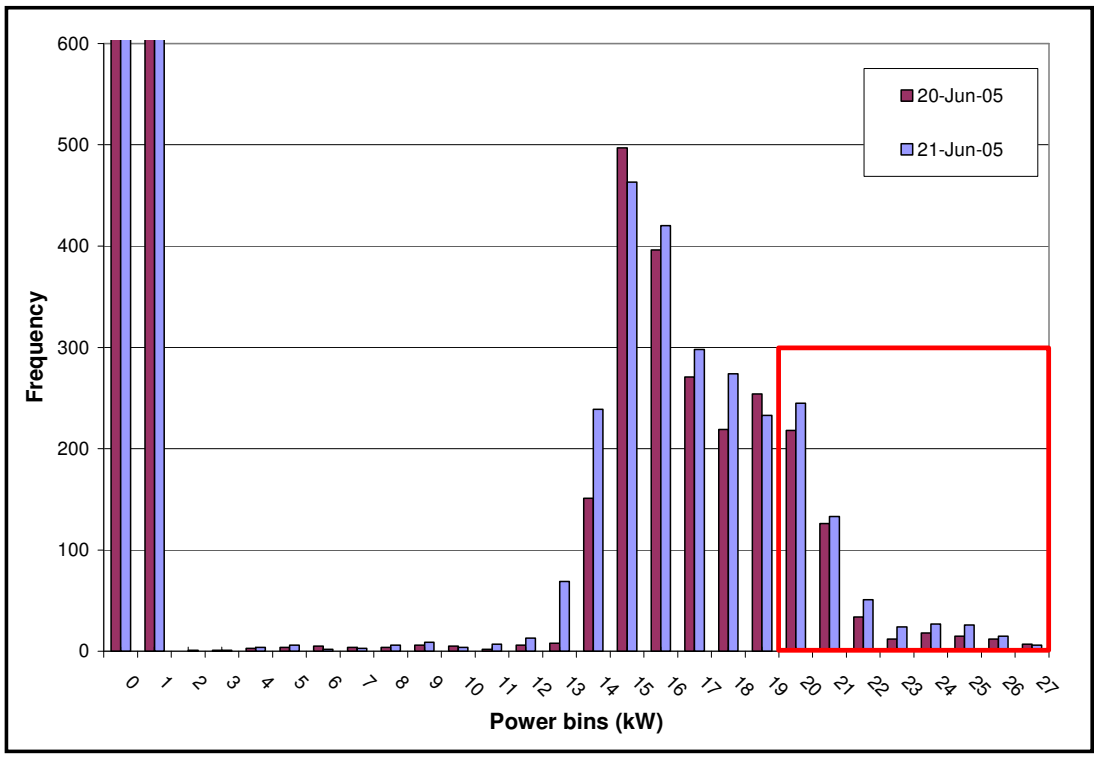

Figure N.2-7: Histogram for power consumed by a conveyor motor.

