INCREASING LOW-MELTING-POINT TARGET UTILIZATION

A Power Systems Route to Operating Cost Reduction

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AGENDA

Background

Case Study: A Tale of Tin Targets

Problem

Solution: Part One

Solution: Part Two

Conclusion
BACKGROUND

Major expenses in large-area thin-film coating:

1. Worker salaries and benefits
2. Target material
3. Incoming electrical power
CASE STUDY: A TALE OF TIN TARGETS

+ Significant target-material savings were achieved using the Ascent® AMS/DMS pulsed dual-magnetron sputtering system.

  – Rapid, sensitive arc detection and handling enabled radical extension of the lives of low-melting-point targets:

    • Complete use of target material through the targets’ otherwise nearly impossible end-of-life region
    • Reclamation of old “bone pile” targets that previously had been deemed unusable
PROBLEM

+ A company’s existing power supplies consistently caused blowouts on their tin targets.
+ Frequent, massive arcing rendered these targets effectively unusable.
+ The company had accumulated a significant “bone pile” of tin targets.
SOLUTION: PART ONE

+ This company replaced one of their “old iron” AC power supplies with a 60 kW AMS/DMS stack.

+ Set up:
  – To put their new equipment to the test, they tried the worst targets from their “bone pile” they could quickly find.
  – With the AMS/DMS stack at factory default settings, they initiated sputtering at 55+ kW.
“BAD” TARGETS: BEFORE

+ A piece of the this leftmost target had been blown out and then reattached using melted indium.

+ Targets rendered unusable by frequent, massive arcing
"BAD" TARGETS: BEFORE

+ Other targets were in similar or worse condition.
RESULTS

+ With the AMS/DMS stack *at factory default settings*, sputtering at 55+ kW:
  
  – The targets ran at the high set point and immediately made quality product.
  – The targets were in service for four months.
  – The AMS/DMS stack ran perfectly out of the box with no engineering intervention.
Notice that the holes and the repairs on the target are still intact and visible.
TARGETS: AFTER FOUR MONTHS OF PRODUCTION WITH AMS/DMS STACK
SOLUTION: PART TWO

+ Set up:
  – After the initial success with the Ascent AMS/DMS stack, the company retrieved their absolute WORST tin targets.
    • The ends of these 8” diameter targets were significantly blown out and for all practical purposes, unusable.
  – They put these targets into service with the AMS/DMS stack to see if they might be at all usable for production.
“TERRIBLE” TARGETS: BEFORE
“TERRIBLE” TARGETS: AFTER FOUR WEEKS OF PRODUCTION
RESULTS

+ Results:

– The targets were used in production for four weeks at 55+ kW, making good films.

– As an unexpected bonus, the Ascent DMS auto-balancing feature enabled a dramatic increase in target material utilization.
  • The coater operators usually run the targets down to 5 mm thickness before considering them spent and replacing them.
  • The Ascent DMS auto-balancing feature enabled them to continue production to as low as 2 mm thickness, which can equate to an additional campaign on the targets.
CONCLUSION

+ This coater realized significant savings using an AMS/DMS power delivery system to:

  – Reclaim targets that were previously deemed unusable

  – More fully utilize target material by sputtering down to 2 mm instead of 5 mm

Reclaimed Targets + Full Material Utilization = Significant Target Material Savings
CONCLUSION

+ This solution offers an important option for companies looking to increase profits by significantly reducing target material costs.

– Though each process is unique, the potential return on investment is highly compelling.

Reclaimed Targets + Full Material Utilization = Significant Target Material Savings