EGG DROP

DESIGNED BY: BRICK RANDALL, DANIEL HARRIS, & JOHN PLASENCIA
DATE: FEBRUARY 27, 2012
CLASS: ECE102AA TU–TH 8:25AM–10:05AM
ASSIGNMENT: EGG DROP DESIGN

DESCRIPTION: THE PURPOSE OF THESE INSTRUCTIONS IS TO AID AN INDIVIDUAL OR INDIVIDUALS IN ASSEMBLING AN EGG DROP PROTECTION DEVICE THAT WILL SAFELY LAND AN EGG FROM AN ELEVATED LOCATION WITHOUT BREAKING.

ESTIMATED TIME OF ASSEMBLY: 30 MINUTES NUMBER OF STEPS: 9

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TEAM MEMBER DESIGNATIONS:

ASSEMBLY WILL BE FASTER BY DELEGATING RESPONSIBILITIES TO OTHER TEAM MEMBERS. IT WILL BE ASSUMED THAT THE TEAM WILL CONSIST OF (4) MEMBERS. IF YOUR TEAM HAS MORE OR LESS TEAM MEMBERS, DECIDE TOGETHER WHO WILL DO WHICH TASKS. PLEASE DESIGNATE THE FOLLOWING RESPONSIBILITIES TO EACH TEAM MEMBER:

TEAM MEMBER #1: FOLLOW STEP 1 TO BUILD ONE WING.
TEAM MEMBER #2: FOLLOW STEP 1 TO BUILD ANOTHER WING.
TEAM MEMBER #3: FOLLOW STEP 2 & 4 TO PREPARE WING STABILIZER BRACES AND EGG BASKET, RESPECTIVELY.
TEAM MEMBER #4: FOLLOW STEP 3 TO PREPARE CYLINDRICAL CUSHIONS.

NOTE THAT OTHER STEPS WILL DIRECT RESPONSIBILITY TO A SPECIFIC TEAM MEMBER IN LATER STEPS. THIS ALLOWS ALL TEAM MEMBERS TO FULLY PARTICIPATE IN THE ASSEMBLY PROCESS.

TIP: READ ALL INSTRUCTIONS IN STEP BEFORE CONTINUING.

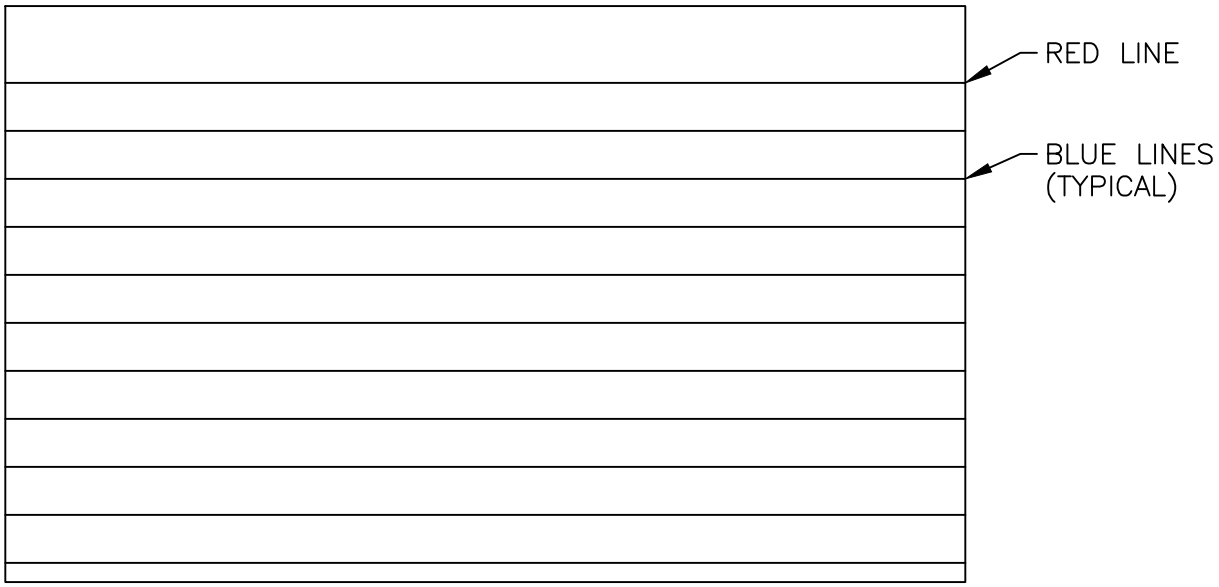
MATERIALS NEEDED:

TO BEGIN, VERIFY THE FOLLOWING MATERIALS ARE AVAILABLE AND AT-HAND:

1. (50) 3"X5" NOTE CARDS
2. (1) SPOOL OF SCOTCH MAGIC TAPE 3/4"
3. SCISSORS
4. (1) EGG

CAUTION: SCISSORS CONTAIN SHARP BLADES THAT COULD CAUSE PERSONAL DAMAGE IF USED IMPROPERLY. THE INSTRUCTIONS CONTAINED HEREIN ASSUME THE INDIVIDUAL OR INDIVIDUALS ARE FAMILIAR AND EXPERIENCED WITH THE USE OF SCISSORS AND TAKE NO LIABILITY IN THE EVENT OF INJURY.