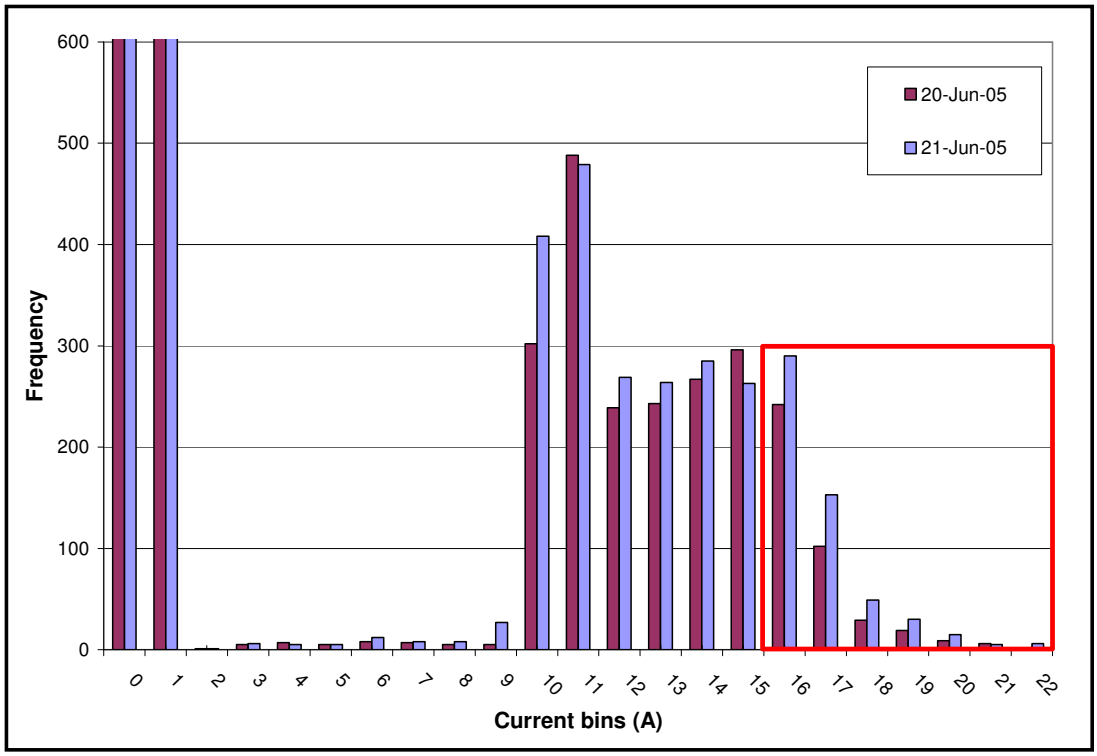

Figure N.2-8: Histogram for current consumed by a conveyor motor.

N.3 THERMAL CAPACITY

The next section focuses on the temperature of the windings of the conveyor motor. Each graph shows the temperature of the motor, the load current and rated full load current of the motor. The morning shifts and afternoon shifts are separated as well as the measurements made at the different sections. The thermal time constant is 30 minutes.

