DYNAMIC ANALYST

Dynamic analysis is used to verify the maximum and minimum loads on all belt conveyor components during all possible transient conditions of stopping and starting. It is also used to develop and test the control algorithms necessary to safely and reliability stop and start the load.

Proper dynamic analysis requires a time based, FEA solver which considers the elasticity of the belting and all the masses which make us the conveyance system.

What is Dynamic Analysis?

Dynamic Analyst™ is an add on module to Overland Conveyor Co's internationally renowned static analysis program; Belt Analyst™

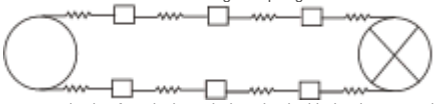
Dynamic Analyst™ uses the same user friendly interface to input any additional information required. Never a need to input the same data twice. Input motor and brake data as well as control deceleration and acceleration curves either numerically or graphically. Use popular PID control algorithms to control devices. Model take-ups as either gravity, fixed (screw) or as a mechanical winch or hydraulic cylinder.

Quicky add points to plot.
Plot belt tensions or belt velocity at any point on the conveyor. At every drive or brake, plot power, torque and whether or not slip might occur. Evaluate low tension conditions for potential dangeous sag conditions. And plot take-up carriage displacement and velocity. Review or record animations of belt tensions and belt velocities. Animation recorded in standard Windows AVI format can be viewed on any Windows based computer.

Quickly change between Imperial or Metric units with one click.
Printout all input and output data including graphics in a clean, professional format. Also, one click and you can write a PDF document to archive or e-mail to clients or associates.

How Does Dynamic Analysis Work?

When performing starting and stopping calculations per CEMA or DIN 22101 (static analysis), it is assumed all masses are accelerated at the same time and rate; in other words the belt is a rigid body (non-elastic). In reality, drive torque transmitted to the belt via the drive pulley creates a stress wave which starts the belt moving gradually as the wave propagates along the belt. Stress variations along the belt (and therefore elastic stretch of the belt) are caused by these longitudinal waves while being dampened by resistances to motion. It is, therefore, important a mathematical model of the belt conveyor that takes belt elasticity into account during stopping and starting be considered in these critical, long applications. A model of the complete conveyor system can be achieved by dividing the conveyor into a series of finite elements. Each element has a mass and rheological spring as illustrated below:

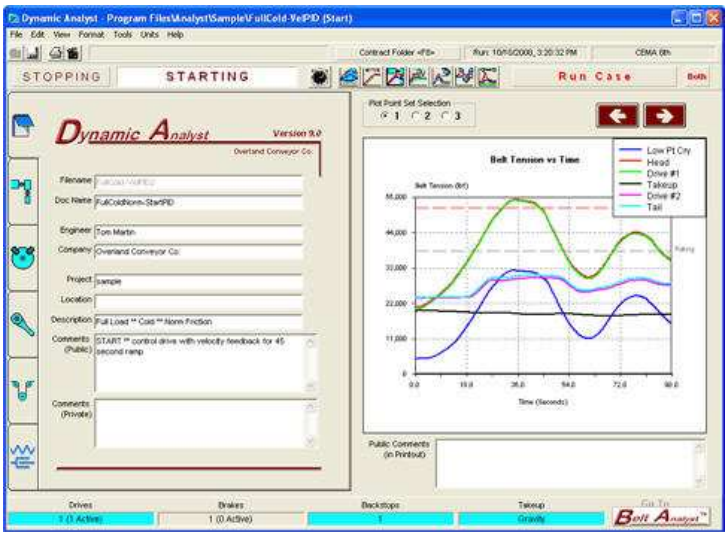


Many methods of analyzing a belt's physical behaviour as a rheological spring have been studied and various techniques have been used. An appropriate model needs to address:

- > Elastic modulus of the belt longitudinal tensile member
- > Resistances to motion which are velocity dependent (i.e. idlers)
- > Viscoelastic losses due to rubber-idler indentation
- > Apparent belt modulus changes due to belt sag between idlers

