TNT

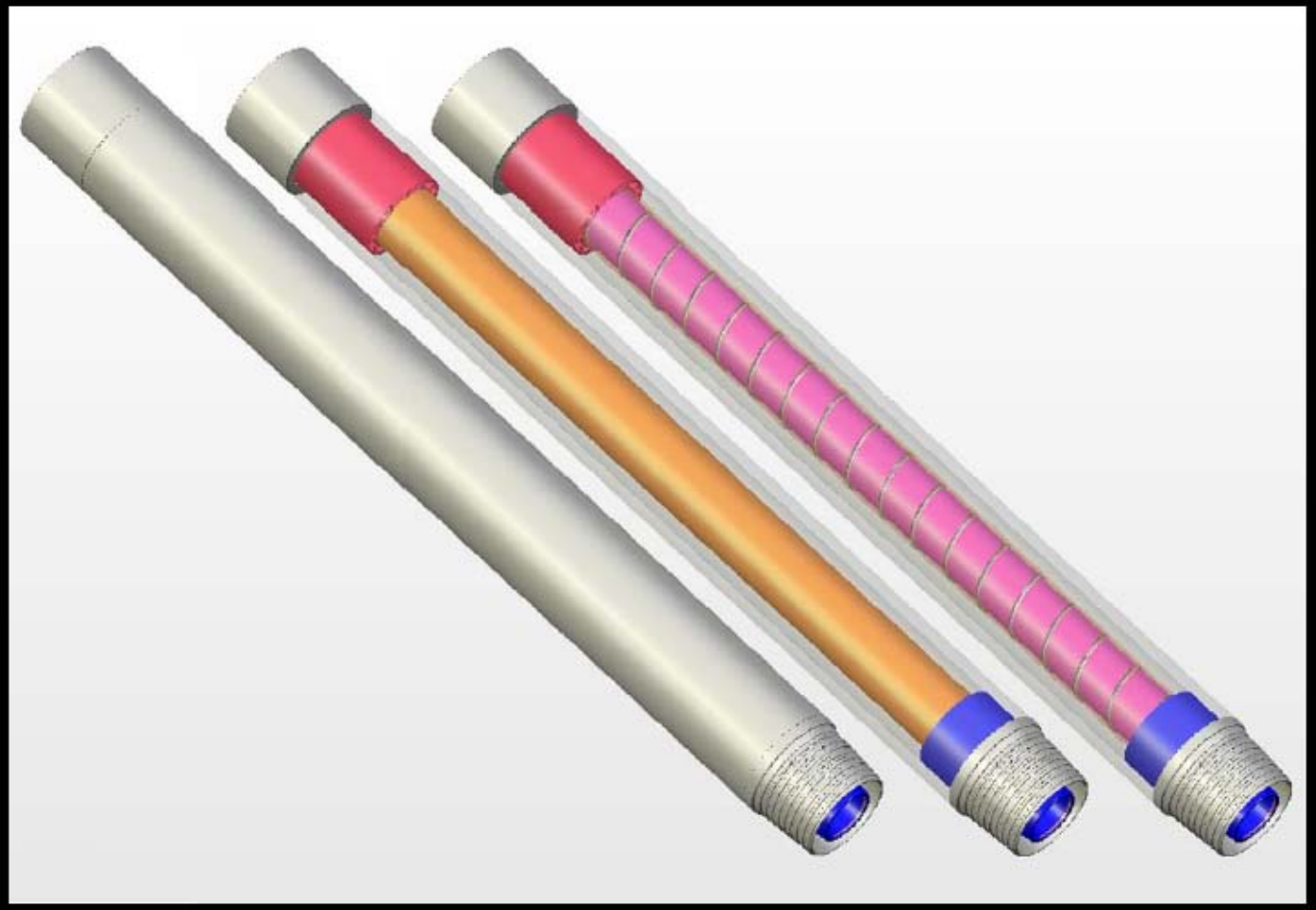
Tube in Tube Drill Pipe

TorqueLock™ Corporation

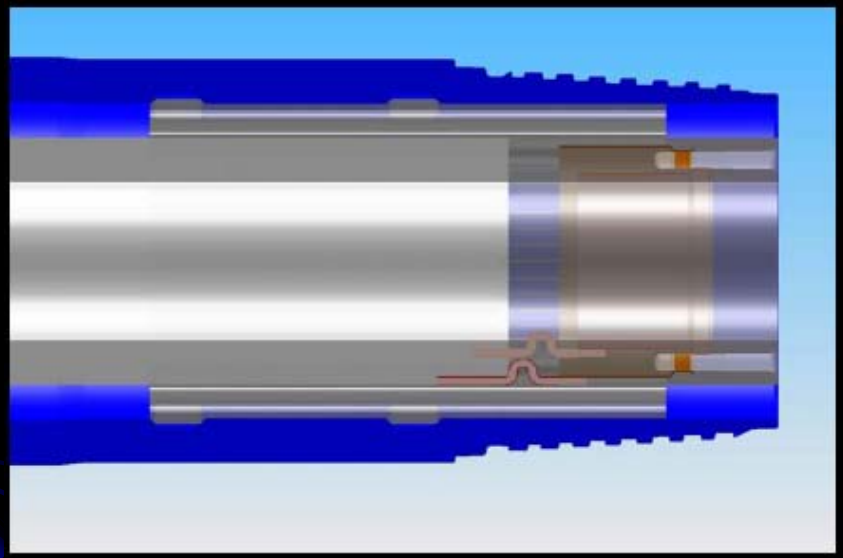
TNT
Key Advantages

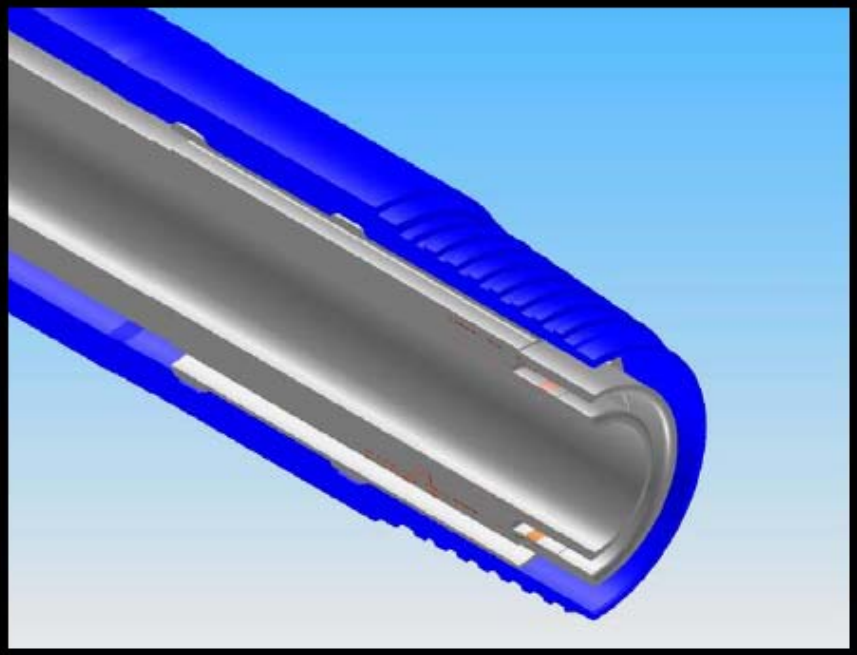
- **Designed specifically for use in Reverse Circulation Center Discharge (RCCD) drilling applications.**
- **Non-metallic flexible inner tube substantially reduces or eliminates erosion of the inner tube wall caused by drilling returns experienced by a steel inner tube.**
- **Communication wiring enclosed within the flexible inner tube enables real time communication between the drill string downhole and the surface drill machine.**
- **Non-metallic flexible inner tube allows drill with substantially tighter bend radius than steel inside of steel pipe to permit both vertical and horizontal drilling applications.**