N.3.1 SECTION 50

N.3.1.1 Morning shifts

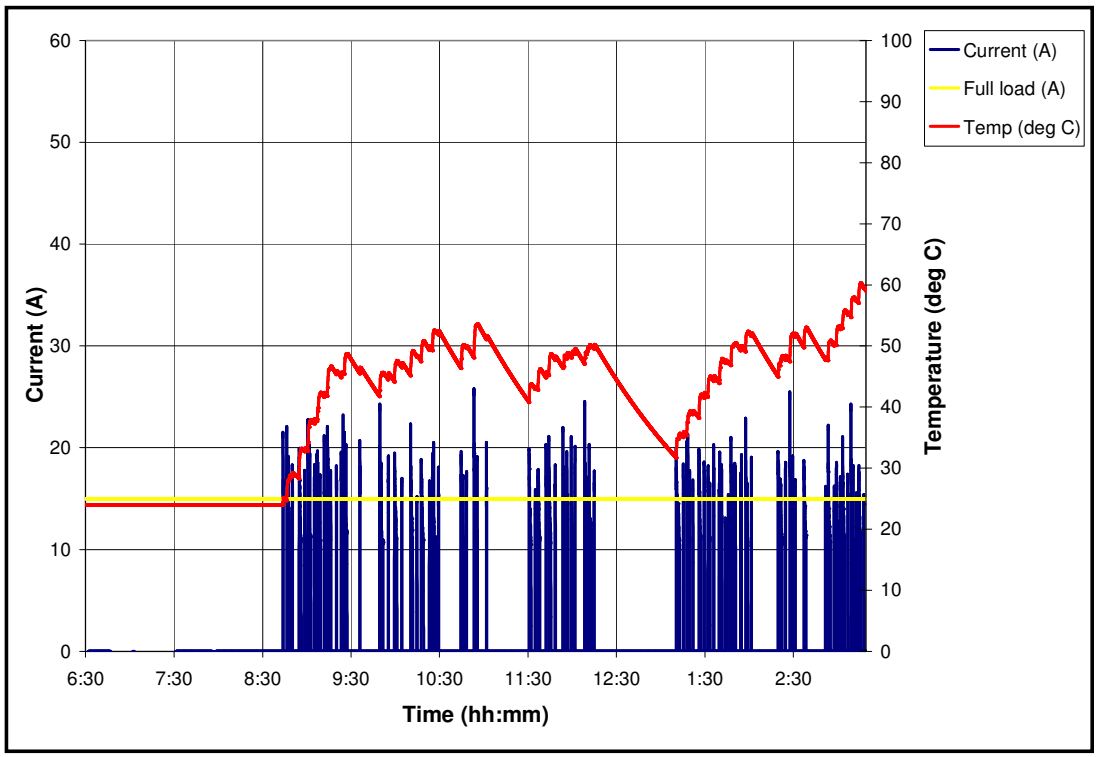

Figure N.3-1: Load current and motor temperature for a conveyor motor – 04 July 2005.

N.3.1.2 Afternoon shifts

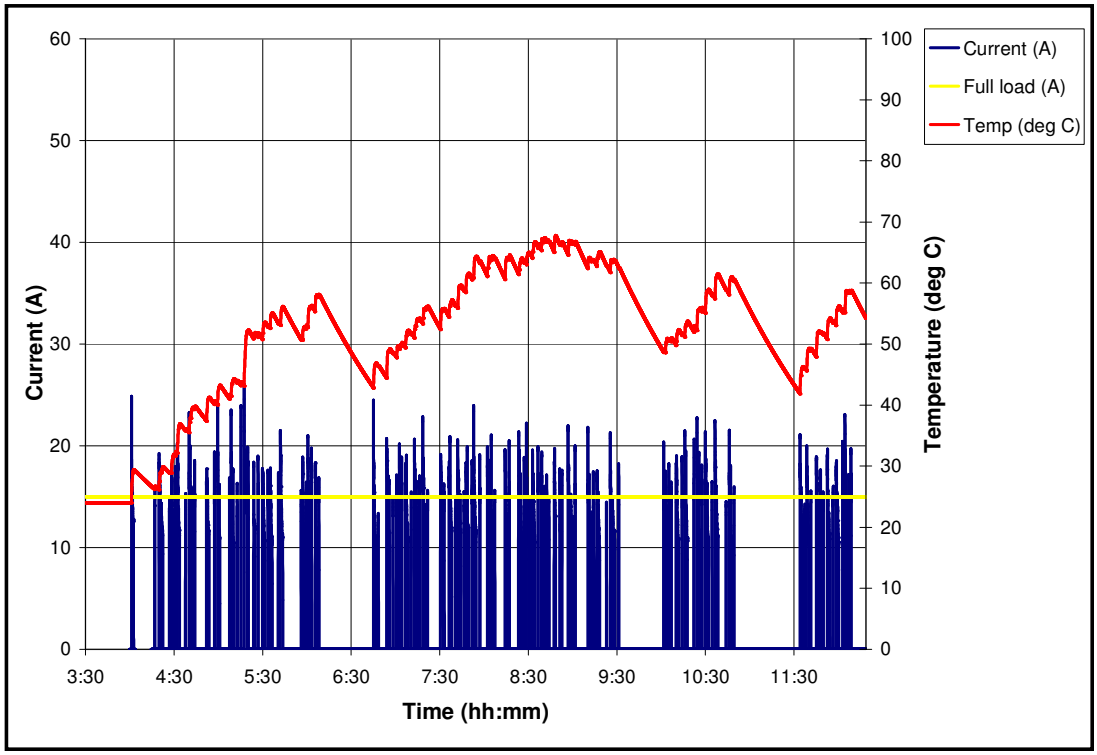

Figure N.3-2: Load current and motor temperature for a conveyor motor – 04 July 2005.

