

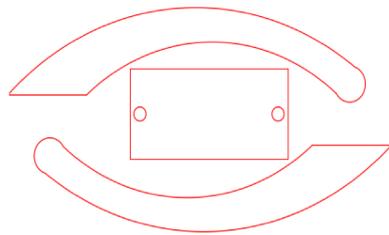
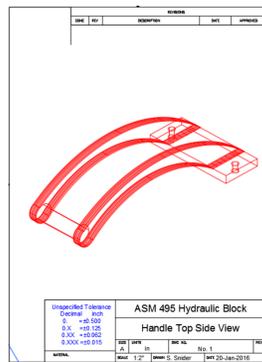
Scott Snider (Agricultural Systems Management Major, Farm Management Minor)

Background and Objective :

To produce an efficient way to connect mostly large and some small implements to power units that utilize hydraulic and/or electrical power. The complexity of many new implements can become overwhelming, and if not properly connected, damage or even harm may be caused. A potential solution must be comprised of many elements that are important to the consumer. The final product utilizes safety, correct placement, handles large quantities, boasts great impurity protection, overcomes pressure gradients, and overall reduces time consumption while promoting ease of connection. All of these criteria have been accomplished while staying within tight budget constraints and time allowance.

Design Components/Evaluation :

- Handle Added for added leverage during connection
- Promotes clean connection
- Designed for ease of use
- Mitigates pressure gradients
- Easily aligns hoses correctly
- Reduces connection duration
- Promotes safe connection



Constraints and Troubleshooting :

- Mounting location not to interfere with other functions
- Budget awareness
- Material availability
- Power unit simulation
- Accidental implement detachment simulation



Alternative Solutions/Designs :

- Hard-mounted block specific to each model tractor with specific design options for Selective Control Valves (SCV's).
- In-line implement block with loose hold on fittings to ensure correct placement.
- Single implement block with hydraulic fittings hard mounted in exact position to fit into SCV's.

Photos credited to John Deere Tech Information Manual



Economics :

Item	Cost
Salvage Quick Connect Block	\$425
Hardware: Bolts, Spring	\$10
Parker Hydraulic Hoses	\$0 On Hand
Hydraulic Fittings	\$0 On hand
Aluminum: 4 lb Block	\$0 On hand
Electrical Connections/Wire	\$30
Machining Services	\$0 Donated by Purdue University
Total:	Slightly < \$500

Sustainability/Impact :

- Payback period
- Previous success in various applications
 - Harvest machines
 - Loader attachments
- Reduces risk dramatically
- Economic benefit adds to cost savings

	A	B	C	D	E
Cost of Wasted Time Attaching Implements					
1					
2	Task	Time (Min)	\$	Time (Min)	Savings
3	Cleaning Fittings	15	\$7.00	1	\$6.53
4	Correct Placement	30	\$14.00	0	\$14.00
5	Pressure Gradient Release	10	\$4.67	0	\$4.67
6	Hose Support	5	\$2.33	2	\$1.40
7	Electrical Connection Cleaning	5	\$2.33	1	\$1.87
8	Securing Electrical Connection	5	\$2.33	0	\$2.33
9	Total	70	\$32.67	4	\$30.80
10	Total Savings * 8 different implement swaps per year =				\$246.40
11	Total Cost of Female + 5 Male Blocks =				300+125*5 = \$925.00
12	Total Payoff =				Cost/Savings = 3.75 years

Timeline/Schedule :

Spring 2016 Schedule	Hydraulic Block Design				
	Weeks 1-3	Weeks 4-6	Weeks 7-9	Weeks 10-12	Weeks 13-16
Parts Ordered					
Final Measurements					
Machining (if needed)					
Parts Fitment					
Troubleshooting					
Finalize/Report					

Final Solution :

Universal In-line Butterfly Handle Quick Connect Block

Block:

- Utilizes two hydraulic connections
- Contains one electrical connection
- Universal for attachment to various power units
- Handle for added support
- Displays safe hydraulic connection

Mount:

- Mounts to 3-point hitch attachment points
- Provides general area of mounting below 3-pt. hitch
- Utilizes extension spring for easy access and movement of block



Sponsor:
Purdue Agricultural and Biological Engineering Department

Technical Advisor:
Dr. Daniel Ess

Instructors:
Dr. Robert Stwalley
Dr. Bernard Engel

Acknowledgements:
Special thanks to Mr. Scott Brand for machining services and Mr. Daniel Skelton for modeling assistance.