# Tuning Methods of a 5"/125mm wide Linear Sputtering Cathode

Angstrom Sciences, Inc.

# CROSS SECTION OF A TYPICAL 5"/125MM WIDE SPUTTERING CATHODE
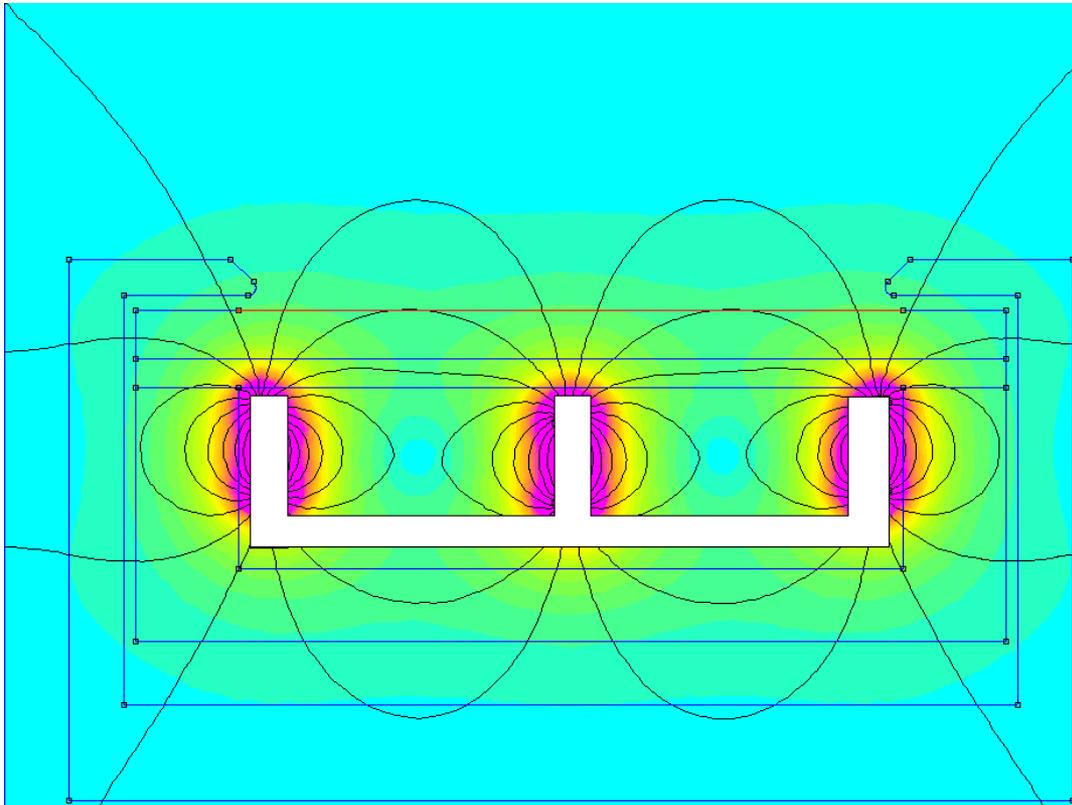
GRAPH OF MAGNETIC CONFINEMENT
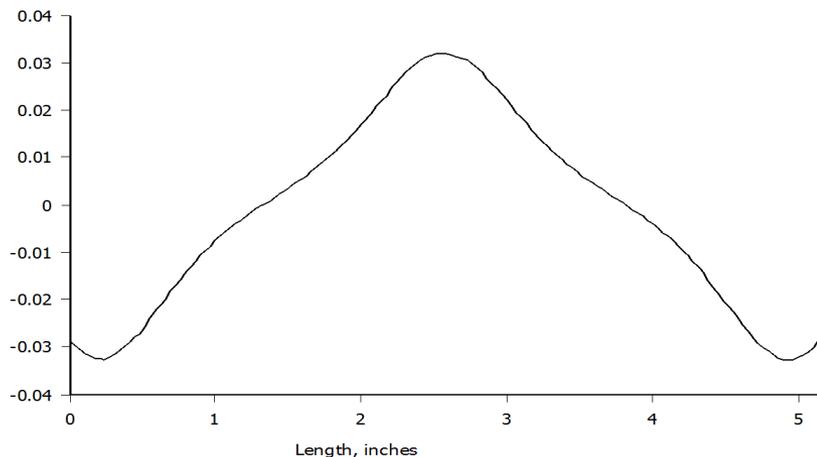
"Normal Field"
Intensity
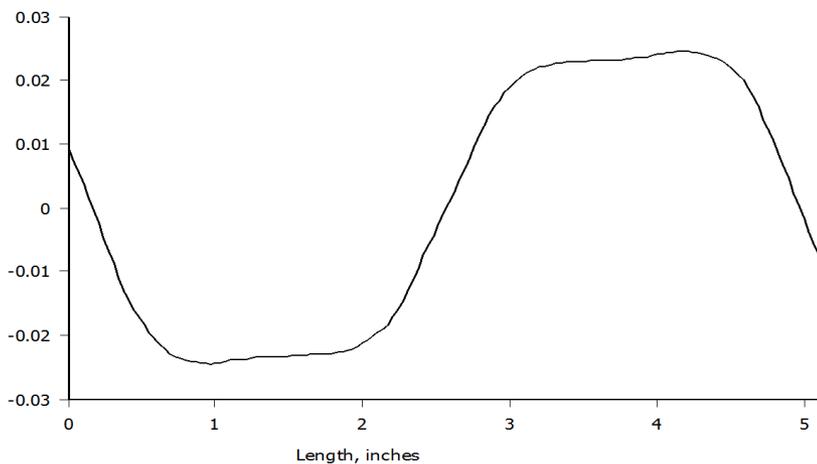
"Tangential Field"
Intensity