N.3.2 SECTION 51

N.3.2.1 Morning shifts

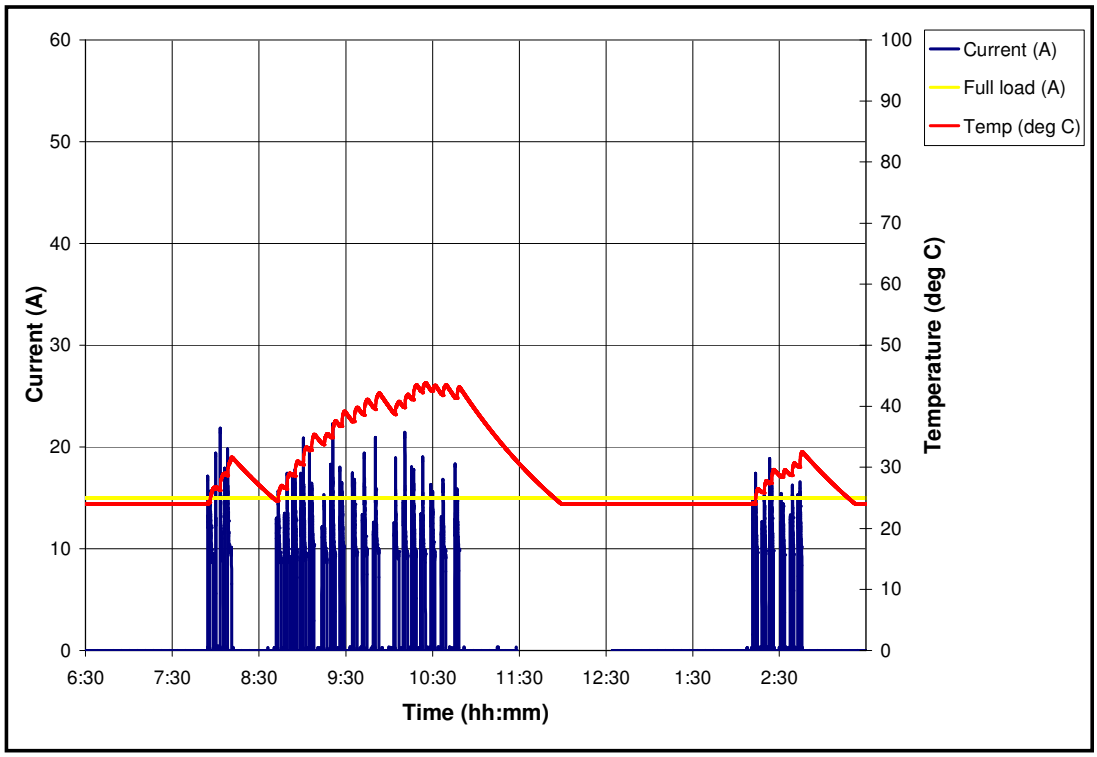

Figure N.3-3: Load current and motor temperature for a conveyor motor – 20 June 2005.