NOTE: FOR ACCURACY, THE DETAILS BELOW REPRESENT THE NOMENCLATURE USED IN THE INSTRUCTIONS.



LINED SIDE OF CARD

BLANK SIDE OF CARD

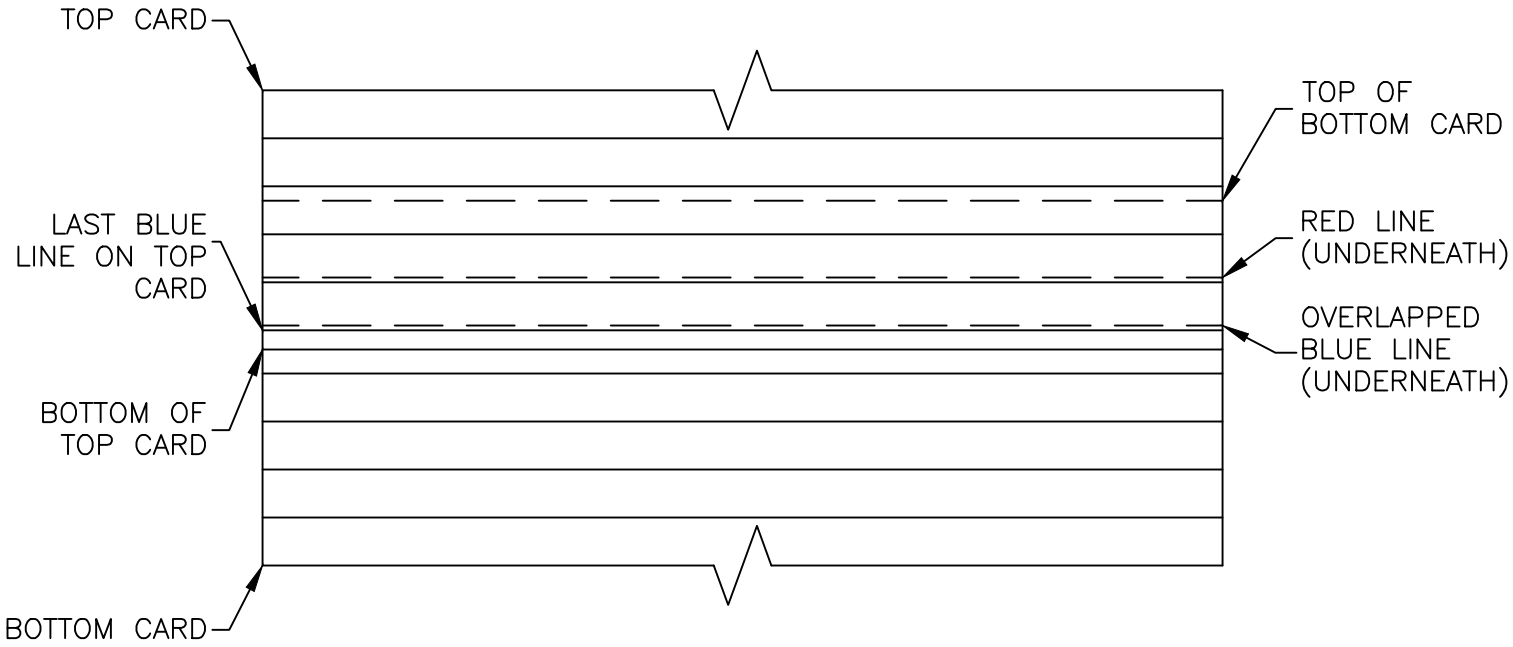
PREPARATION:

STEP 1 – BUILD THE WINGS:

DESCRIPTION: THE WING WILL BE THE MAIN PROVIDER OF AIR RESISTANCE TO PROVIDE THE EGG A SAFE LANDING.

NOTE FOR ASSEMBLY: ASSUME THE RED LINE ON THE NOTE CARD IS THE TOP.

1. RESERVE (12) 3"X5" NOTE CARDS IN A SEPARATE PILE.
2. BEGIN WITH (2) OF THE RESERVED NOTE CARDS WITH THE LINED SIDE FACED UPWARDS.
3. OVERLAP THE BOTTOM OF (1) CARD OVER THE TOP OF THE OTHER AND SPACE THE OVERLAP PAST THE FIRST BLUE LINE BELOW THE REDLINE APPROXIMATELY HALF WAY TO THE NEXT BLUE LINE. SEE DETAIL BELOW (DETAIL IS TO SCALE, SO IT MAY BE USED AS A REFERENCE).



