



# Tubular Design Update Upset Casing

*A New Frontier in Tubular Technology Design*

August, 2018

# Who we are...



- Established in 2006 to supply completion & drilling tubular tools
- Largest privately held company dedicated to the manufacturing of drilling tubular goods
- Over 150 years of experience in tubular manufacturing
- Co-founders of two different Tubular Manufacturing Companies
- Certified Facility:
  - API Spec 5DP
  - API Spec 5CT
  - API Spec 7-1
  - API Q1 Spec
  - NS-1 (All Drilling Products)



# What we do...

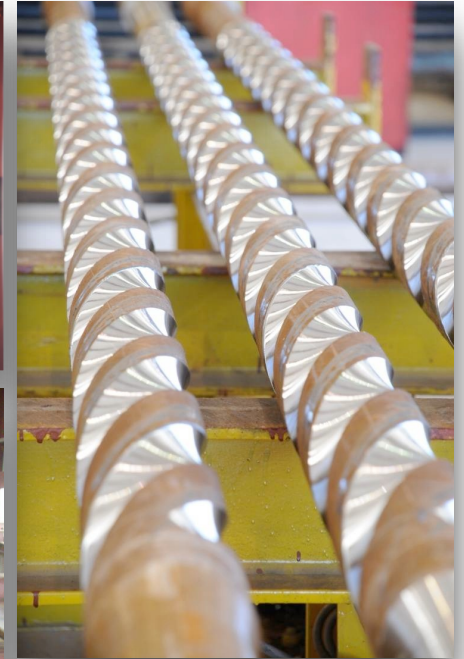


- **Products**

- Wear Knot™ Drill Pipe
- Drill Pipe
- Landing Strings
- Premium Tubing (2-Step)
- Premium Casing (Upset Casing)
- Heavy Weight Drill Pipe
- Drill Collar
- Drilling Accessories

- **Services**

- OCTG 3rd Party Processing
- Internal Plastic Coating (PCI-USA)
- Re-Tool Jointing
- Re-Certified
- Hard Banding
- TAM – Tubular Asset Management (2D ID Tag)

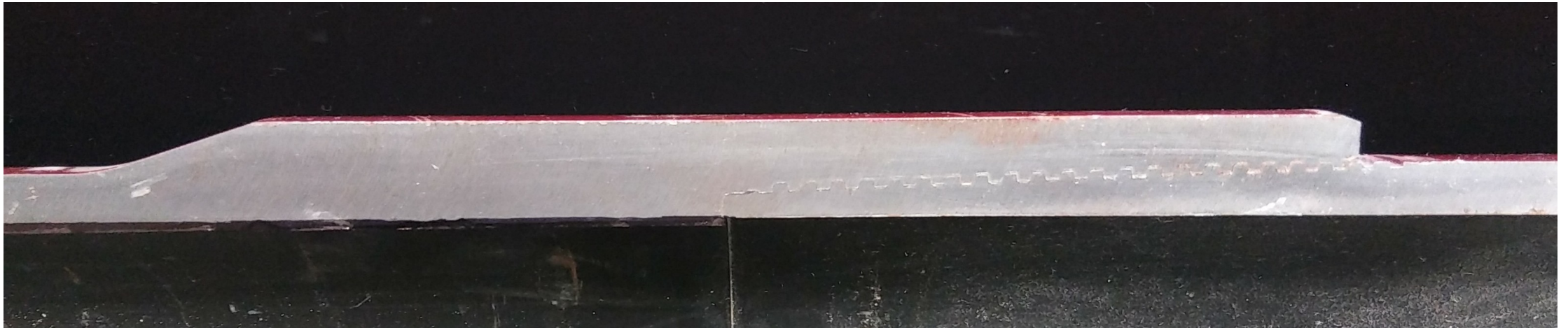
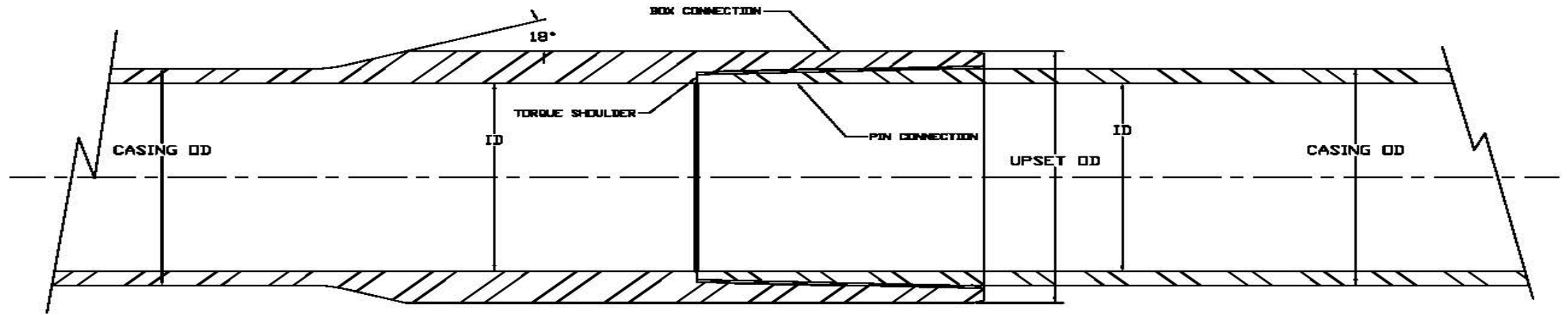


