Application Note

Real-time Anti-sway with ME300, Using Analogue Input

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History

Rev.	Comments	Date
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1 Introduction

Crane applications get more and more complicated and advanced every year. Being a critical a part of whole system in industrial facilities, manufacturing areas, construction sites and ports, these kind of applications not only should be reliable, but also should have the capability to make the working conditions more smooth and operator friendly.

Anti-Sway is one of these functions, which creates benefits to operators as well as whole electromechanical system by having an advanced control of trolley and long travel (riding) motors during the acceleration and deceleration. Main aim is to avoid the sway that occurs during these moments of a crane with a load. Some of the benefits of this function are:

- Effectively eliminate the time it takes for the load to stop swaying.
- Greatly improve the safety of crane operation and reduce the risk of injury
- Make the crane easier to operate
- Extend the service life of the crane.

1.1 Operating Principle

We will be using trolley drive for this application note. Trolley usually refers to the drive & motor in overhead cranes which provides the movement between two long travel legs. Trolley motor is usually has the smallest power compared to hoist and long travel motors.

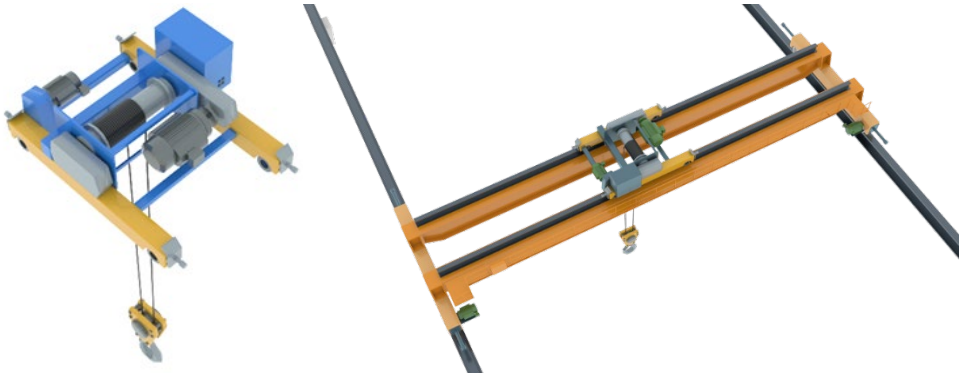

Figure 1-1 Trolley section

Figure 1-2 demonstrates the possible swaying scenario during the acceleration and deceleration of trolley/long travel motor. With regular acceleration and deceleration curves, there is no control over the sway so it is very likely to see the load moving back and forward (or right and left) during the movement. Main aim of anti-sway function is to modify the speed ramp curve during the acceleration and deceleration to avoid the sway.

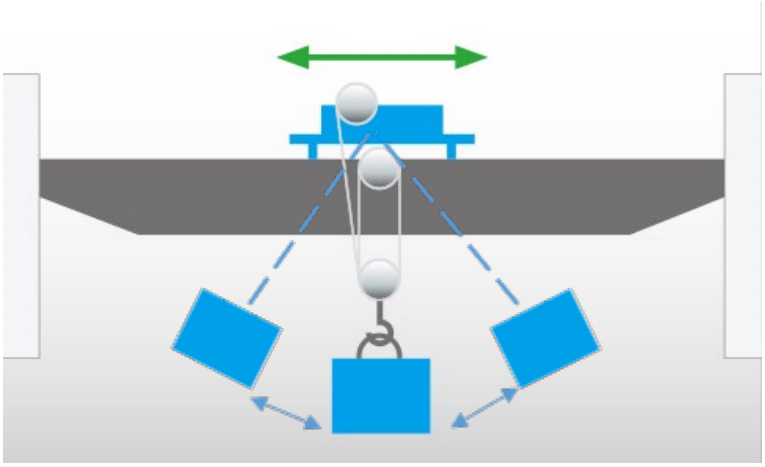

Figure 1-2 visible sway in overhead crane when there is no anti-sway function enabled

1.2 Rope length

For anti-sway function to work properly, trolley drive will need rope length data. This data can be entered to hoist drive manually or it can be obtained real-time from hoist drive. To get the data in real-time, there are two options. One of them is to use D2D link and the other is to use analogue signal. In this example, analogue signal is used and the calculation of rope length is made in C2000+ hoist drive. Then we get this data from hoist drive to our trolley drive. Please refer to application note for hoist rope calculation for details.

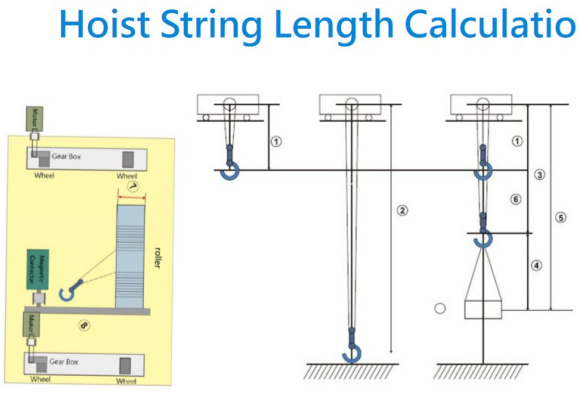

Figure 1-3 Refer to Hoist string Length Calculation Application Note

2 Setting Up Full-Closed Loop System

2.1 Products used

	Crane duty	Firmware	Description
C2000+	Hoist	-	This drive is not necessarily have to be C2000+
ME300	Trolley	1,03 or higher	

2.2 Physical layout

2.3 Parameter Table

Trolley necessary parameters:

03-00	AVI Selection	17 : Main rope length
04-20	Anti-sway function selection	1: Enabled, real time
04-26	Rope Length reading source	1: Analog connection
07-28	Macro settings	52: Trolley macro
02-01 ~ 02-05	Multi-Function Input Terminals	34: Anti-Sway on/off
		44: NL reverse limit
		45: PL forward limit
02-13	Multi-Function Relay Output	70: Brake Control

Hoist necessary parameters*

02-13	Multi-Function Relay Output	26: Crane Analogue rope length

**Please see hoist control application notes for all other parameters related to hoist control*

3 Checking the functionality

When anti-sway function is enabled and active, the movement of trolley (or long travel) motors becomes very smoot and it is easily visible. You can also notice that the acceleration and declaration curves change.

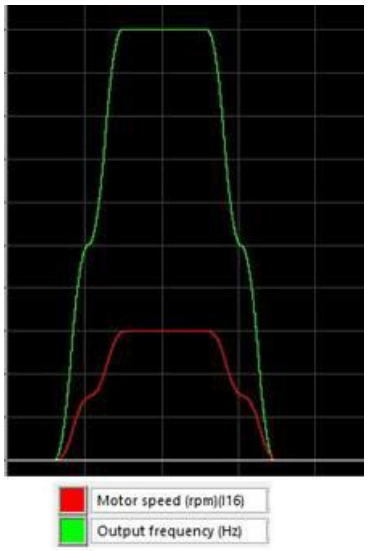

Figure 3-1 - Start-stop curves of active anti-sway function