3. PEEL ONE PIECE OF TAPE AND CUT LONG ENOUGH TO BIND SECURELY THE TWO CARDS TOGETHER IN THE INSTRUCTED POSITION.
4. REPEAT ALL THE ABOVE UNTIL ALL NOTE CARDS HAVE BEEN USED IN THE RESERVED PILE.

PREPARATION CONTINUED:

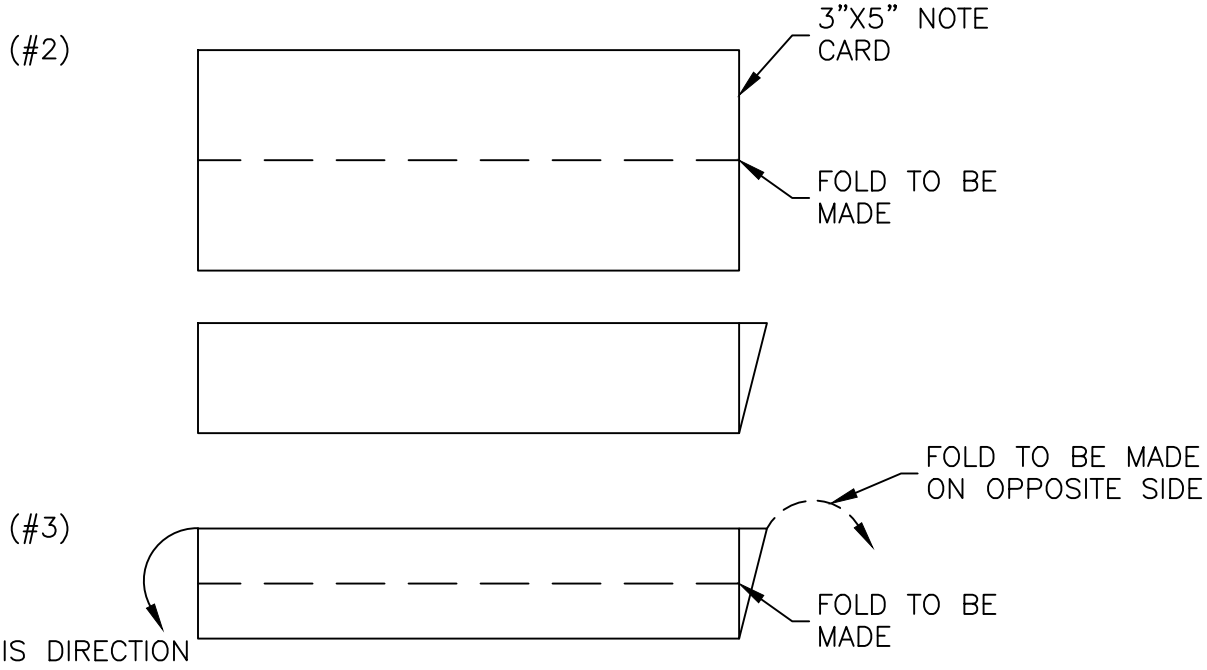
STEP 2 – BUILD THE WING STABILIZER BRACES:

DESCRIPTION: THE STABILIZER WING BRACE WILL PROVIDE STRENGTH TO THE WINGS TO PREVENT THE WINGS FROM FLAPPING UPWARDS WHEN IN DESCENT.

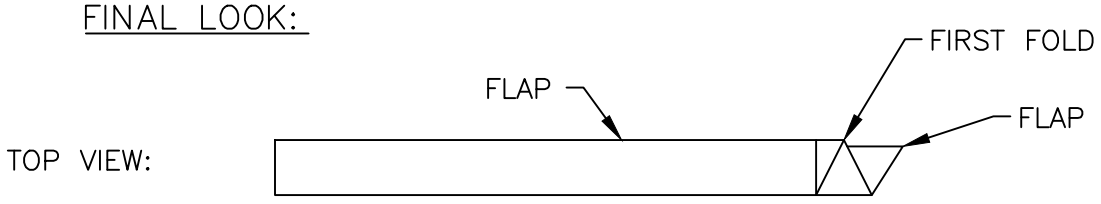
NOTE FOR ASSEMBLY: ASSUME THE RED LINE ON THE NOTE CARD IS THE TOP.

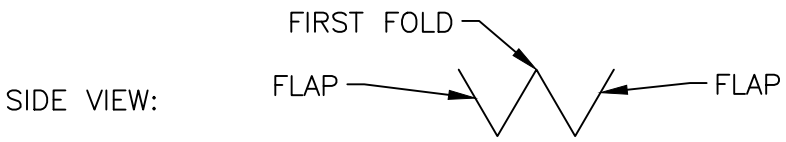
1. RESERVE (12) 3"X5" NOTE CARDS IN A SEPARATE PILE.
2. BEGIN BY FOLDING THE CARD IN HALF–HOT DOG STYLE.
3. FOLD ONE FLAP IN HALF TOWARDS THE FIRST FOLD.
4. REPEAT ON OTHER SIDE.
5. REPEAT 1–4 UNTIL ALL RESERVED CARDS HAVE BEEN USED