TNT Drill Pipe

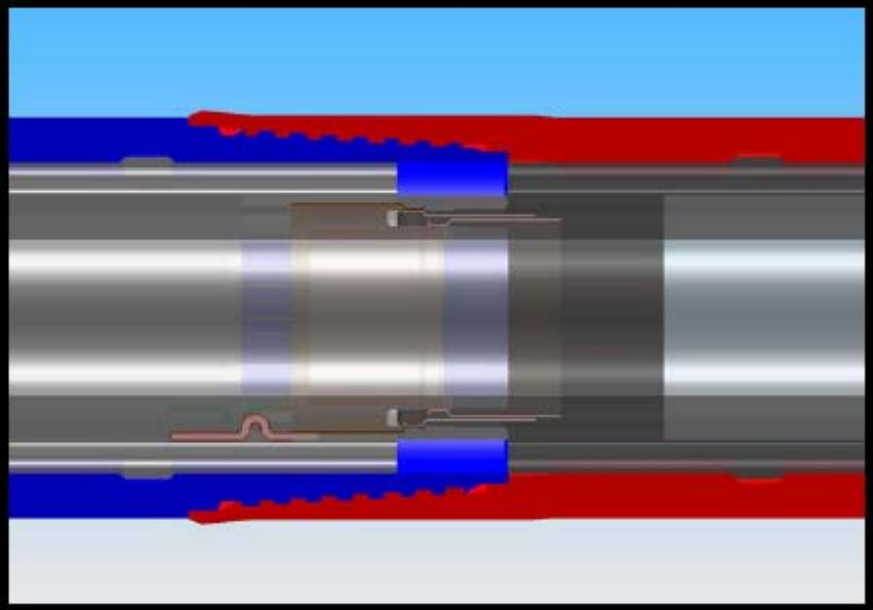


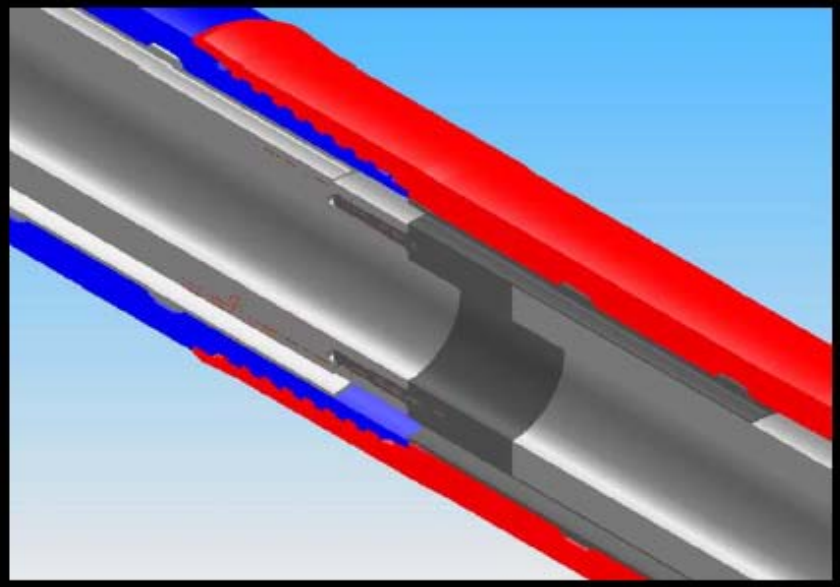
TNT Pin End Enlarged



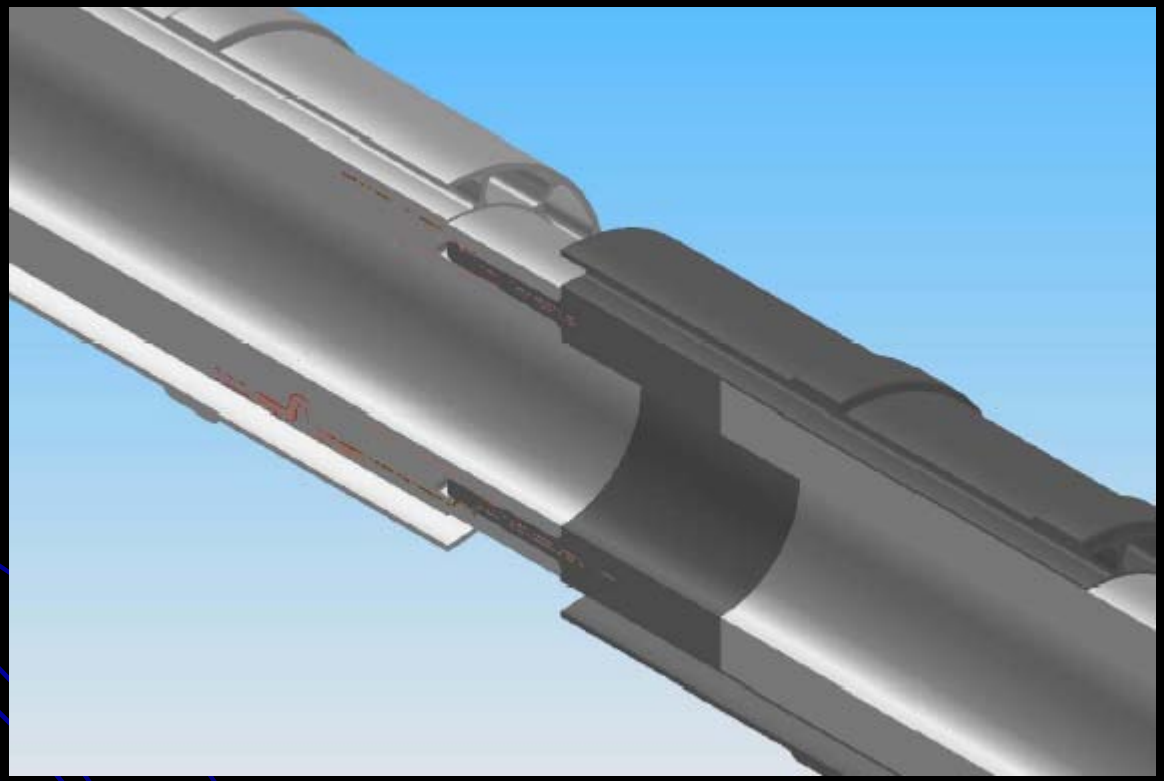


TNT Box End Enlarged

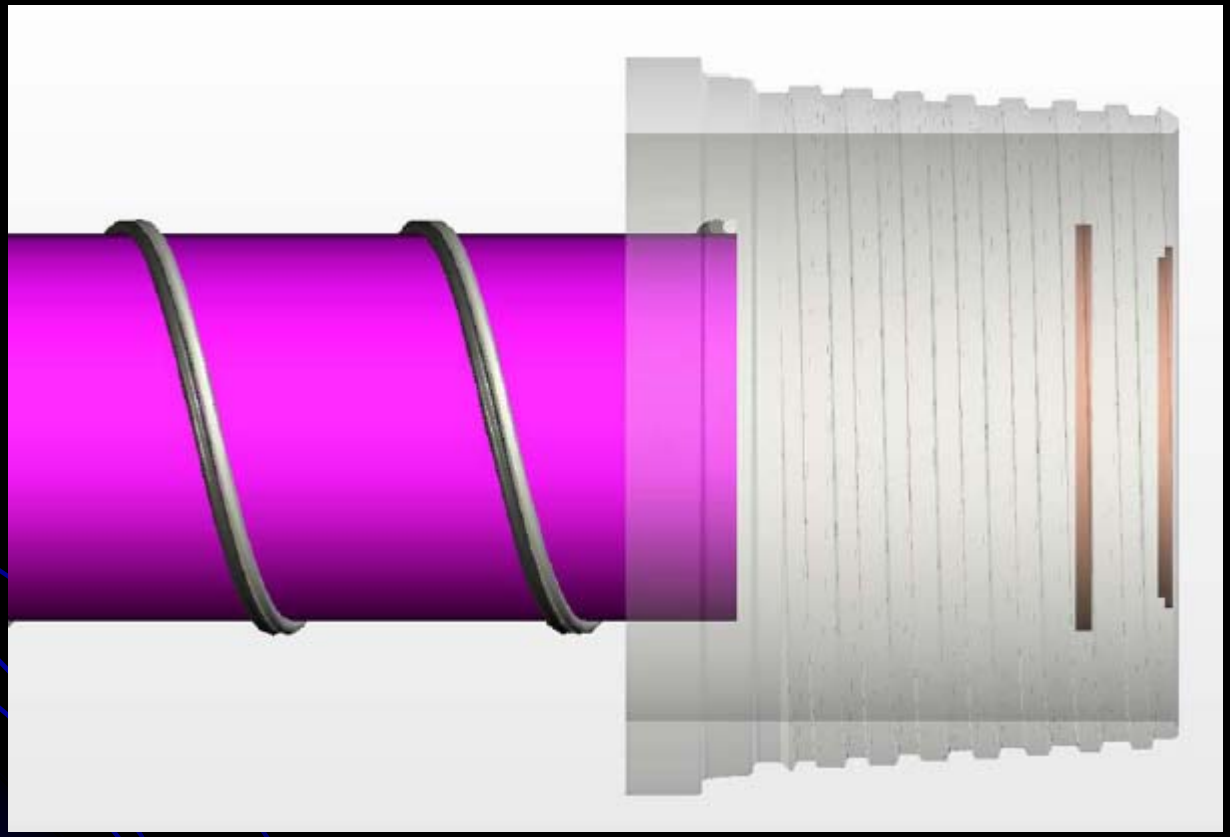




Pin and Box
Inner Tube Centralizers



Flexible Inner Tube Electrical Wiring



TNT
Advantages
over Steel in Steel Drill Pipe

- Enhanced life (erosive resistant internal rubber tube outlasts internal steel tube)
- Use of Tool Joints is optional
- Flush OD has less drag for longer horizontal distance capabilities
- Flush OD inflicts less wear on casing than drill pipe's tool joints
- Flush OD reduces keyhole hang-ups
- Flush OD enhances the ability to retrieve stuck pipe in well-bore cave in
- Erosion wear on OD is spread over the length of the drill pipe whereas the traditional tool joint ODs receive most of the wear
- Flush OD box connection may be hard banded prior to machining threads
- Guidance and monitoring system capabilities:
- Virtual monitoring of bit location and steering
- Virtual communication back to the rig of downhole changes in pressure
- Transmit electric power to downhole electric drill motors