MODEL WITH .5"/12MM SHUNTS INSTALLED
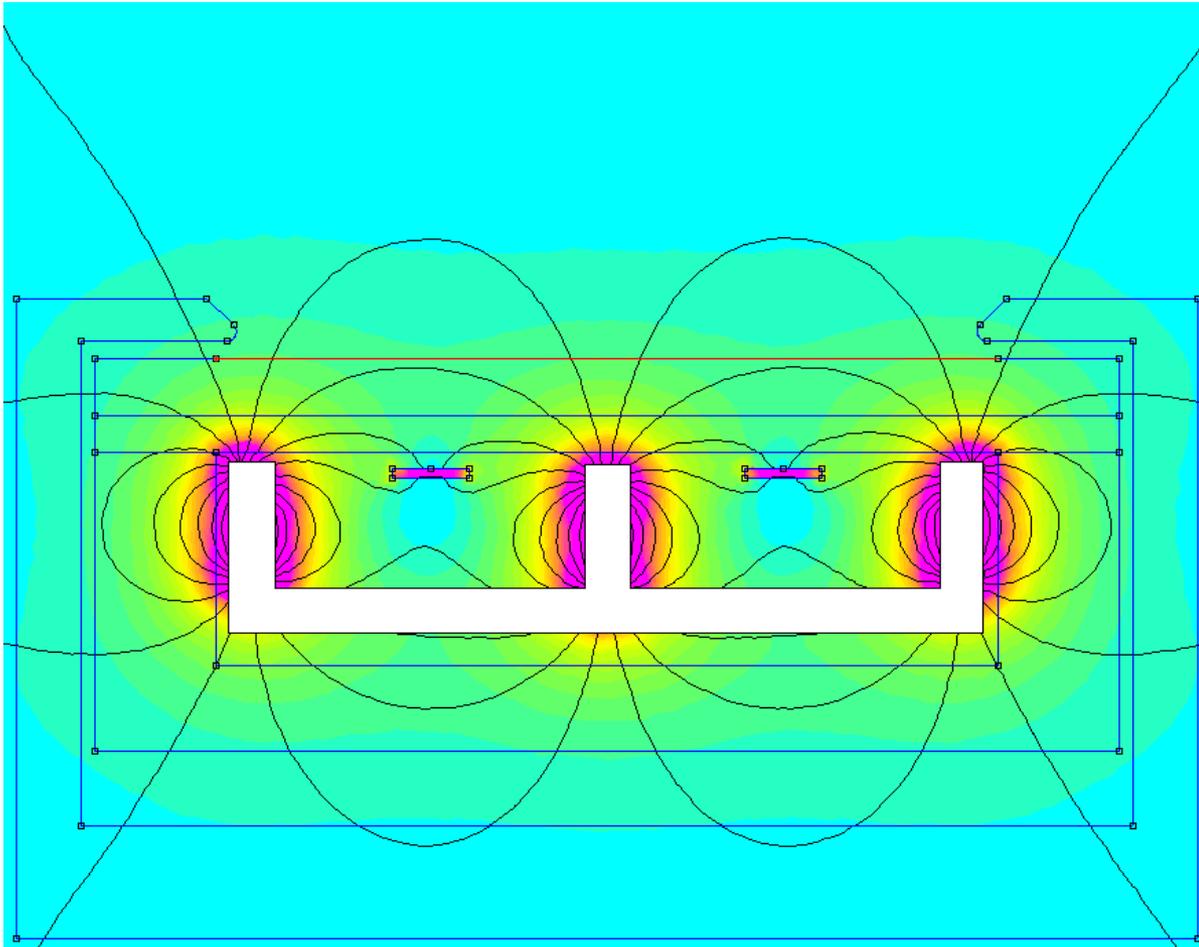
# CHANGE TO MAGNETIC CONFINEMENT
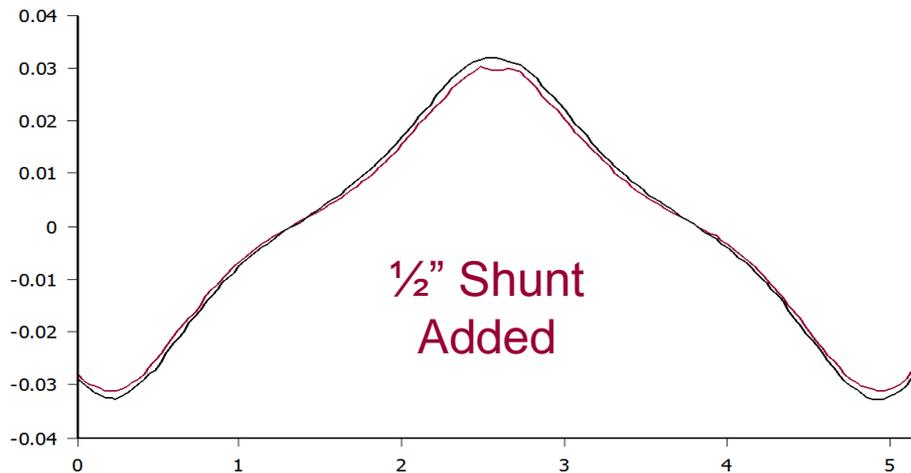
"Normal Field" Intensity
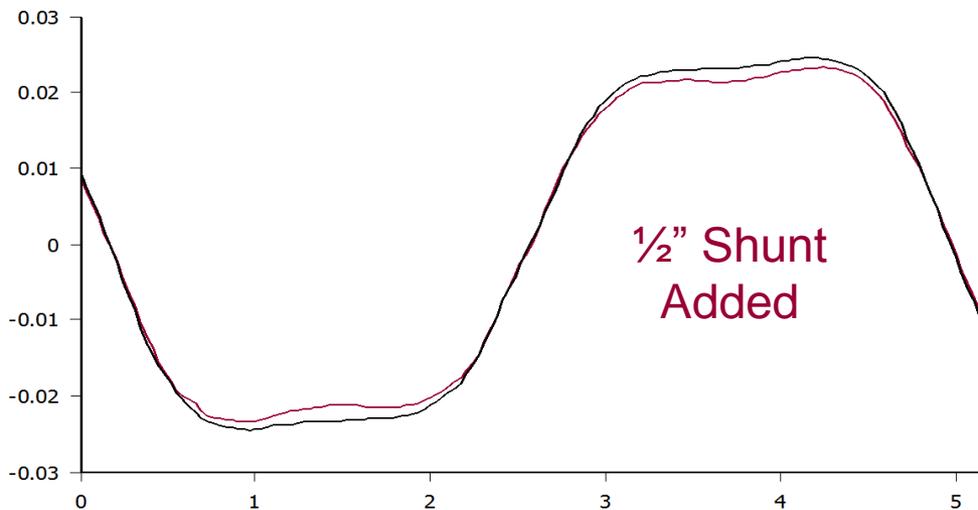
½" Shunt Added