# Upset Casing



- Integral connection tubular design using standard API threads to maintain interchangeability
- Improve connection torque rating over standard T&C connections:
  - Additional torque from internal torque shoulder and pin nose make up
- Design to drill, ream, rotate or can run in the hole as conventional casing with no special handling considerations.
- Can be run with TopDrive, elevator and slips = Substantial time and cost savings
- 3<sup>rd</sup> Party threads by request; Premium, Semi-Premium, API, Flush Joint, Semi-Flush

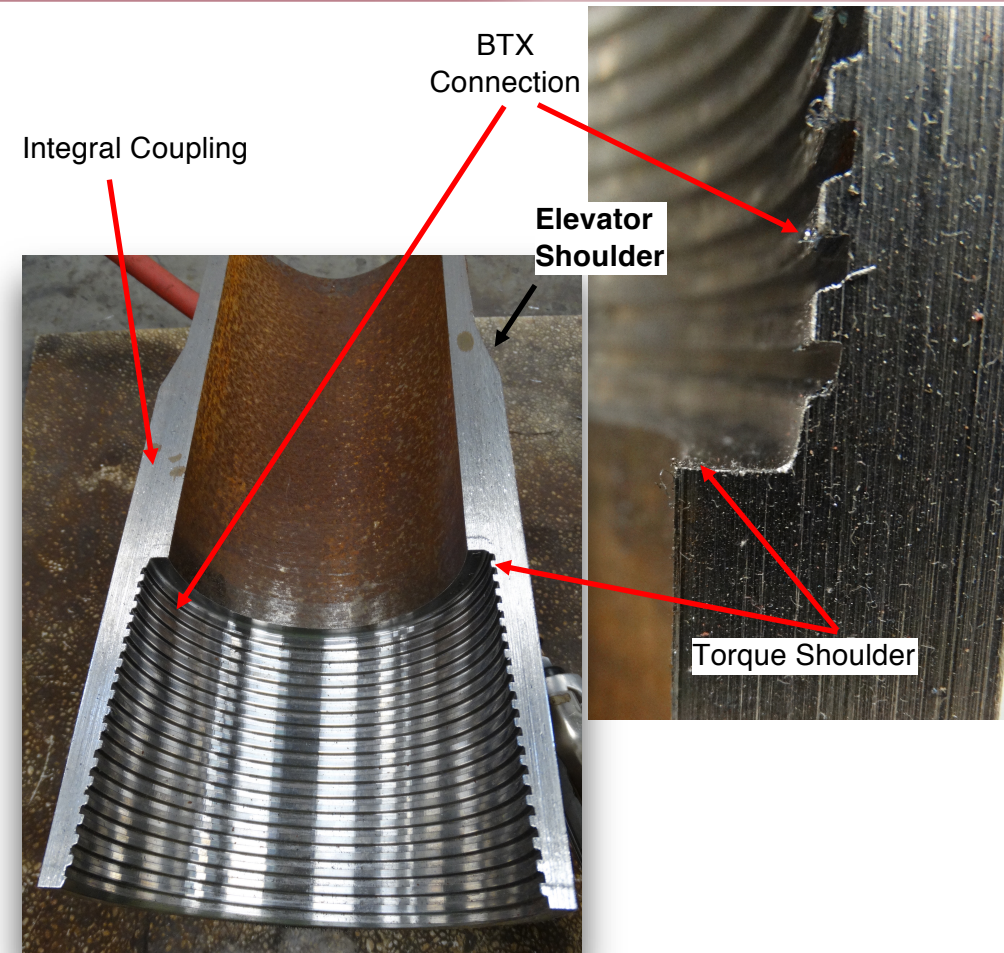




# Upset Casing Features and Advantages



Features	Advantage
Premium chemistries	Improved wear factor on tube body for drilling or reaming while rotating operations
Integral coupling	Fewer connection failures. 50% reduction of leakage failure
Upset processed box	No coupling required; allows bending moment "like drill pipe"
Upset area has the same API coupling dimensions	No change in length, ID or OD
Controlled yield on upset area	Reduces risk of connection failure
Offered in seamless as well as ERW	Cost vs. Application option
Elevator shoulder	No square shoulders that can hang-up on running operations
Torque shoulder connection	Semi-premium type torque ratings with internal flush ID profile
Offered in "new" API OD dimensions as well as "old" API OD dimensions	Allows drilling programs to maintain casing tolerances using "old" API dimensions