SEE DETAILS BELOW FOR REFERENCE (NOT TO SCALE):



FINAL LOOK:





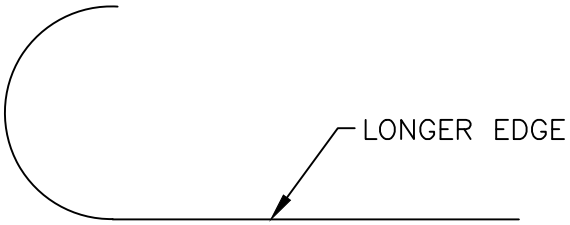
PREPARATION CONTINUED:

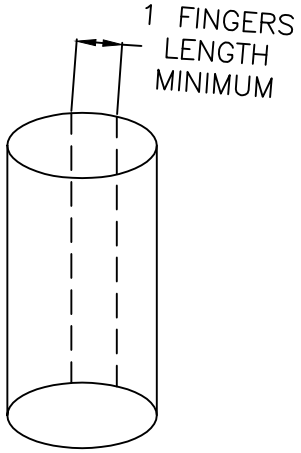
STEP 3 – PREPARE THE CUSHION:

DESCRIPTION: WITH THE AIR RESISTANCE PROVIDED WITH THE WINGS, IT IS NOW IMPORTANT TO ADD CUSHION TO THE BASE. BELOW INSTRUCTS HOW THIS IS ACCOMPLISHED.

1. RESERVE (11) 3"X5" NOTE CARDS.
2. TAKE (1) 3"X5" NOTE CARD AND ROLL HAMBURGER–STYLE TOWARDS THE OPPOSITE EDGE. OBJECT WILL LOOK LIKE A CYLINDER.
3. CURL THE CARD NO LESS THAN 1 FINGERS LENGTH OVER TO OPPOSITE EDGE.
4. SECURELY JOIN ENDS WITH TAPE.
5. REPEAT UNTIL ALL RESERVED CARDS HAVE BEEN USED.
6. SET CUSHIONS ASIDE FOR LATER.

SEE DETAIL BELOW FOR REFERENCE (NOT TO SCALE):





PREPARATION CONTINUED:

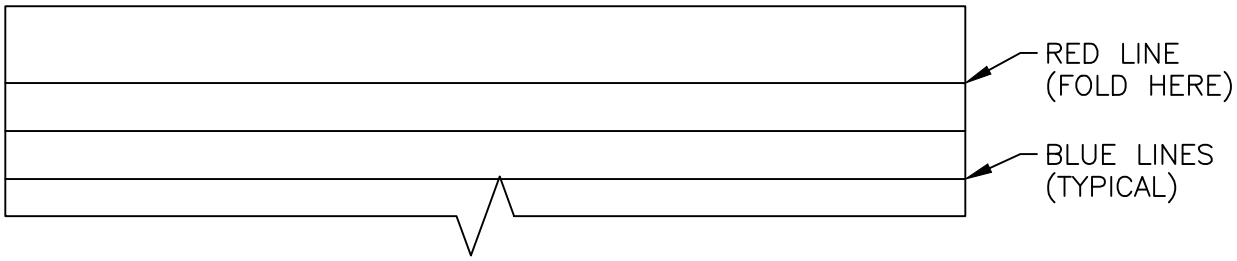
STEP 4 – BUILD THE BASKET:

DESCRIPTION: THE BASKET WILL HOLD THE EGG IN THE DEVICE WHILE IN DESCENT.

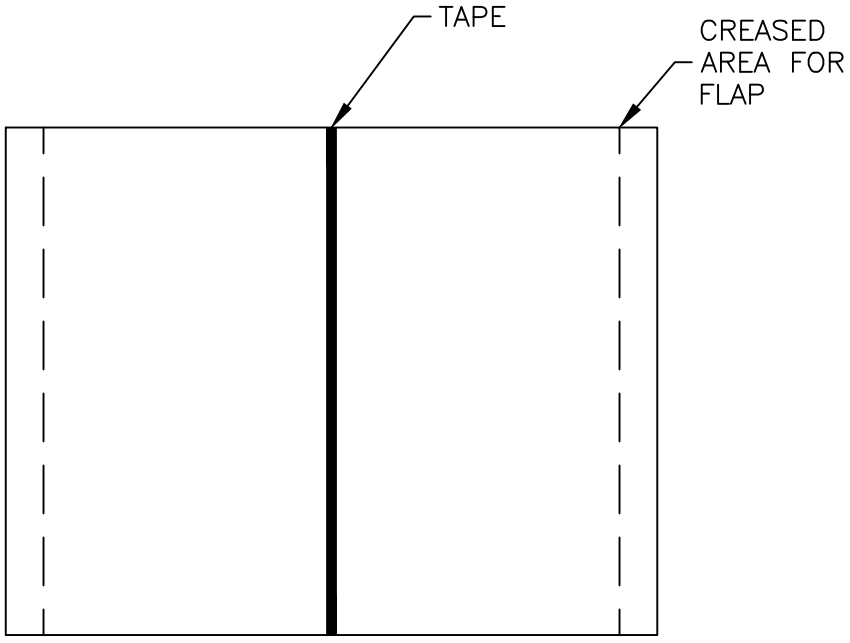
1. RESERVE (2) 3"X5" NOTE CARDS.
2. CREATE A FLAP BY FOLDING ALONG THE RED LINE ON THE CARD.
3. REPEAT FOR THE OTHER CARD.
4. TAPE BOTH TOGETHER SECURELY AT THE BOTTOM EDGES.