"Tangential Field" Intensity

½" Shunt Added

MODEL WITH 1"/25MM SHUNTS
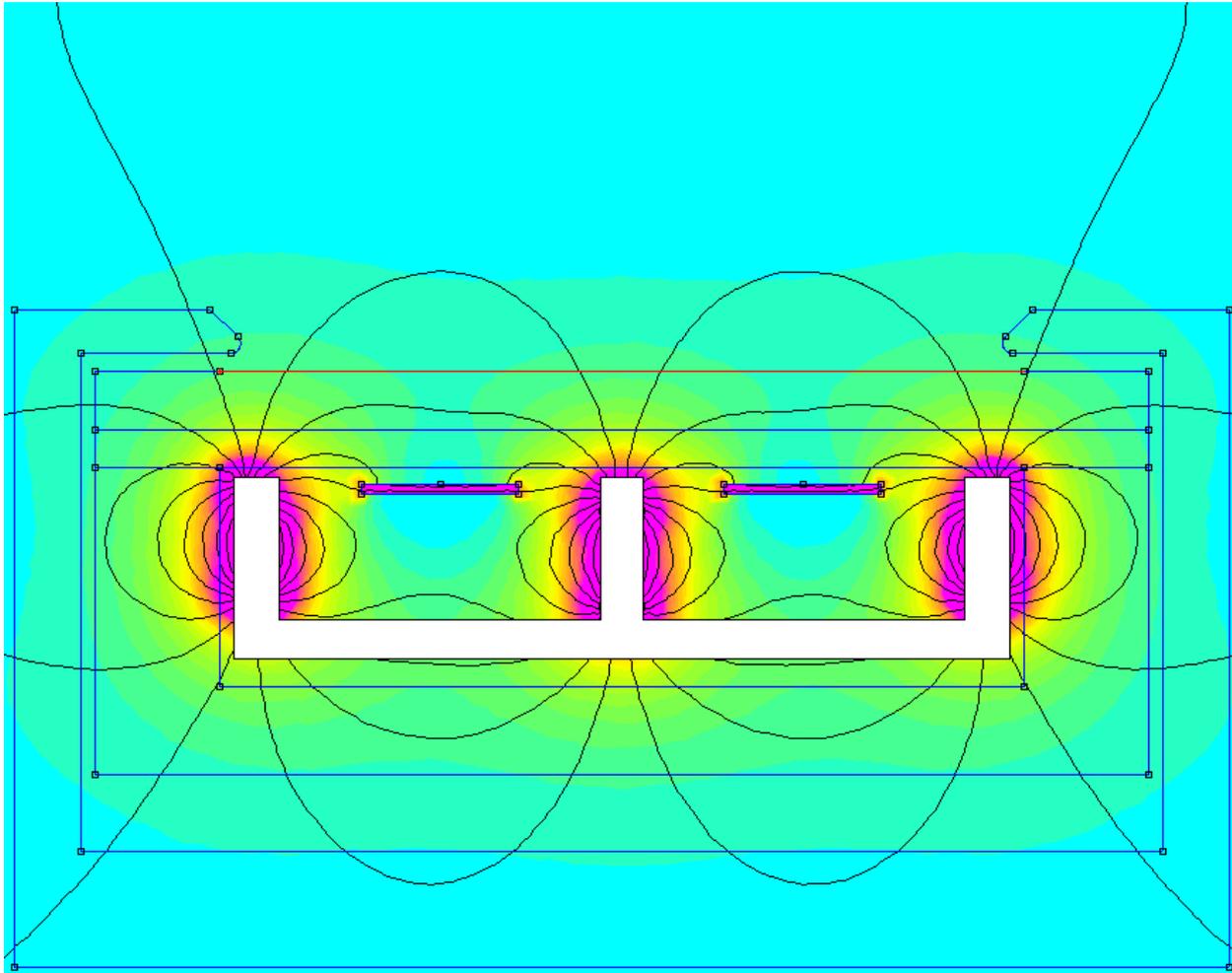
CHANGE TO MAGNETIC CONFINEMENT