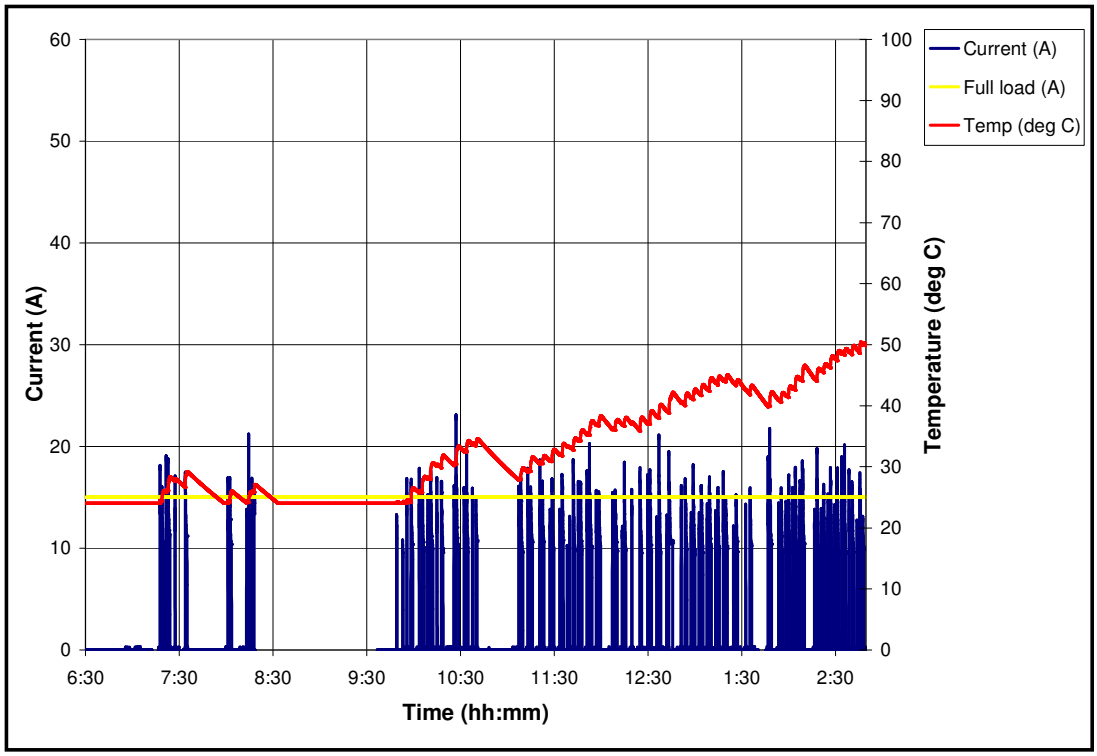

Figure N.3-4: Load current and motor temperature for a conveyor motor – 21 June 2005.