Offered in both buttress (BTX) & long thread (LTX) connections	Maintains interchangeability with API connections

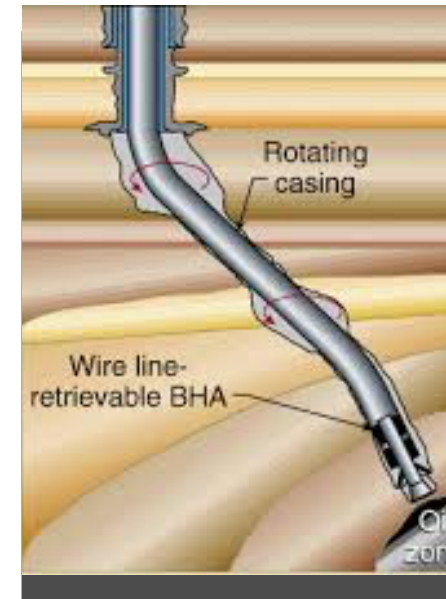


# Upset Casing: Benefits compared to T&C



- Allows Operator to run casing smoothly through ledges
  - reducing rig time due to angled coupling transition
- Allows connection to bend easier than coupled
  - eliminating connection cracking caused by preferential corrosion and/or hoop stress, seen in API couplings
- Reduction in tubing and/or work string O.D. wear due to internal flush connection
- Same casing can be used for normal running operations as well as Drilling/Reaming with Casing Operations without requiring a back-up string and/or accessories

Casing Drilling



Rotating Casing

Box Profile



# Equipment Differences



Equipment Type	Threaded & Coupled	Upset Casing	Financial Savings
Premium Material	No	Yes	Upset Casing requires a higher specification chemistry
Phosphate connections	No (Optional)	Yes	Improves run ability
Metal to Metal Seals	Yes (Optional)	Yes (Optional)	Allows for alternatives to higher cost connections
Box and Pin Upset	No	Yes (Optional)	Extends product offering
3 <sup>rd</sup> Party Connectors	No	Yes	Extends capability of product
Potential Coupling Leak Paths	Yes	No	Substantial, may cause casing to be re-run
Torque Shoulder	No (Optional)	Yes	Allows for alternatives to higher cost connections
Coupling Wear	Yes	No	Substantial