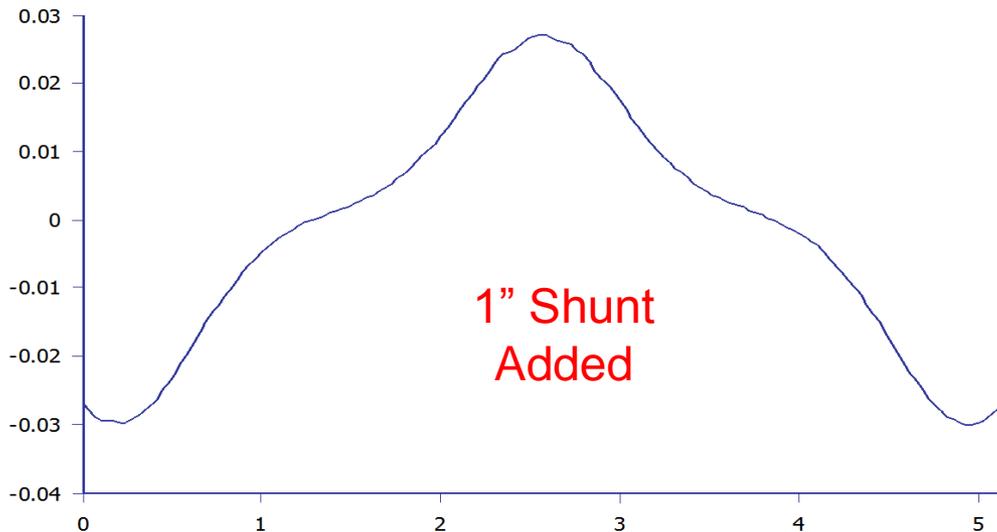
"Normal Field" Intensity
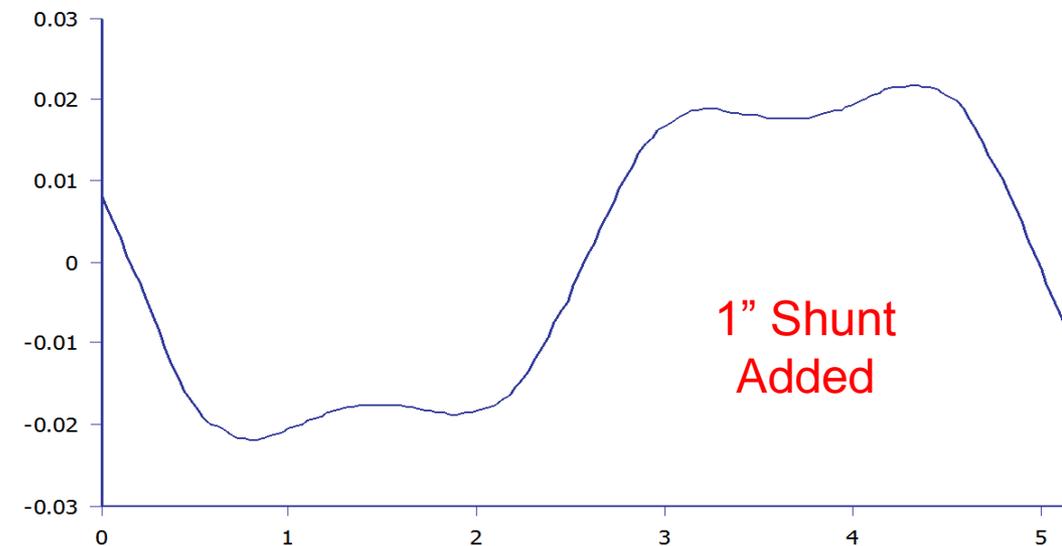
1" Shunt Added

