

ToolJoint™

APS Technology's ToolJoint program is a member of the SoftToolsSM family of analytical tools for downhole drilling equipment. The program is designed as a "quick look" tool for sizing and evaluating API and custom rotary connections for downhole service. Connection problems are still a major cause of drill string failures. Connection failures and washouts result in expensive rig downtime, while thread galling causes the "laying down" of equipment prematurely. The benefit of this program is that it quickly analyzes different connections and loads. Currently written as a Microsoft Excel add-in, ToolJoint is only available through APS consulting services.





Title: 2 3/8 EF Connection

CONNECTION GEOMETRY:
(Ref: API 7 and Drilco Handbook)

	SYMBOLS		2 3/8 EF
	(API 7G)	UNITS	
API Rotary Connection			
Collar Outer Diameter	OD	inches	6.75
Collar Bore Diameter	ID	inches	3.19
Make-up Torque	T	ft-lb	31500
Coeff. Friction	f		0.08
Thread Taper	tpr	in/ft	3
Thread angle (Theta)	O	degrees	30
Thread Pitch	p	inches	0.250

Analysis

While rotary connections are simple in structure, connection-working loads are more complex due to make-up and downhole operating conditions. ToolJoint provides a more detailed analysis than presented in the API 7G Standards and analyzes the following connection operating conditions:

- > Maximum rotary build rate capability
- > Maximum sliding build rate capability
- > Build rate that begins to open the box and pin faces

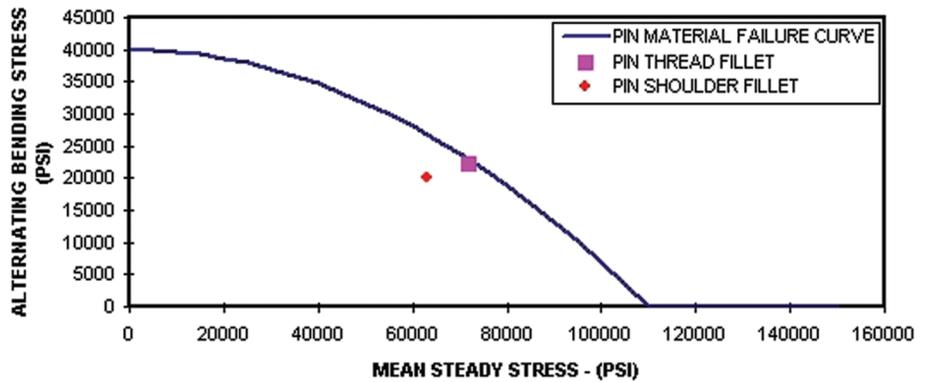
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The program analyzes the working stresses at four connection locations:

- > Pin thread fillet
- > Pin shoulder fillet
- > Box thread fillet
- > Box bore back

The stress at each of these locations is compared to the material properties. Connections with different pin and box materials can be analyzed. The connection fatigue capability is based on the Gerber failure criteria. The maximum sliding build rate is based on the yield strength of the material as well as the ability of the connection to resist opening at the faces.

PIN FAILURE DIAGRAM



For more detailed analyses, APS Technology's FEA consulting services are also available.

APS has a companion program, WellDrill, used for predicting accurate bending moments at the connections. This program calculates the bending moment along the drill string, critical rotary speeds that excite vibration, buckling and forced drill string response. The latest version of WellDrill includes BHA Predict, for accurate prediction of BHA response in all drilling conditions.

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Specifications subject to change without notice.

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