Advantages continued:

- Connection comparable and in most cases enhanced over API in axial compression (API tool joints are not rated)
- Connection adequate in tensile for known near term requirements
- Connection includes two separate fatigue feature enhancements that reduce fatigue failure within the connection
- Connection's interlocking thread design without tool joints, eliminates tool joint stiffness and provides a more flexible (bendable) connection
- Connection designed to prevent cross-threading when rig's vertical orientation is deviated by wind, waves or setup misalignment
- Fast make up (internal integral (one piece) rubber tube makes up automatically, concurrently with external drill pipe make up)
- Faster makeup when downhole communication is required (connection wiring makes up concurrently with the internal and external drill pipe make up)
- Safer make up (eliminates the need for dangerous "O" ring installation)
- Connection's flush joint design offers the ability to utilize a larger diameter pipe in the same size hole as a smaller diameter pipe with tool joints (enhanced air flow flexibility)
- Heavier pipe body enhances resistance to buckling in horizontal drilling and provides higher compressive strength than standard wall drill pipe of same OD
- Field repairable

Drill Pipe Performance Comparison
4 ½” 21.41# TNT Flush Joint
vs.
4 ½” 16.60# API NC 46 Tool Joint

Grade	Wall	Torsional Yield ft/lb	Tensile lbs	Torsional Yield ft/lb	Tensile lbs	OD	ID	Drilling Depth at 1.0 SF
	4 1/2" 16.60# Drill Pipe			NC 46 Tool Joint				
E75	0.337	30,800	330,600	34,000	901,200	6 1/4	3 1/4	19,915 feet (determined by pipe mechanicals)
X95	0.337	39,000	418,700	34,000	901,200	6 1/4	3 1/4	26,168 feet (determined by pipe mechanicals)
	4 1/2" 21.41# Drill Pipe			4 1/2" 21.41# TNT Flush Joint				
X95	0.500	51,853	596,903	30,535 (pin)	357,772	4 1/2	3 1/2	16,710 feet (determined by connection mechanicals)
S135	0.500	73,640	848,232	43,392 (pin)	508,000	4 1/2	3 1/2	23,727 feet (determined by connection mechanicals)

While the API tool joint connections are not rated for compression, TorqueLock TNT is designed for compressive strength close to the compressive rating of the pipe body

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