SEE DETAIL BELOW FOR REFERENCE (NOT TO SCALE):

(#2)



(#4)

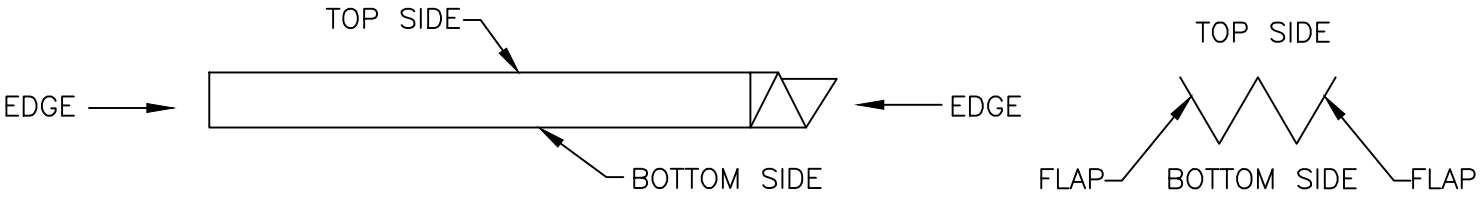


ASSEMBLY:

BY NOW, ALL 3"X"5 NOTE CARDS SHOULD HAVE BEEN USED EXCEPT ONE. VERIFY (2) WINGS, (4) WING STABILIZER BRACES, (11) CYLINDRICAL CUSHIONS, AND THE EGG BASKET, HAVE BEEN BUILT PRIOR TO CONTINUING.

THE NEXT STEPS WILL INSTRUCT HOW TO COMBINE THE WINGS AND BRACES TOGETHER.

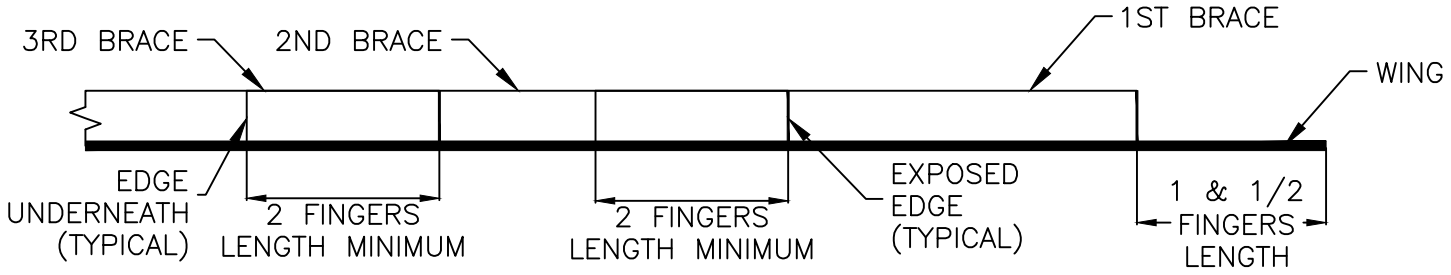
NOTE FOR ASSEMBLY: SEE DETAIL BELOW FOR NOMENCLATURE (NOT TO SCALE).



STEP 5 – COMBINE THE WINGS AND BRACES:

* SPLIT THIS STEP INTO TWO. HAVE (2) TEAMMATES WORK TOGETHER FOR EACH WING.

1. BEGIN WITH (1) WING AND MEASURE APPROXIMATELY 1 & 1/2 FINGER LENGTHS FROM THE LONG SIDE OF THE WING.
2. PLACE AN EDGE OF (1) STABILIZER WING BRACE AT THAT POSITION WITH THE FLAPS LAYING PARALLEL WITH THE WING.
3. SPREAD THE BRACE APART BY PULLING THE FLAPS TO CREATE A SMALL TRIANGLE
4. TAPE FLAPS SECURELY ON WING.
5. OVERLAP A SECOND BRACE OVER THE FIRST AND SLIDE TOWARDS THE CENTER OF THE WING UNTIL NO LESS THAN (2) FINGER LENGTHS OF THE SECOND BRACE'S EDGE COVERS THE FIRST BRACE'S EDGE. SEE DETAIL BELOW (NOT TO SCALE).



6. TAPE SECURELY TO ADJACENT BRACE AND WING.
7. REPEAT 1–6 ON THE OTHER SIDE OF THE WING.

NOTE: BRACES ARE NOT TO REACH COMPLETELY TO THE CENTER OF THE WING. ALLOW ENOUGH ROOM FOR THE WINGS TO BE OVERLAPPED IN THE CENTER.