N.3.2.2 Afternoon shifts

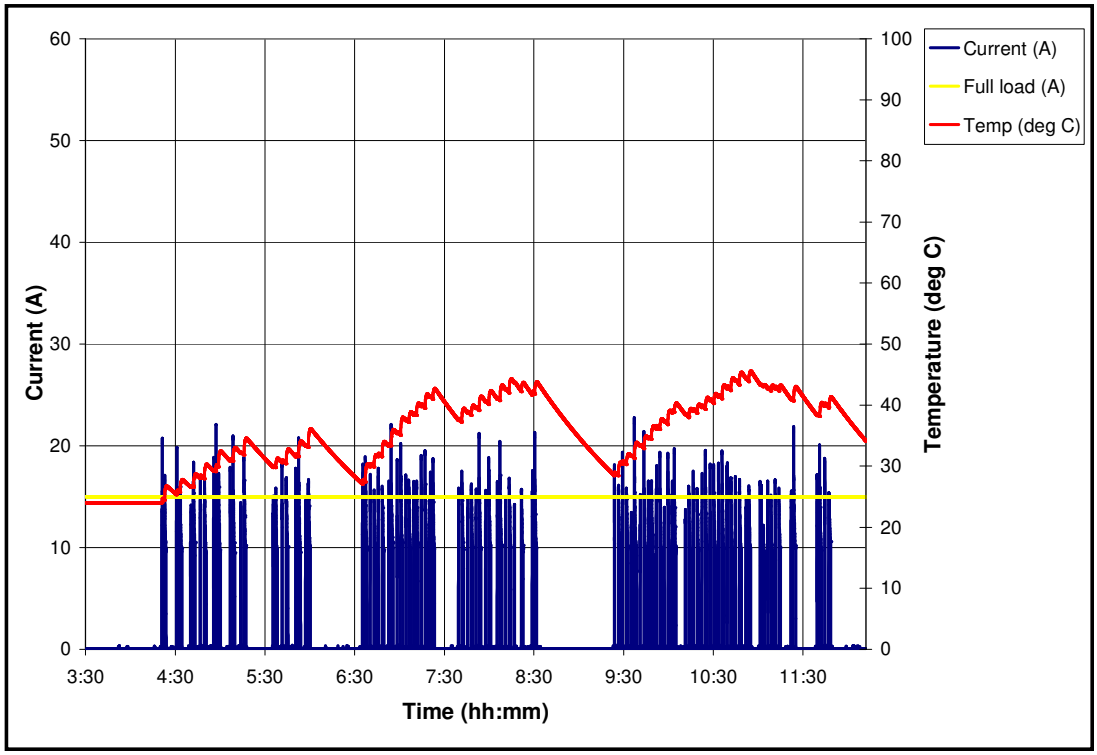

Figure N.3-5: Load current and motor temperature for a conveyor motor – 20 June 2005.

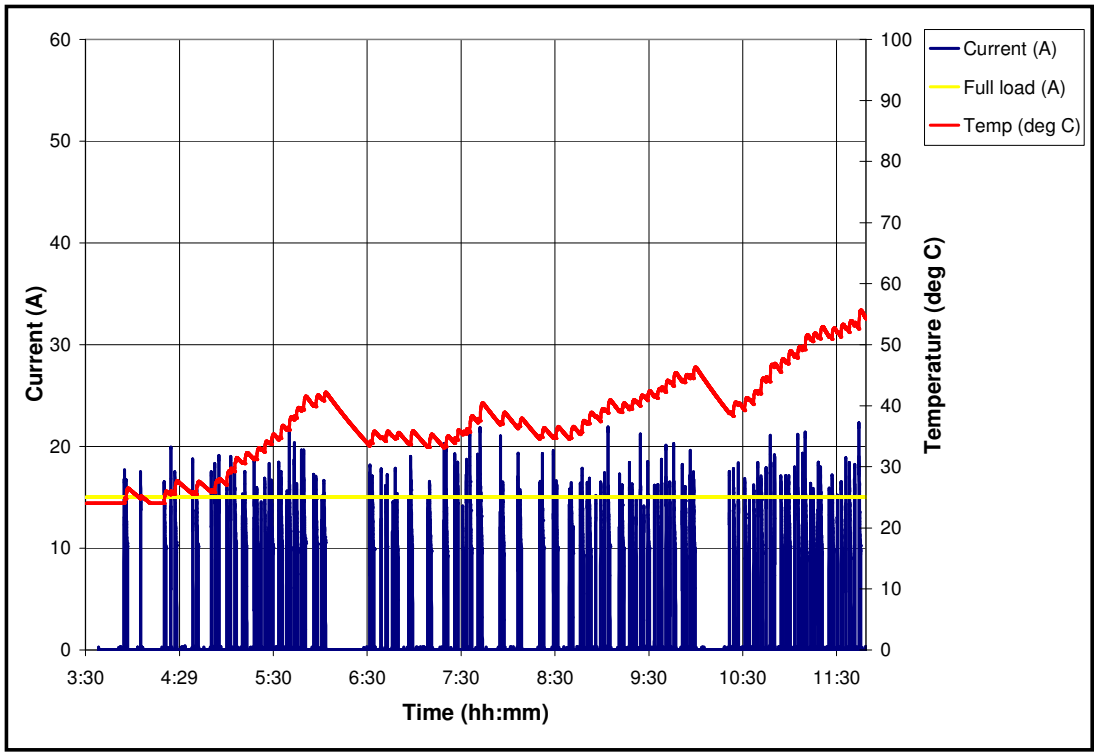

Figure N.3-6: Load current and motor temperature for a conveyor motor – 21 June 2005.