"Tangential Field" Intensity

1" Shunt Added

CHANGE TO MAGNETIC CONFINEMENT – 3D VIEW
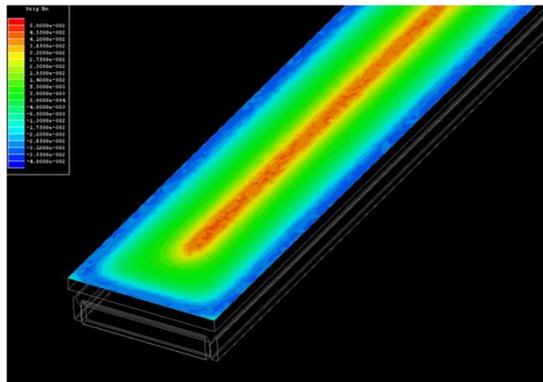
No Shunting
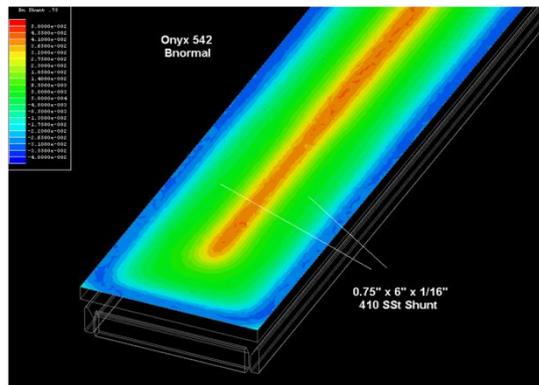
.5"/12mm Shunts
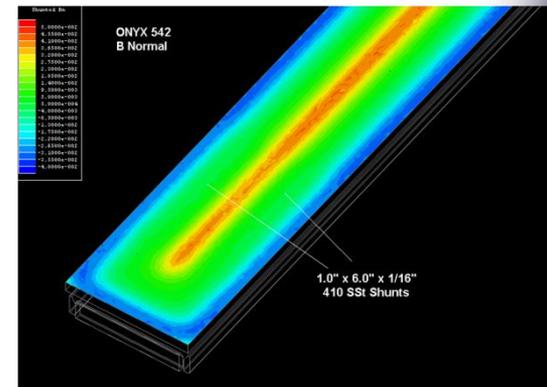
1"/25mm Shunts
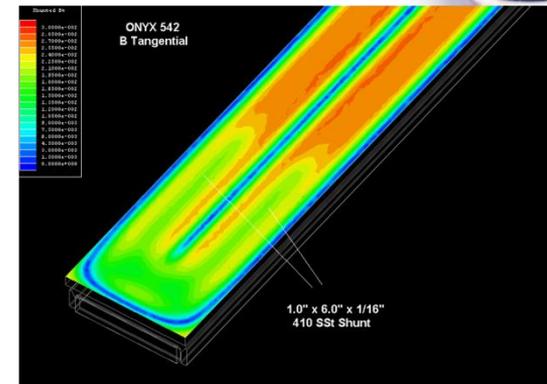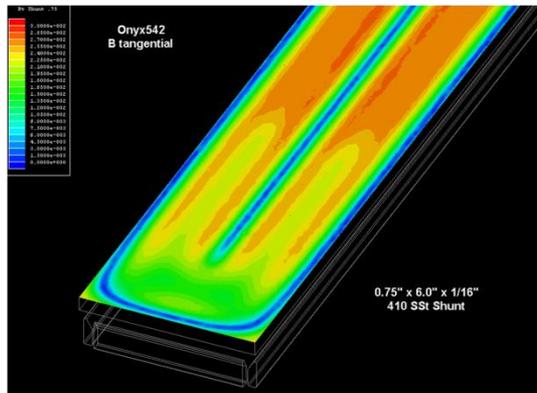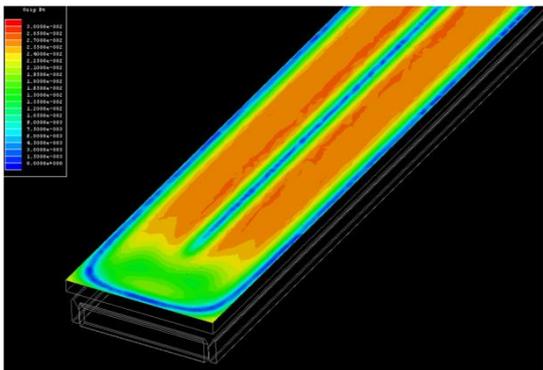
EFFECTS OF SHUNTS ON TARGET UTILIZATION

Onyx542 Target Erosion Profile

Process Parameters:

Stainless Steel Target
Pressure = 4.0mT Argon
Power 10kW

Target Parameters:

Target Size: 5" x 42" x 0.375"
Maximum Erosion Depth = 0.335"

Volume Available = 5 x 42 x 0.335
= 70.35 in^3

Volume Consumed = 27.99 in^3 30.8

Target Utilization = 27.99/70.35
= **39.8%**

Legend				
0-0.025	0.025-0.05	0.05-0.075	0.075-0.1	0.1-0.125
0.125-0.15	0.15-0.175	0.175-0.2	0.2-0.225	0.225-0.25
0.25-0.275	0.275-0.3	0.3-0.325	0.325-0.35	