ASSEMBLY CONTINUED:

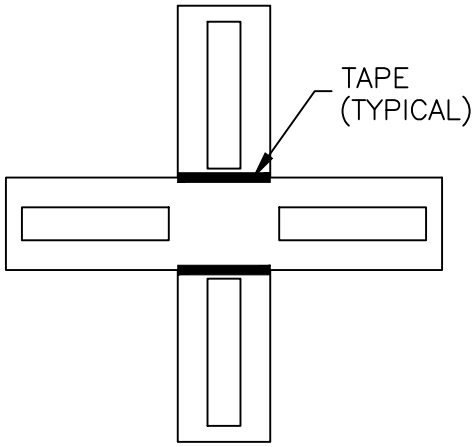
STEP 6 – ATTACH BOTH WINGS TOGETHER:

DESCRIPTION: THE NEXT STEP WILL COMBINE BOTH WINGS TOGETHER. TEAM MEMBER #1 SHALL COMPLETE THIS STEP.

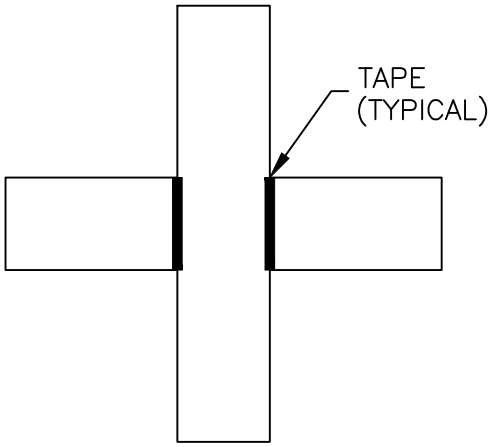
1. COORDINATE WITH TEAM THAT BOTH WINGS ARE READY FOR COMBINING.
2. CAREFULLY PICK UP AND LAY ONE WING PERPENDICULAR ON THE TOP OF THE THE OTHER WING.
3. CENTER THE WINGS AS BEST AS POSSIBLE.
4. SECURELY ATTACH TAPE TO ALL AREAS TO JOIN BOTH WINGS TOGETHER. THIS INCLUDES THE SIDE WITH THE BRACES FACED DOWNWARDS.

NOTE: VERIFY BRACES ARE FACED UPWARDS IN THIS PROCESS.

SEE DETAIL BELOW FOR REFERENCE:



BRACES FACED UPWARDS:



BRACES FACED DOWNWARDS:

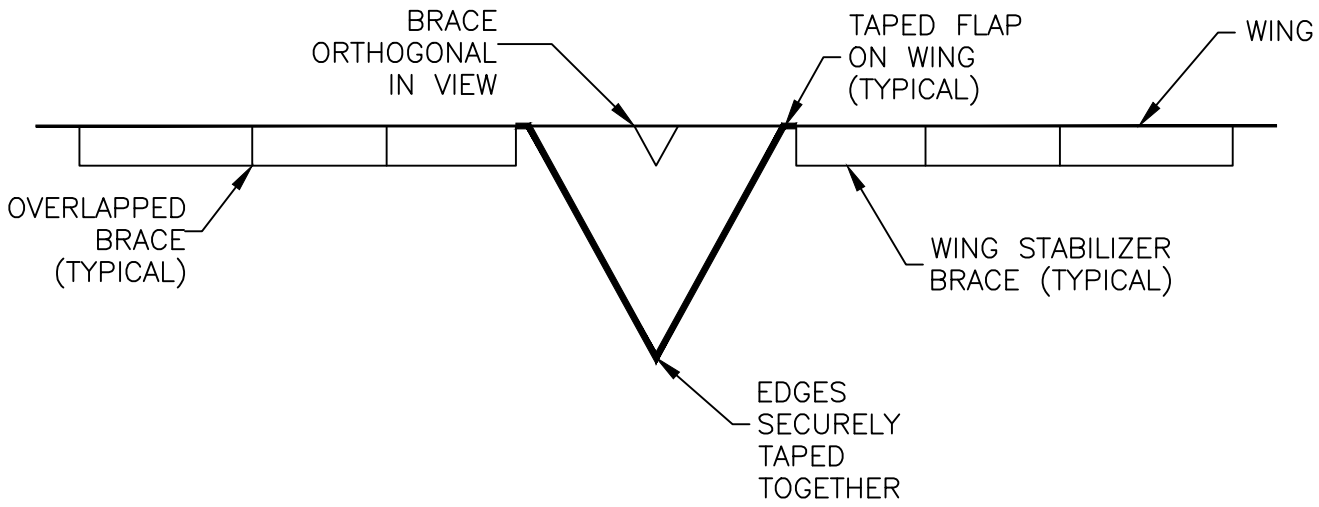
ASSEMBLY CONTINUED:

STEP 7 = ATTACH THE BASKET:

DESCRIPTION: ATTACHING THE BASKET TO THE WINGS. TEAM MEMBER #3 SHALL COMPLETE THIS STEP.

