



Intelligent Agricultural Solutions enables ultraefficient field seeding with help from ADI's advanced MEMS microphones and single-chip audio processors

播种施肥的时候，管道被外来泥或者大块的湿了的肥料堵住了。所以有些空地就没有播种到，就产出降低。

Commercial agriculture's embrace of precision automation has a transformative impact on modern farming practices, yielding continuous improvements in process efficiency, productivity, and profitability. This progress is exemplified by modern air seeders—wide-frame mechanical implements pulled behind farming vehicles that till the soil, distribute seed and fertilizer to the ground via air delivery, and repack the soil in a single pass.



When an air seeder gets blocked, sections of a crop are left unseeded and hurt the bottom line.

Unfortunately, the tubes—or “runs”—through which the seed and fertilizer is expelled are prone to blockages caused by errant mud and/or clumps of moist seed or fertilizer. In the absence of a mechanism to detect these blockages, the vehicle driver is often unaware that the seed distribution has been interrupted and may inadvertently leave strips of land unseeded, negatively affecting productivity and profitability. 光学传感器通过看来判定是否堵住就缺陷，因为其摄像头本身可能被灰尘堵住。而麦克风是听，不是看。类似听诊器，有无hiss声就可判定堵住否。

Intelligent Agricultural Solutions' (IAS) wireless blockage monitor solves this problem via a novel acoustic sensor-based approach enabled by ADI's advanced

ADMP401 MEMS microphones and ADAU1401 SigmaDSP® audio processors. Where competing blockage monitoring solutions employ optical sensors that “watch” for blockages and are prone to failure from environmental factors such as dust and fertilizer build-up on the sensors, IAS's wireless blockage monitor relies on ADI MEMS microphones that “listen” to seed and fertilizer flowing through the system as they bounce off a small steel membrane—similar to how a stethoscope works. These sound pulses are converted into digital signals, and this data is transmitted wirelessly to the iPad®-based visual display located in the vehicle cabin where it can be monitored by the driver. This wireless acoustic system has been proven to be far more reliable than optical systems and dramatically reduces the number of wires common to optical systems, thereby minimizing reliability issues caused by wire damage.

The omnidirectional ADI ADMP401 MEMS microphones that comprise the acoustic sensor network within IAS's wireless blockage monitor feature a high signal-to-noise ratio (SNR) and an optimized output signal range that equips the IAS system for highly precise detection of seed “impacts” regardless of the seeds' weight and density. The small size of these MEMS microphones (4.72 mm × 3.76 mm × 1.0 mm) enabled IAS's designers to fit 24 microphones per board, and the microphones' low temperature and vibration susceptibility assured high reliability in harsh operating conditions. Meanwhile, the ADI ADAU1401 SigmaDSP audio processors in the IAS system capably handle the real-time processing of the high volume of audio data feeding in from the ADI MEMS microphones and facilitate the necessary front-end signal conditioning and digital filtering.



Intelligent Agricultural Solutions' wireless blockage monitor (front and rear view).

每个板子用了24个麦克风

“ADI's advanced MEMS microphones and audio processors were key to achieving the core innovation behind our acoustics-driven blockage detection technology, and the tireless support that ADI provides us distinguishes the company as one of our favorite suppliers.”

Bobby Volesky, Product Manager, IAS