# Equipment Running Differences



Equipment Type	Threaded & Couple	Upset Casing	Financial Savings
Slips	Yes	Yes	Similar
Standard Elevators	No	Yes	\$150/day**
Can be rotated	Not recommended	Yes	Substantial
Rotating Casing while running into the hole	Couplings may unscrew	No issues	Substantial – Re run joint
Making Up	Manual or Power Tong	Top Drive, Manual or Power Tong	If Top Drive, substantial reduction in equipment
Breaking out risks	Cracked Couplings	None	Substantial – Re run joint
Pulling with excessive force	May loosen couplings	None	Substantial – Re run joint
Slip Type Elevators Required	Yes	No, but can be used	\$250/day**
Stabbing Guides	Yes	Yes	Similar
Coupling Requiring Make-Up before job	Yes	No	\$25/coupling*

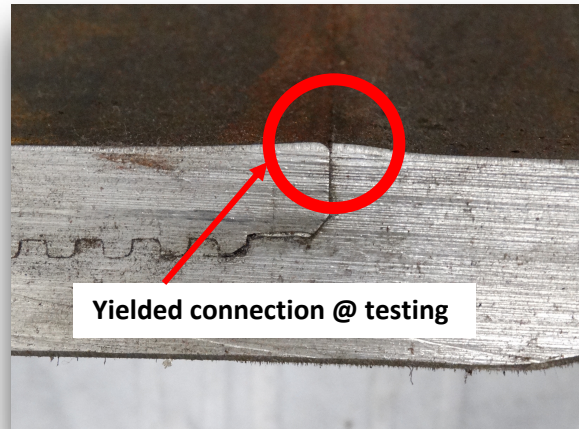
\* Pricing based on current market pricing

\*\* Estimate daily rental cost of elevators

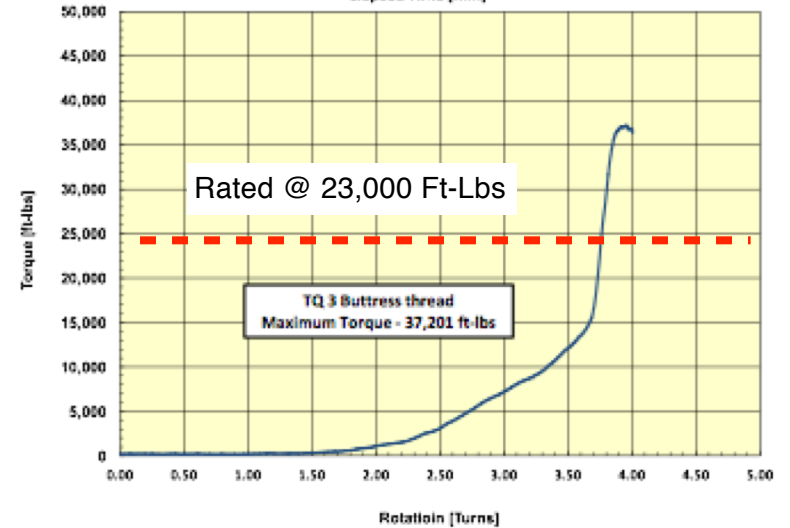
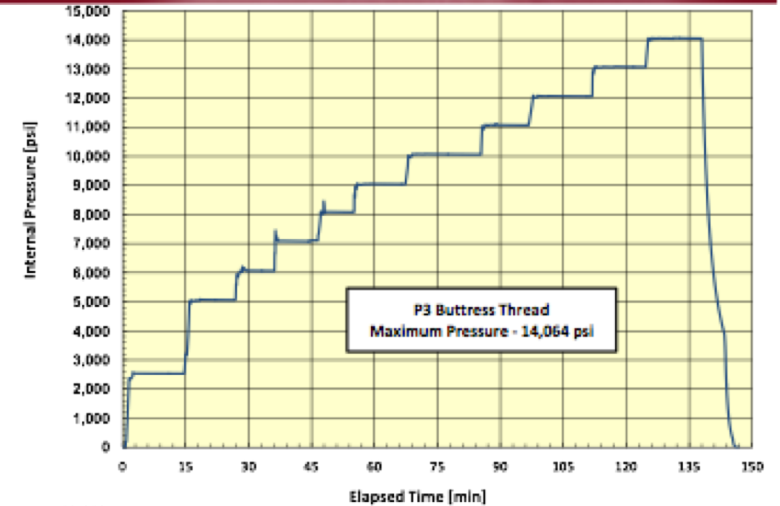
# Upset Casing: 5-1/2" 23.00# Testing