Target Length (in.)
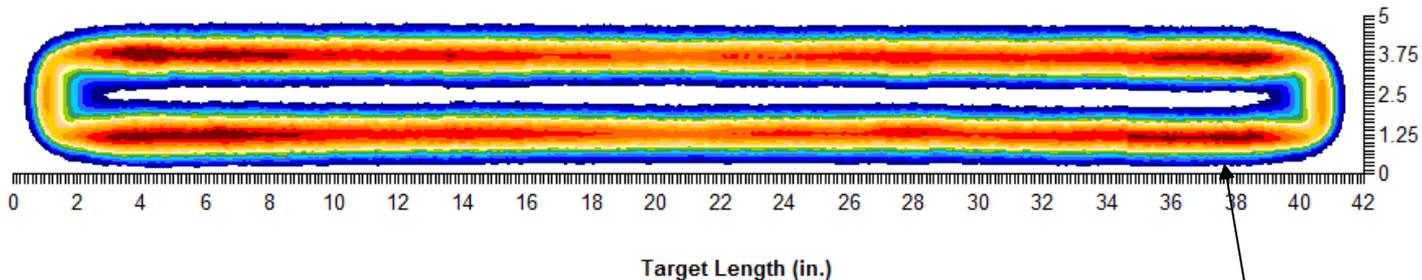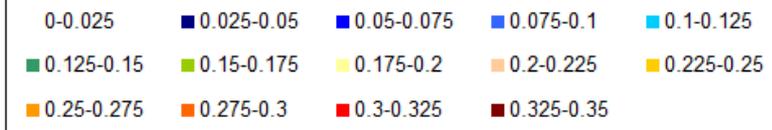
No Shunts

Notes: Turnaround Target Tiles (1.25" x 5" x 0.375") Can be used 2X

Equivalent Target Length = 5 x 40.75

Equivalent Utilization = 41.0%

EFFECTS OF SHUNTS ON TARGET UTILIZATION

Onyx542 Run#2

Target Parameters:

Target Size: 5" x 42" x 0.375"
Maximum Erosion Depth = 0.335"

Process Parameters:

Bonded Aluminum Target
Pressure = 4.0mT Argon
Power 19kW

Volume <u>Available</u> = 5 x 42 x 0.335
= 70.35 in^3
Volume <u>Consumed</u> = 28.58 in^3

<u>Target Utilization</u> = 28.58/70.35 = 40.6%

0-0.025	0.025-0.05	0.05-0.075	0.075-0.1	0.1-0.125
0.125-0.15	0.15-0.175	0.175-0.2	0.2-0.225	0.225-0.25
0.25-0.275	0.275-0.3	0.3-0.325	0.325-0.35	
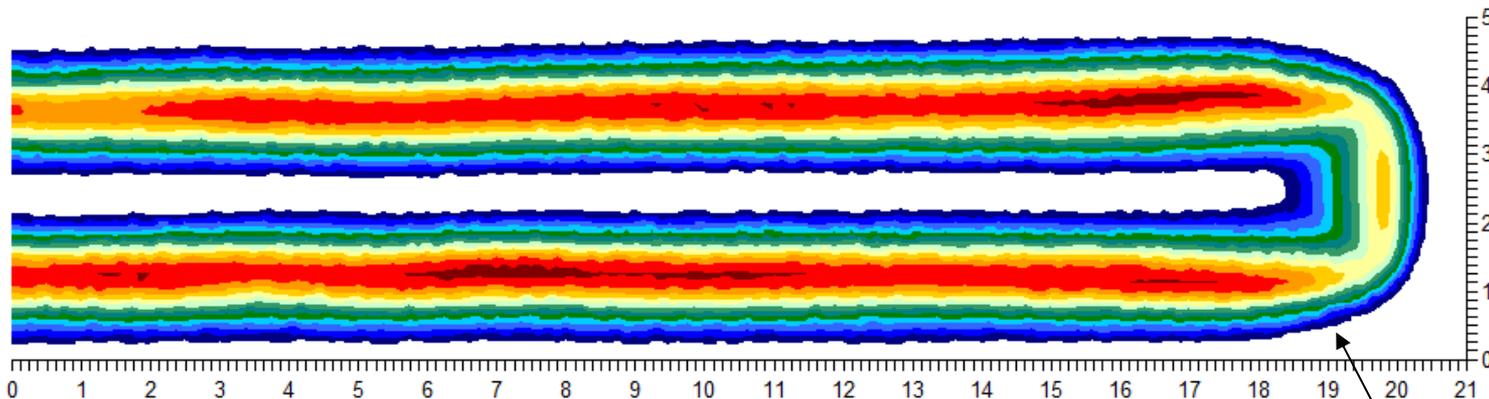
Notes: Turnaround Target Tiles (1.25" x 5" x 0.375")
Can be used 2X

Equivalent Target Length = 5 x 41.375"

