

# DOUBLE CONICAL SPIRAL ANALYSIS REPORT

*Comprehensive Analysis of Spiral Configurations*

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## ANALYSIS METHODS INCLUDED:

- Analytical Calculations (Exact Mathematical Solutions)
- Numerical Approximations (Discrete Point Analysis)
  - Circular Approximation Methods
  - 3D Visualization and Projections
- Structural Analysis with Net Length Calculations
  - Comparative Accuracy Assessment

# EXECUTIVE SUMMARY

## ANALYSIS OVERVIEW:

- Total Configurations Analyzed: 1
- Average Spiral Length: 630.64 units
- Maximum Spiral Length: 630.64 units
- Minimum Spiral Length: 630.64 units

## METHOD ACCURACY ASSESSMENT:

All configurations were analyzed using three distinct calculation methods:

1. ANALYTICAL METHOD: Provides exact mathematical solutions using integral calculus
2. NUMERICAL METHOD: Discrete approximation using parametric equations
3. CIRCULAR APPROXIMATION: Simplified circular arc approximation

The analytical method serves as the baseline for accuracy comparison.

## KEY FINDINGS:

- Analytical calculations provide the most accurate results
- Numerical methods show excellent agreement with analytical solutions
- Circular approximations are suitable for rapid estimation
- Phase offset significantly affects spiral intersection patterns
- Structural line integration enables complete system analysis

# CONFIGURATION COMPARISON TABLE

Configuration	Analytical	Numerical	Circular	Best Match	Struct Lines	Net Length	Total w/ Struct
Aligned Spirals (0Å° phase)	630.64	630.57	628.32	Numerical	120.00	12361.4120	750.64

- TABLE SUMMARY:
- Total Configurations: 1
  - Average Analytical Length: 630.64
  - Standard Deviation: 0.00
  - Range: 630.64 - 630.64

# CONFIGURATION ANALYSIS

## 1. Aligned Spirals (0° phase offset)

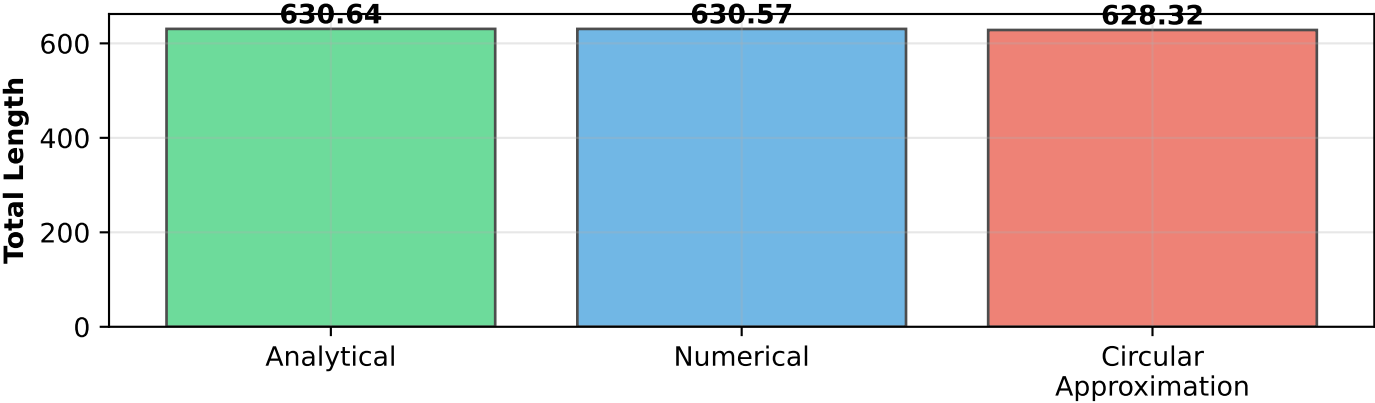
### CONFIGURATION PARAMETERS

Outer Radius: 15.00  
Inner Radius: 10.00  
Height: 12.00  
Number of Turns: 8.00  
Phase Offset: 0.0°  
Structural Lines: 10.00

### ANALYTICAL RESULTS

Outer Spiral: 378.1811  
Inner Spiral: 252.4596  
Total Length: 630.6407  
Error Margin: ±0.000000

