

## Moving Forward with Autonomy

# Applied Research Opportunities Growing with Autonomous Agriculture

Olds College Centre for Innovation (OCCI) is pushing the boundaries of autonomy applied to agricultural operations with its Raven OMNiPOWER™ platform utilizing technology and equipment to farm more efficiently. The team is wrapping up three growing seasons using OMNiPOWER on the Olds College Smart Farm — and the applied research opportunities in autonomy keep coming.

OMNiPOWER operating next to conventional equipment.





OMNiPOWER demonstration at AgSmart 2022 with the coulters bar implement from Pattison Liquid Systems.

OMNiPOWER joined Olds College of Agriculture & Technology initially for a 3½-year applied research project on autonomous agriculture equipment. The College owns the OMNiPOWER autonomous platform with three implements: Seedmaster 30-foot air seeder, Pattison 120-foot sprayer and New Leader 90-foot fertilizer spreader.

Roy Maki, Research Project Manager, Smart Ag, is leading the College's autonomous agriculture equipment initiative for broad acre crop production. Maki and his team are continuing to collect information and observations from OMNiPOWER to understand the benefits and challenges of autonomous agriculture equipment.

“The confidence gained from using OMNiPOWER for three years of back-to-back operations led to the Smart Farm relying on OMNiPOWER to perform significant seeding, spraying and spreading duties in the 2022 growing season,” says Maki.

“Working with OMNiPOWER over the past few years shows us that autonomous technology is available and mature enough for broad acre farming,” says Maki. “We’ve been able to expand our data collection to compare OMNiPOWER to conventional equipment, as well as test a new to Olds College coulters bar. As we gather more and more data throughout the project, we gain more insights into the performance of autonomous equipment on the farm.”

One major project milestone was comparing autonomous equipment operations to conventional equipment in terms of cost, labour and efficiencies. Team members working with OMNiPOWER are performing comparable autonomous data collection with an electronic data

		Implement Width (m)	Tank Size (L)	Total Weight (kg)	Engine Power (kW)	Work Rate (ha/h) (weighted average of EFC)
Seeder	OMNiPOWER	9.144	12,366	23,605	129	4.2
	Conventional	21.3	21,095	61,079	402.5	7.3
Sprayer	OMNiPOWER	37.06	6,057	19,019	129	19.8
	Conventional	36.5	4,542	18,615	242	41.4
Spreader	OMNiPOWER	27.43	8,130	19,042	129	20.3
	Conventional	25	5,663	N/A	253.5	45.5

OMNiPOWER sizes (width, tank volume and total maximum allowable weight when loaded with product, engine power and work rate) compared to conventional equipment (includes combined tractor and implement loaded with product weight) used in 2022.



Roy Maki, Research Project Manager, in Field 2E on the Smart Farm while OMNiPOWER is performing a mission.

collection system called a Somat-eDAQ. The device electronically collects location specific data (GPS) and equipment data (CAN bus) at a rate of two times a second and includes starts, stops, and field and fuel efficiency.

The College owns two Somat-eDAQ devices: one is installed on OMNiPOWER and the second is housed in a carrying case and used to collect data in conventional equipment. This provides the team with robust datasets tracing the equipment’s progress and any downtime, tracking fuel consumption and field/route efficiencies, identifying temporal/spatial points of interest, and calculating hands-off operational time. The datasets collected are used to evaluate autonomous versus conventional equipment.

Two years of data acquisition with the Somat-eDAQ devices and results show promise that OMNiPOWER performs favourably to conventional farm equipment when measuring field efficiencies; however, work rates will be lower mainly due to engine power limitations and slower operating speeds.

The team is currently gathering and comparing all the datasets collected from the Somat-eDAQ devices from OMNiPOWER and conventional equipment during the 2022 growing season, and are looking forward to making more comparisons.

The team also tested the OMNiPOWER-ready coulter toolbar for liquid sectional control from Pattison Liquid Systems to reduce on-farm input costs. The team was loaned the coulter bar from Pattison to use for field demonstrations during AgSmart 2022, and was able to test the equipment in the field afterwards by fertilizing 66 acres. Learnings from field operations on the Smart Farm of operating this equipment in a new region and soil zone were passed on to Pattison after the trial period.

To increase the number of available acres for testing and operation, Olds College continues to partner with local producers Carlson Ag, Gatez Farms Ltd. and Antler Valley Farm to operate OMNiPOWER on a number of their fields located near Olds. OMNiPOWER completed a total of 64 missions during the 2022 season — mission being the term used when OMNiPOWER is carrying out an operation in a field after it has been programmed.

What’s next in autonomous equipment applied research on the Smart Farm? Stay tuned to [oldscollege.ca/smartfarm](http://oldscollege.ca/smartfarm).



OMNiPOWER with the coulter bar implement from Pattison Liquid Systems.

	2020	2021	2022
Calculated missions and acres completed during the last three growing seasons with OMNiPOWER	Seeding <b>125 acres</b>	Seeding <b>497 acres</b>	Seeding <b>636 acres</b>
	Spreading <b>240 acres</b>	Spreading <b>1,895 acres</b>	Spreading <b>4,422 acres</b>
	Spraying <b>2,078 acres</b>	Spraying <b>2,158 acres</b>	Spraying <b>2,035 acres</b>
	<b>34</b> missions	<b>56</b> missions	<b>64</b> missions
			<b>+ Fertilizing 66 acres</b> completed with coulter bar