Equivalent Utilization = 44.4%

.5"/12mm Shunts

EFFECTS OF SHUNTS ON TARGET UTILIZATION

Onyx542 Run#2

1"/25mm Shunts
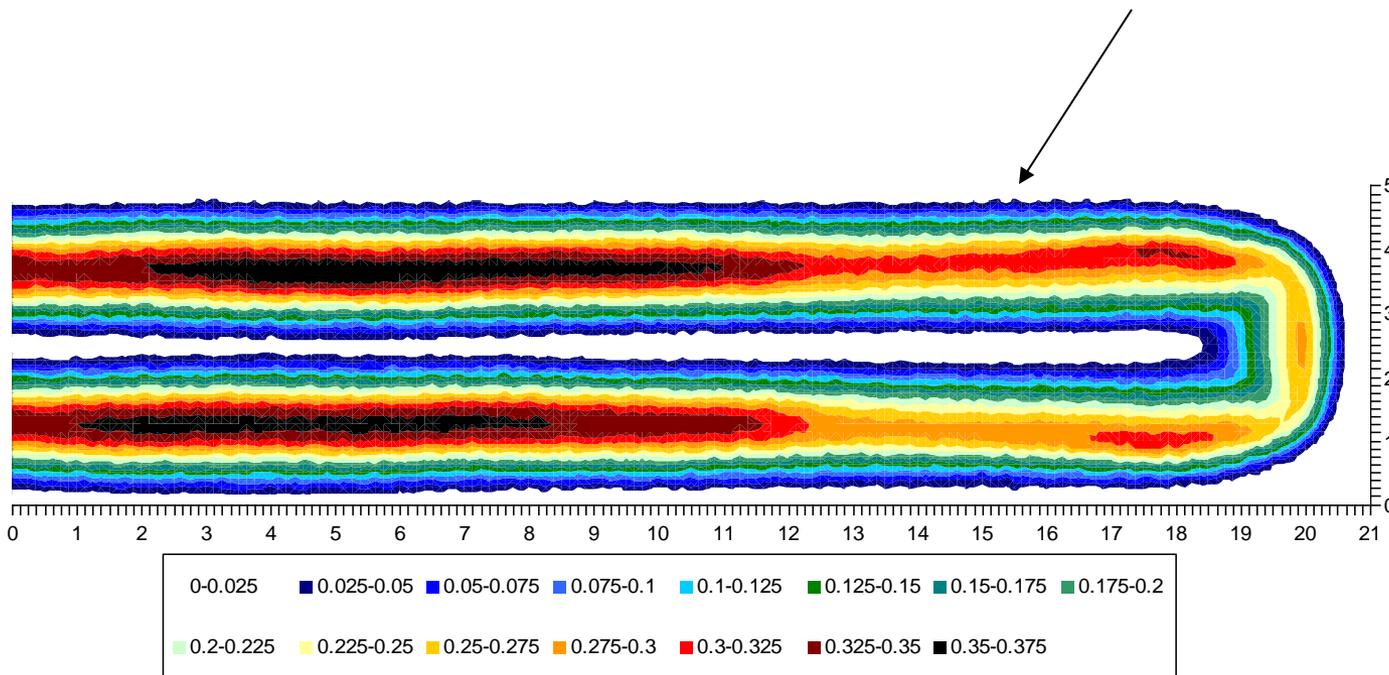
# EFFECTS OF MAGNET HEIGHT
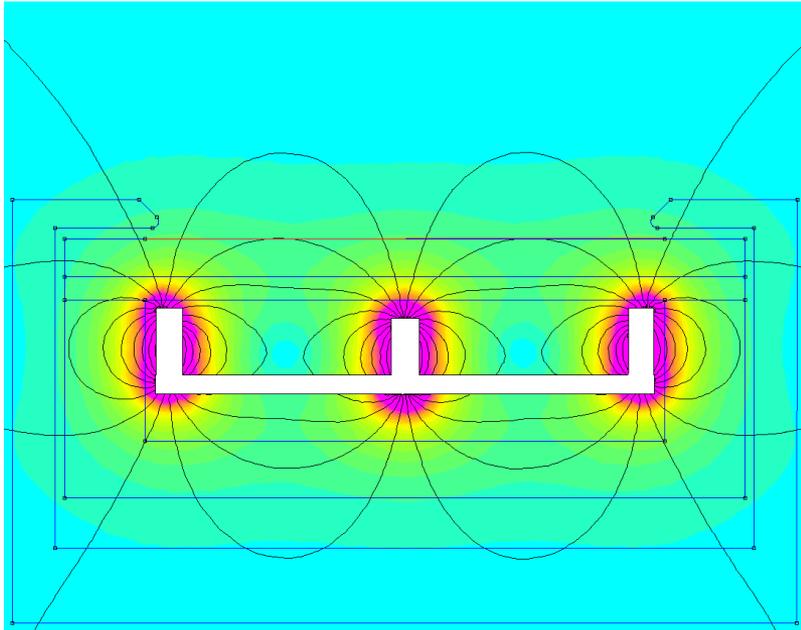
Unbalanced Outer Magnet

Unbalanced Center Magnet
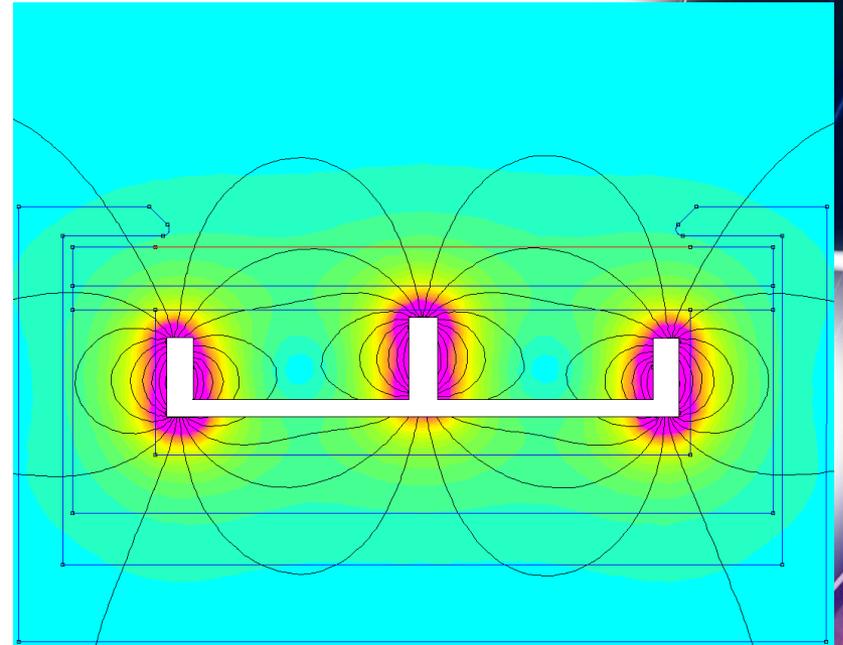
EFFECTS OF MAGNET HEIGHT ADJUSTMENT