### METHOD COMPARISON



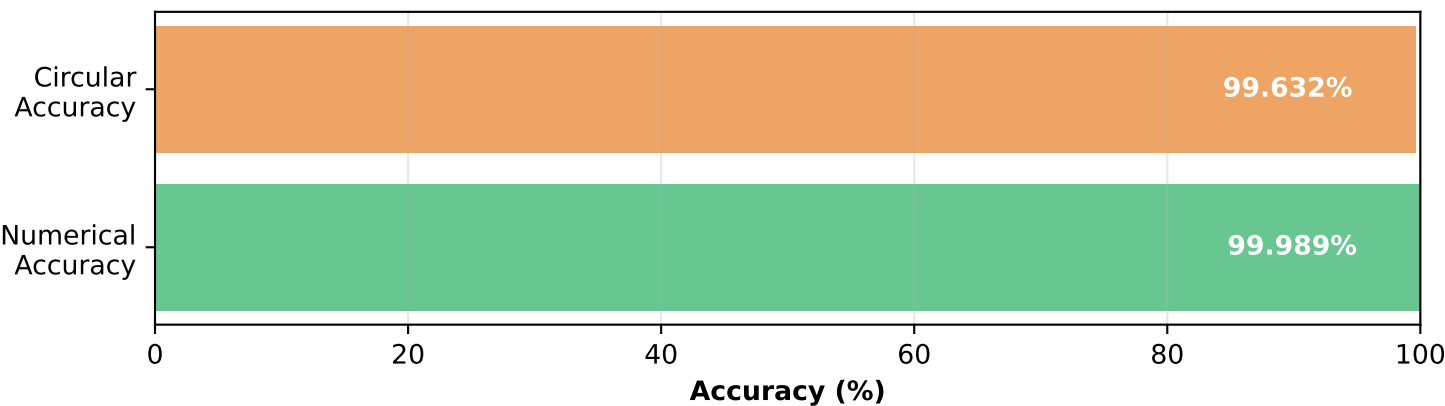
### ACCURACY DIFFERENCES

Analytical vs Numerical:  
0.066810  
Analytical vs Circular:  
2.322176  
Numerical vs Circular:  
2.255366

