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## **Motivation**

- Physical models that **emulate the human body** function, also called phantoms, or surgical simulators, are used to train medical students and doctors in manual and robotic assisted laparoscopic surgery.
- We created a **robust**, **modular**, and **cost**competitive simulator.

## **High Level Requirements**

☑ Shall be transportable as standard airline checked luggage

Shall include the 10<sup>th</sup>-12<sup>th</sup> ribs and pelvis

✓ Must facilitate the insertion of SLICE lab muscle slabs and pelvic cavity

☑ Accommodate ½ gal. of bleeding and recirculate lost blood

✓ Must insufflate and hold 0.5 psi

☑ Adjustable to Trendelenburg (T-burg), and reverse Tburg, and left and right lateral positions (45° max tilt) Skin must be resealable a minimum of 20 times in each incision location



*Figure 1:* Full assembly solid model

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## **Simulator for Laparoscopic Surgical Training**







*Figure 3:* Closeup of vertical rib supports and pelvis retainer (right)



Figure 4: Drawer, muscle slab, and supporting components

*Figure 5:* Demonstration of trocar insertion during in-situ testing [left] and reservoir, organ slab, model physical "exploded" view [right]



*Figure 6*: Endoscope view of prostate [left] and kidney [right]

*Figure 7*: Lateral tilting [left] and T-burg [right] surgical positions