Unbalanced Inner Magnetic Confinement
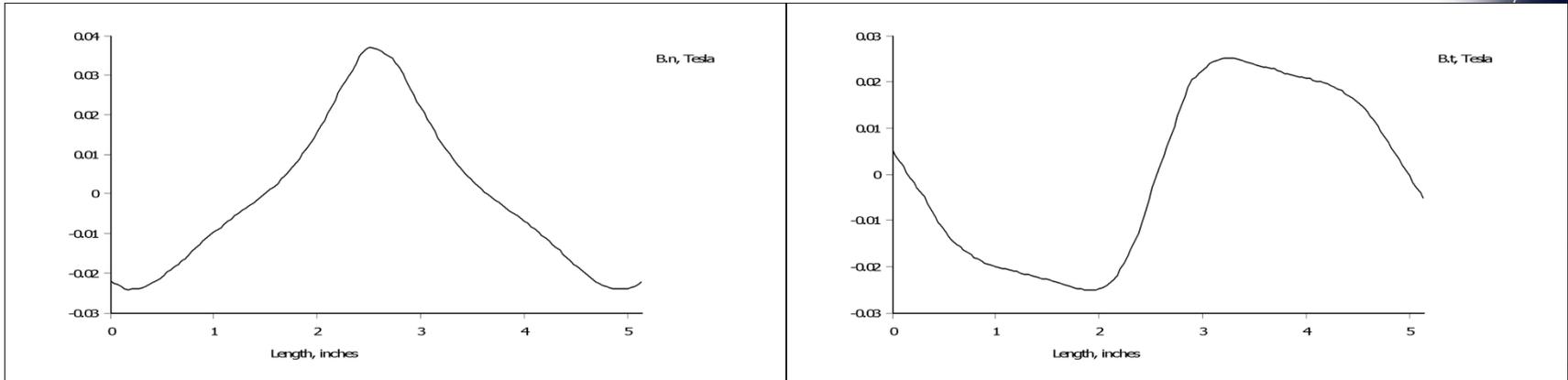
Unbalanced Outer Magnetic Confinement
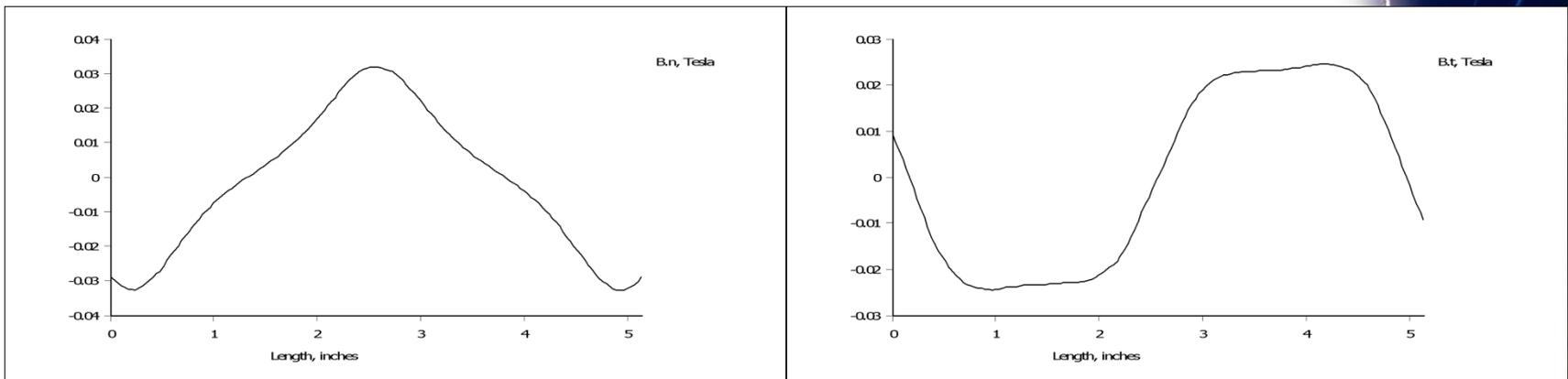
SUMMARY

- Angstrom Sciences has developed several methods to tune the sputtered flux profile by altering the magnetic field profile. These "enhancements" can compensate for system effects (i.e. pumping, gas flow, anode configuration, etc.)

- These methods alter the local deposition rates over the cathode length to help achieve uniform coatings.

- For the "perfectly" tuned system, Angstrom Sciences can deliver magnetrons with field strengths uniform to within +/- 1% .

End

Angstrom Sciences, Inc.