

## The AML Perfect-Field™ Application Development Process A Powerful Platform for Commercialization that Eliminates the Constraints of Conventional Design

As the first company to provide a complete, end-to-end development process for superconducting and magnet-based applications, AML has changed the game. This unique process drives our intellectual property strategy, our approach to business relationships, and our vision for impacting critical markets and industries. For visionary companies, this creates transformational opportunities in a wide swath of industries, including energy, medicine, transportation and environmental science.

An enabler for never-before-realized capabilities and designed for the commercialization mission, the AML Perfect-Field™ Application Development Process draws from AML's large portfolio of intellectual property, which includes dozens of current and pending patents that encompass hundreds of discrete technologies and methods.

### THE "3D PRINTING" PROCESS OF ADVANCED MAGNETICS

The AML Perfect-Field™ process, depicted below, dramatically accelerates time to market by exactly converting a specific application's theoretically "perfect" magnetic field into a fully functioning reality. It eliminates the many design constraints inherent in traditional development methods. Most important, it does it all rapidly, cost-effectively, and for virtually any kind of application – in many cases offering performance capabilities that were once considered unachievable.

### IF IT CAN BE IMAGINED, AML CAN CREATE IT!

Offering the power of unconstrained design flexibility, AML's Perfect-Field™ process dramatically redefines what is possible in the design of magnet-based solutions. It creates an exciting new path for ambitious innovation in markets as diverse as industrial power generation, water reclamation and cancer treatment.



**AML's Technology Platform**  
Proprietary software, magnet & manufacturing technologies

## STEP 1. A THEORETICALLY “PERFECT” MAGNETIC FIELD

With the AML Perfect-Field™ process, a theoretically “perfect” magnetic field is finally a realistic starting point for new applications. It is defined entirely by the application as the ideal field solution, autonomous of any influence from existing magnet configurations.

## STEP 2. PERFECT-FIELD ENABLEMENT THROUGH AML COILCAD™ SOFTWARE

AML’s proprietary CoilCAD™ Software is the heart of the process, offering unprecedented end-to-end precision and automation for turning a theoretical perfect field into reality.

Developed and refined over 20 years, it is the world’s most advanced magnet design platform—a 3D computer design and manufacturing (CAD/CAM) tool that allows rapid design, optimization and precision fabrication converting a theoretical magnetic field into an operational magnet.

Unlike conventional design software and methods, CoilCAD™ describes and optimizes the complete 3D conductor path – unconstrained by conventional magnet configurations – in arbitrary winding configurations, determines all performance aspects of the coil, and generates machine code for precision and highly automated manufacturing.

## STEP 3. REVOLUTIONARY MAGNET TECHNOLOGIES

Thanks to CoilCAD™, AML has made dramatic new magnetic discoveries and created innovative coil configurations that yield formerly impossible geometries and capabilities—effectively eliminating the constraints of conventional technologies and design methods to enable the perfect field. This is a radical departure from conventional coil configurations, and has redefined the performance standards for magnet field design, including:

**Field shape:** Geometry and aspect ratios now conform precisely to Perfect-Field™ specifications – even accommodating flared, twisted, curved, infinitely long, or minimum aspect ratio configurations

**Field size:** Ease of scaling and optimized power density to large applications (such as wind turbines) or very small, focused applications (such as tiny medical devices)

**Field purity:** also called harmonic uniformity—made possible because a reliable and stable “perfect field” can be achieved by overcoming the limitations of conventional magnetic technologies

**Field efficiency:** Operational performance can be optimized to the needs of the application

## STEP 4. UNIQUE APPLICATION OF ADVANCED MATERIALS

AML’s unique magnet and manufacturing technologies enable the practical application of such advanced materials as superconductors and nanomaterials. These technologies also revolutionize the use of conventional magnetic materials such as copper—by endowing them with dramatically improved magnetic capabilities. Now “next-generation” resistive magnets can deliver near-superconducting performance with current densities 20 times greater than that of conventional magnets. As a result, many advanced applications can be developed and deployed without the requirement of more costly cryogenic cooling systems.

## STEP 5. INNOVATIVE MANUFACTURING

The unique capabilities of AML’s CoilCAD™ software eliminate the need of magnet tooling and accelerate time to market. The entire design process is freed from the constraints of conventional magnet manufacturing practices. The optimized design in CoilCAD™ is fully integrated in the manufacturing process through a Computer Aided Manufacturing (CAM) module which drives precision CNC machines and 3D printers – resulting in consistent, reliable and lower-cost end products.

## STEP 6. COMPLETED PRODUCTS OR LICENSES

AML’s business model empowers companies to bring new ideas to life. Using a highly collaborative approach, AML engages directly with customers to support their product development. AML focuses on the enabling magnets inside the product and allows the customer to be the application expert and final product road-to-market. We enable them to transform their industries and markets with products that are fully optimized for size, weight, efficiency, capabilities, environmental impact and cost.