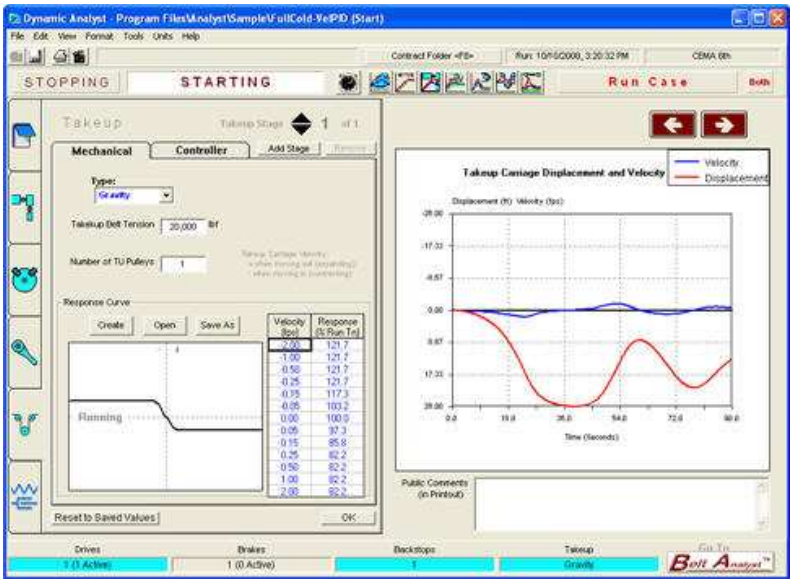
Since the mathematics necessary to solve these dynamic problems are very complex, it is not the goal of this presentation to detail the theoretical basis of dynamic analysis. Rather, the purpose is to stress that as belt lengths increase and as horizontal curves and distributed power becomes more common, the importance of dynamic analysis taking belt elasticity into account is vital to properly develop control algorithms during both stopping and starting.

SCREEN SHOTS



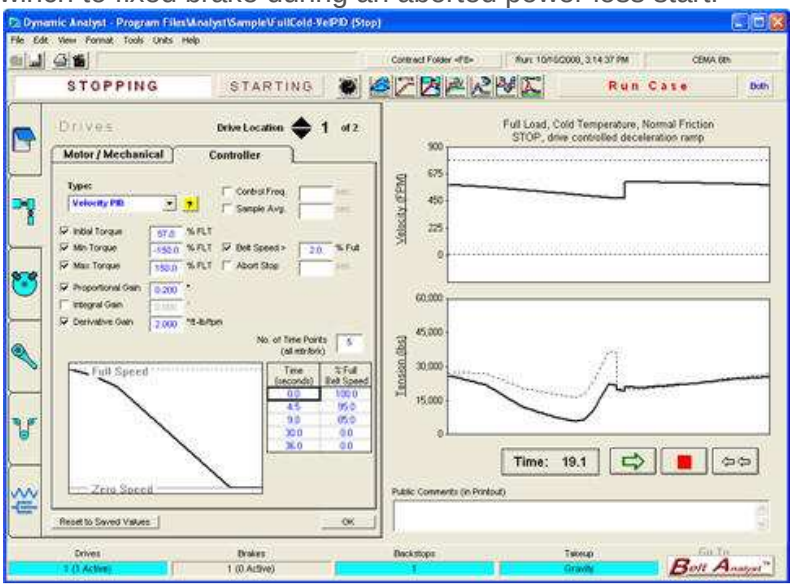
Developed by Conveyor Engineers for Conveyor Engineers. This is not just software, but the most advanced belt conveyor engineering tool available on the market.

An add-on to the popular "Belt Analyst™ program, this tool takes the running steady state condition and provides an accurate simulation of the dynamic conditions of stopping and starting.



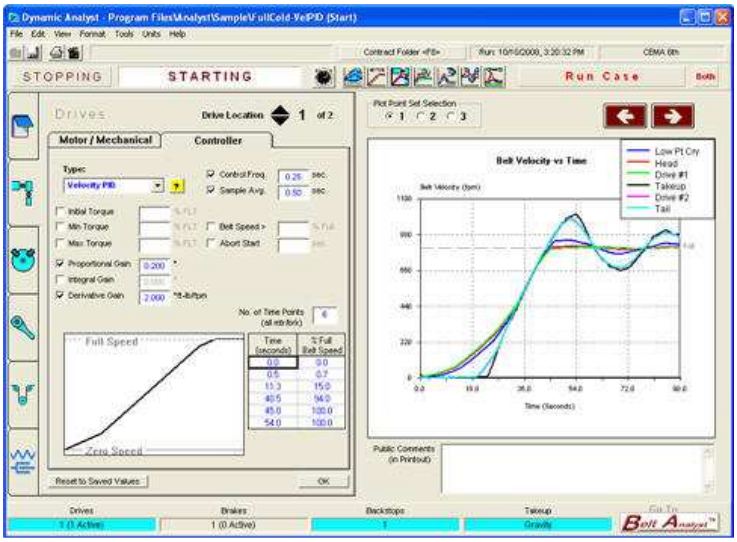
Stop your conveyor with brakes or the drives. Determine accurate dynamic loads on the holdbacks.