1. BRING WINGS TO WORK AREA.
2. PLACE WINGS ON TABLE WITH THE BRACES FACED UPWARDS.
3. TAKE THE BASKET BY THE FLAPS AND LINE UP PARALLEL TO EITHER WING.
4. STRETCH BASKET TOWARDS ADJACENT BRACES UNTIL THE FLAPS AND BRACES TOUCH.
5. SECURELY TAPE THE FLAPS ON THE BASKET TO THE WINGS.

SEE DETAIL BELOW FOR REFERENCE (NOT TO SCALE):



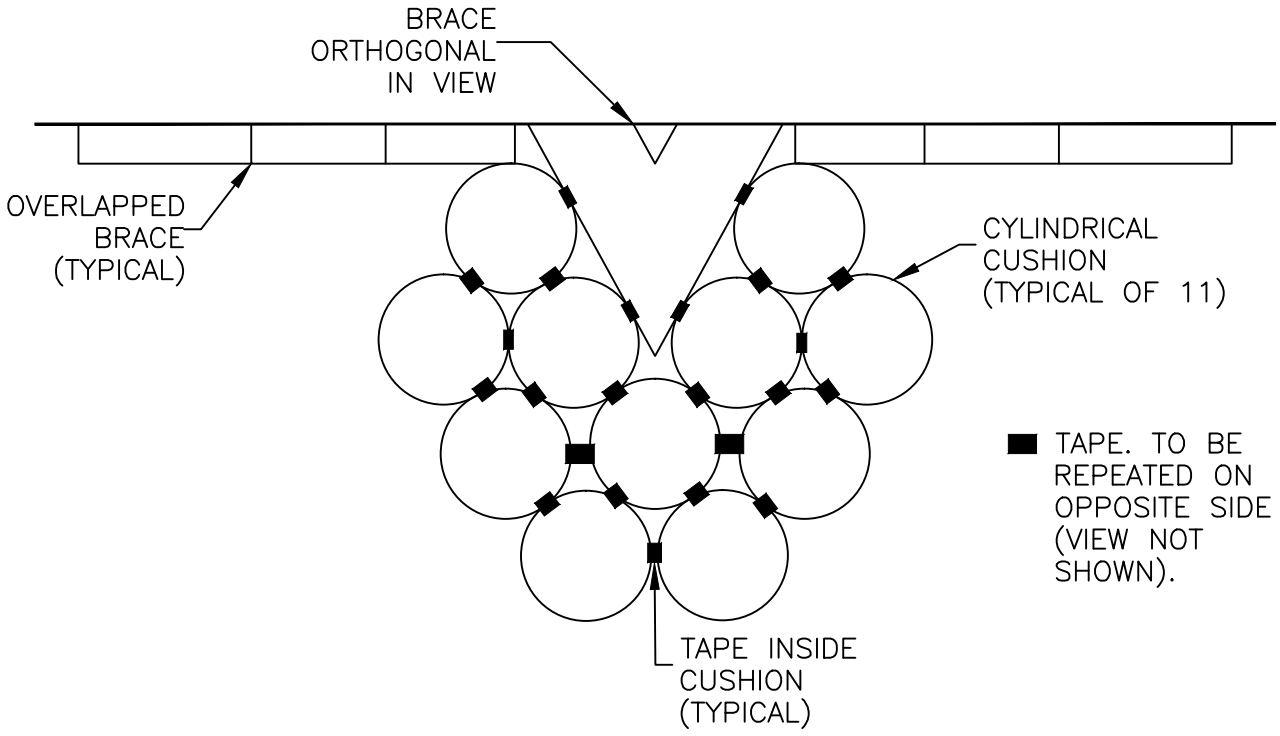
ASSEMBLY CONTINUED:

STEP 8 = ATTACH THE CUSHIONS:

DESCRIPTION: ATTACHING THE CUSHIONS TO THE BOTTOM OF THE BASKET. TEAM MEMBER #4 SHALL COMPLETE THIS STEP.

1. BRING CUSHIONS TO WORK AREA.
2. PLACE ONE CUSHION PARALLEL WITH THE BASKET, TOUCHING THE BRACE AND BASKET, AND CENTER THE CUSHION WITH THE BRACE.
3. SECURELY TAPE FROM THE INSIDE OF THE CUSHION ONTO THE BASKET.
4. CONTINUE ATTACHING CUSHIONS ADJACENTLY TOWARDS THE OPPOSITE SIDE STARTED OF THE BASKET. ALL CUSHIONS ARE TO BE TAPED FROM THE INSIDE IN EVERY INSTANCE.