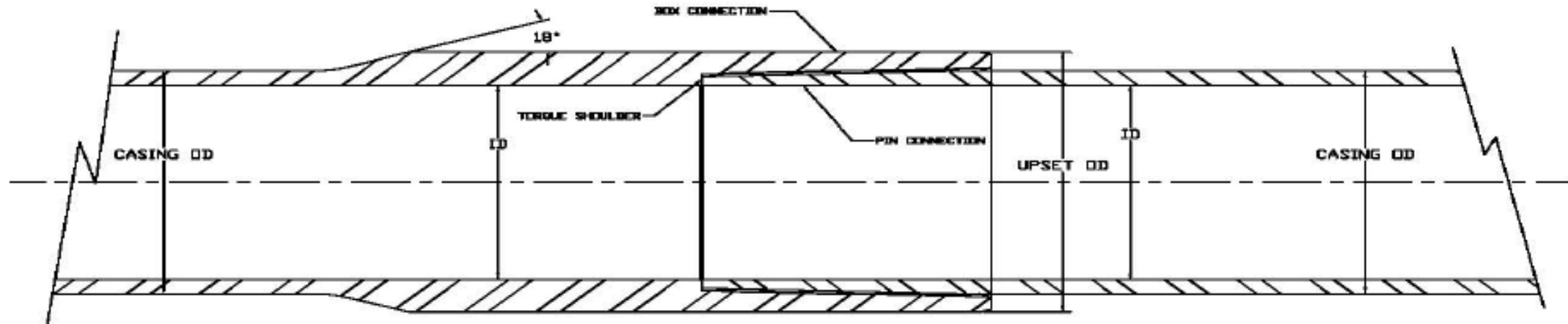
- Stress Engineering tested:
  - 5-1/2" Casing 23.00# P-110 BTX
  - Upset OD was 6.050" (*Old API dimension*)
  - Alternative OD's available
- Pressure tested OK as per API
- Torque connection yielded at 37,201 Ft-Lbs



Yielded connection @ testing



# 5.500" 23.00#, P-110, PREMIUM UPSET CASING, RDT BTX CONNECTION



PIPE BODY DATA					
OUTSIDE DIAMETER (in)	5.500	WALL THICKNESS (in)	0.415	GRADE	P-110CY
NOMINAL WEIGHT (T&C) (lb/ft)	23.000	NOMINAL ID (in)	4.670	API DRIFT (in)	4.545

PIPE BODY PERFORMANCE					
MINIMUM YIELD STRENGTH (psi)	110,000	MAXIMUM YIELD STRENGTH (psi)	125,000	MINIMUM TENSILE STRENGTH (psi)	125,000
TENSION YIELD (lbs)	729,000	INTERNAL PRESSURE YIELD (psi)	14,520	COLLAPSE PRESSURE (psi)	14,540
AVAILABLE SEAMLESS	YES	AVAILABLE WELDED	YES	PERFORMANCE BASED ON (RBW%)	100

CONNECTION DATA					
TYPE: RDT BTX		PIN CONNECTION OD (in)	5.500	MAKE-UP TORQUE MIN (ft-lbs)	10,000
PRESSURE CAPACITY (psi)	EXCEEDS PIPE	PIN CONNECTION ID (in)	4.670	MAKE-UP TORQUE OPTIMUM (ft-lbs)	16,500*
TENSION YIELD (lbs)	EXCEEDS PIPE	BOX CONNECTION OD (in)	6.300	MAX OPERATING TORQUE (ft-lbs)	35,000**
				CONNECTION YIELD TORQUE (ft-lbs)	37,000

# At Well Site



- Over 2 millions feet of upset casing in the wells

Q&A