And most importantly, characterize your take-up whether vertical gravity, horizontal gravity with sheaves, a winch or even with multiple programmable characteristics. Go from active winch to fixed brake during an aborted power loss start.



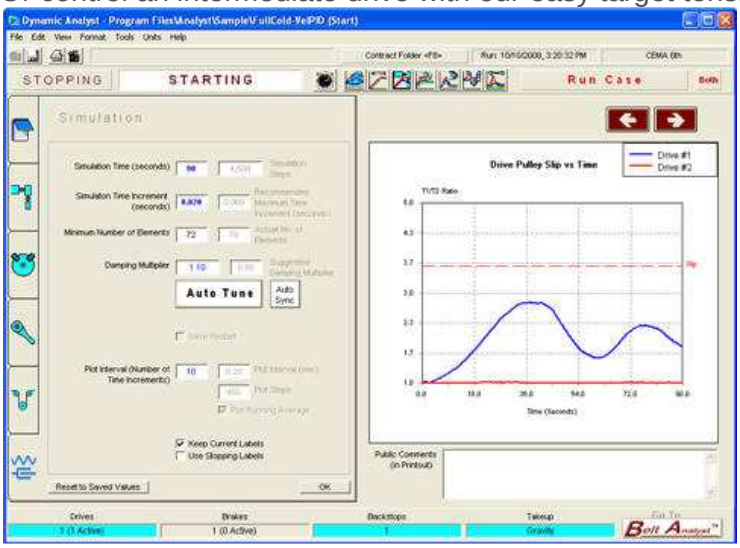
Watch an animation of the belt tensions and belt velocities change from full speed to stopped and back to full speed. There is no better way to understand the transient stress wave migration through the belt than with this specialized animation.

Easily make a Windows AVI file of this animation and include in reports, presentations or email to an associate. This animation is worth a million words.

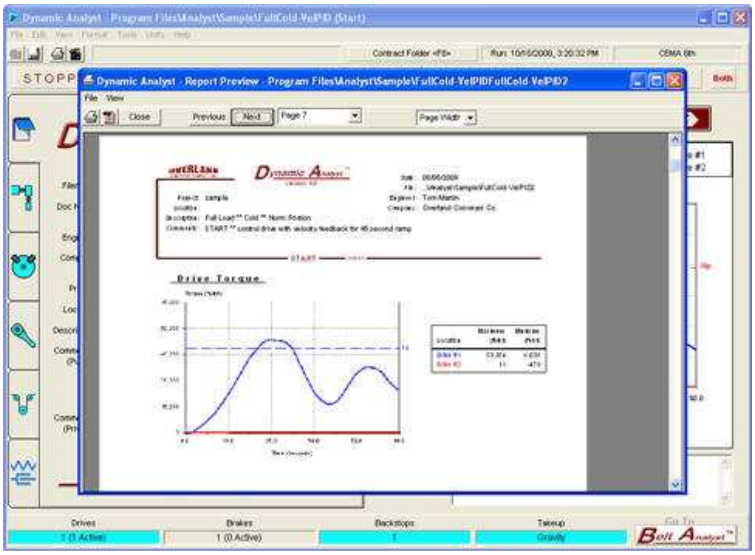


Easily model the starting characteristics of fluid couplings, reduced voltage starters, wound rotor induction motors with multiple resistance steps, hydro viscous clutch, VFD, DC or any other type of start. Define a velocity curve and PID loop parameters.

Or control an intermediate drive with our easy target tension setup window.



Perhaps the most useful feature that has made this advanced tool useable for all; Auto Tuning. FEA analysis is not easy to setup. But now the program does most of the work by automatically setting up damping factors, time steps and element sizes in the most efficient manner for all application.



In the same format as Belt Analyst™ , this program prints everything including all graphics exactly as on the screen for