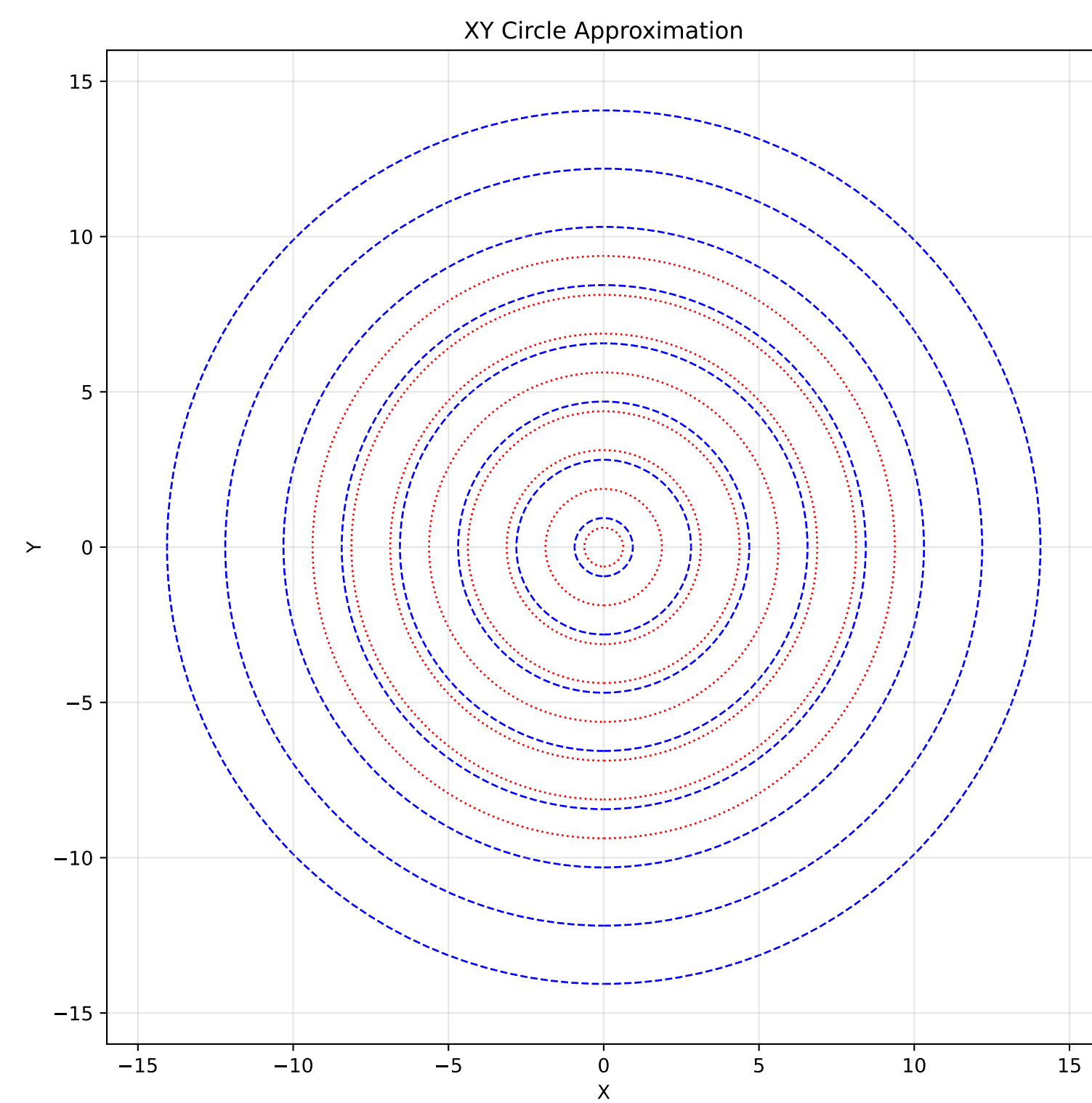
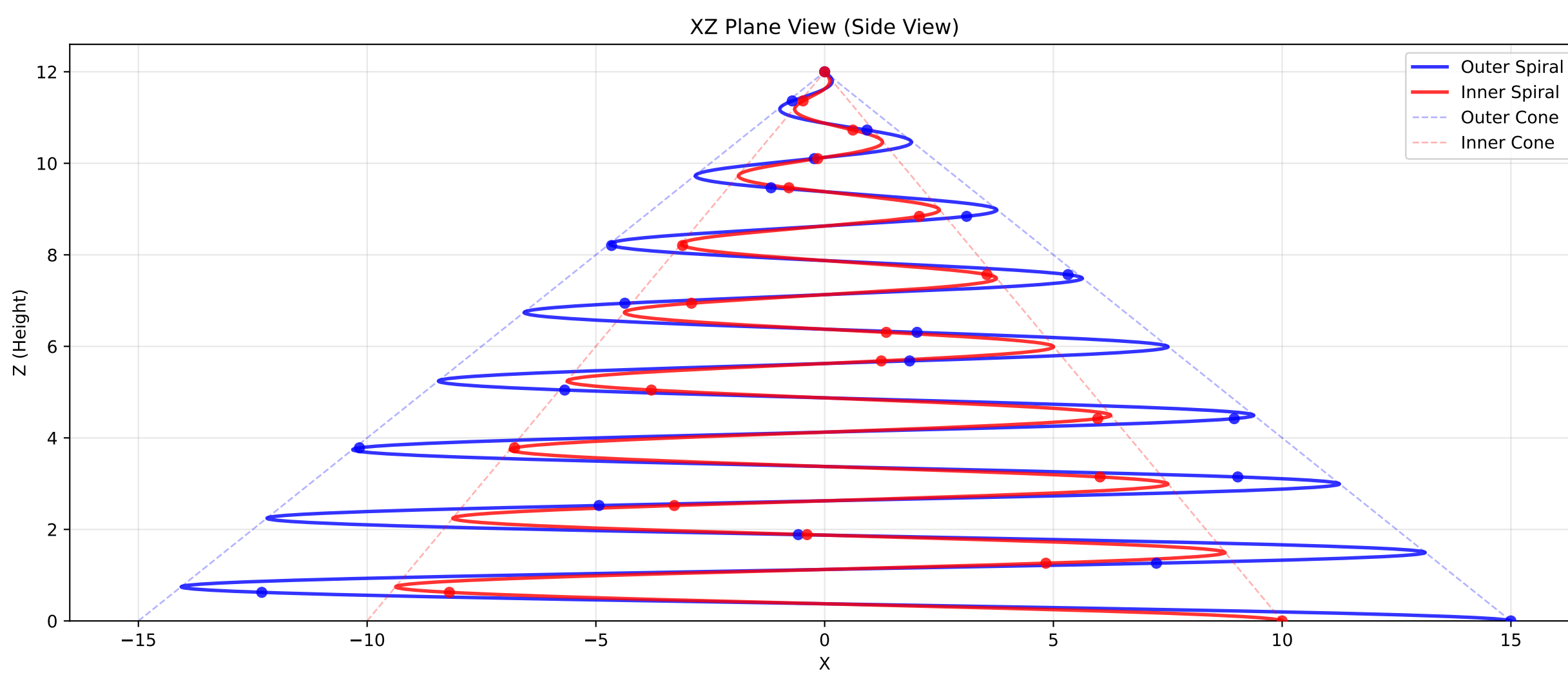
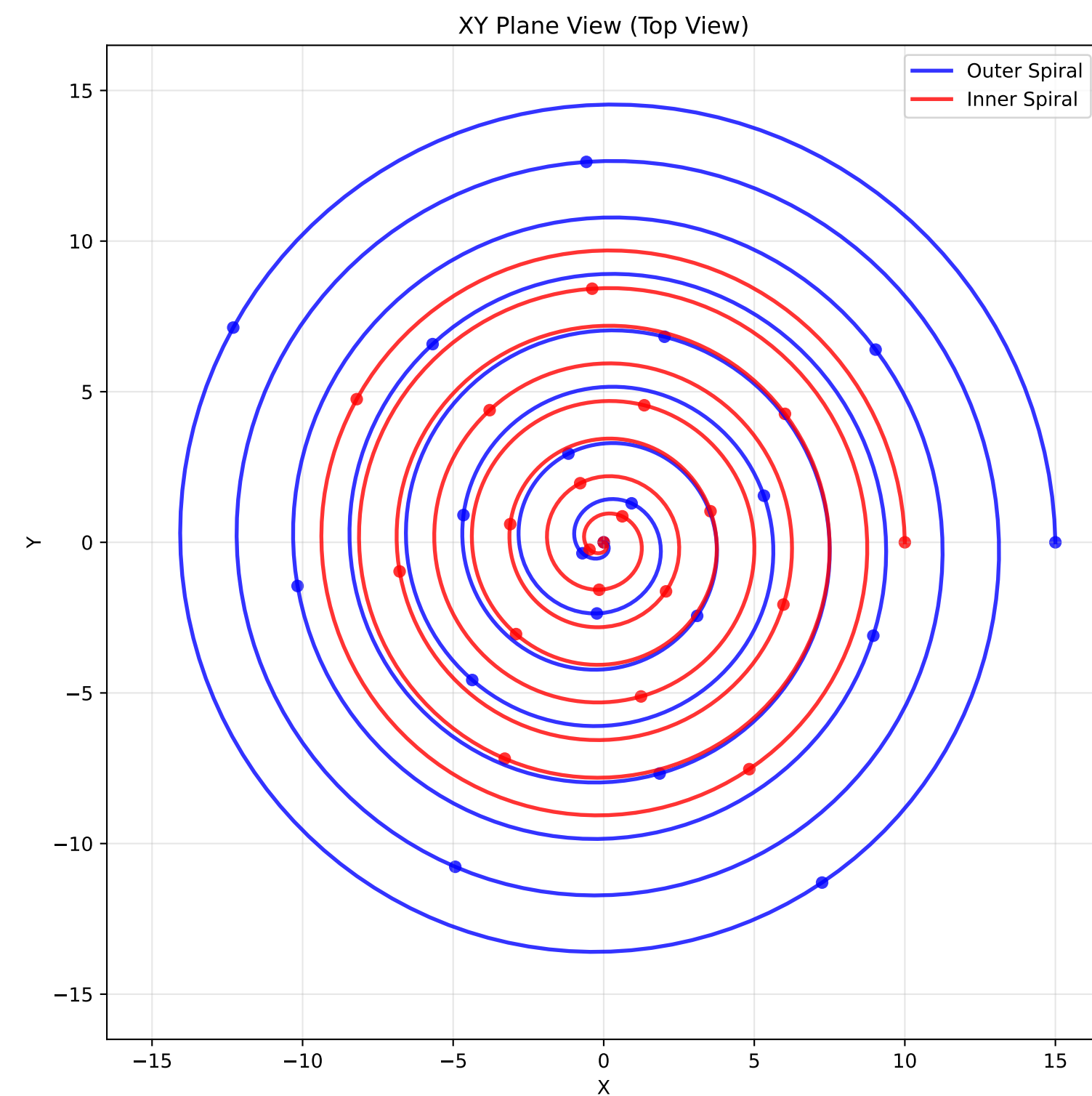
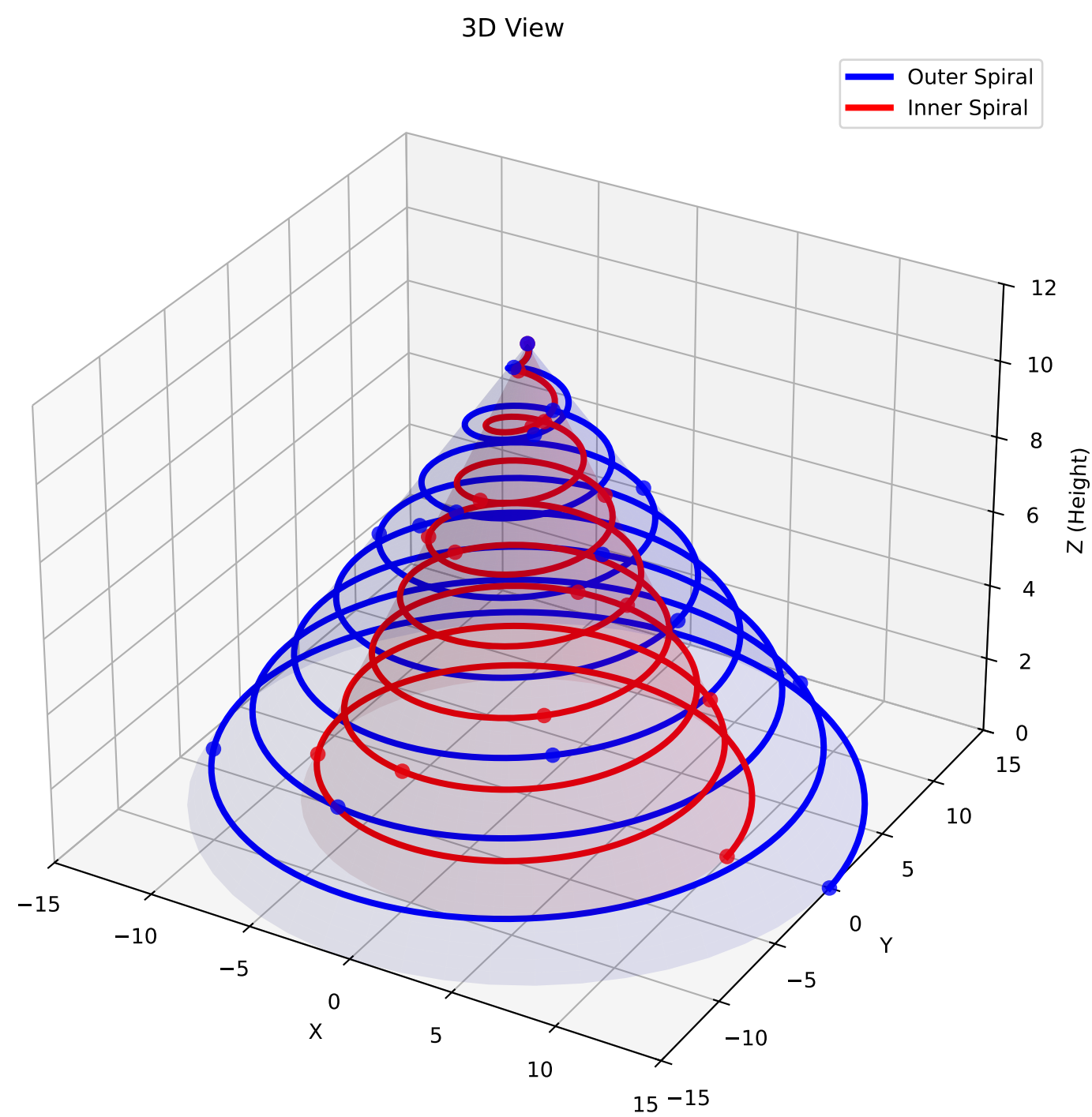
### ADDITIONAL METRICS

Net Length: 12361.4120  
Structural Lines: 120.00  
Total with Structure: 750.64  
Turns Used (Circular): 8

### METHOD ACCURACY RELATIVE TO ANALYTICAL



# 3D VISUALIZATION: 1. Aligned Spirals (0° phase offset)



**ANNULAR NET APPROXIMATION: 1. Aligned Spirals (0° phase offset)**

Annular Regions with 30° Arc Net Pattern