NOTE: CUSHIONS SHALL BE LAID OUT PER DETAIL SHOWN BELOW (NOT TO SCALE):



VIEW PARALLEL WITH BASKET:

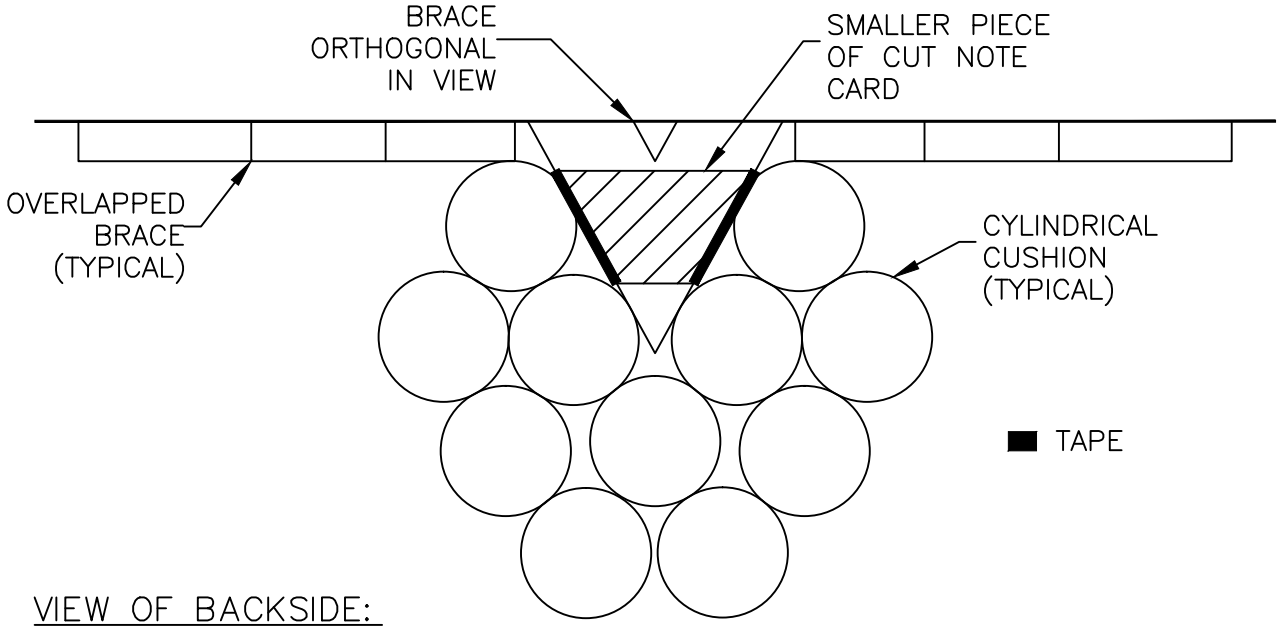
FINALIZATION:

STEP 9 – BUILD THE DOOR:

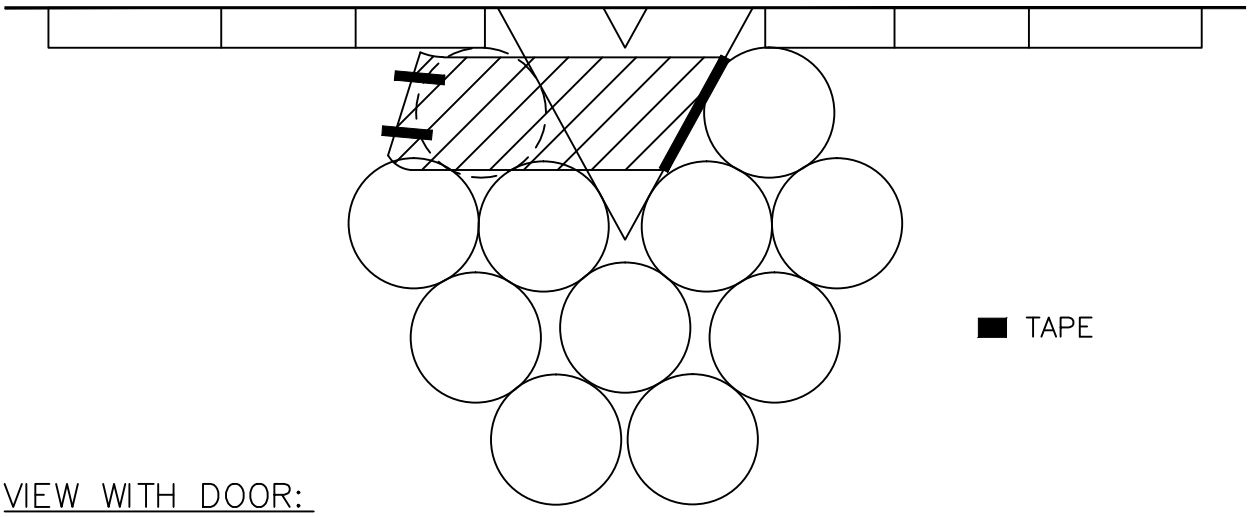
DESCRIPTION: THE PURPOSE OF THE DOOR IS TO PREVENT THE EGG FROM SLIDING OUT OF THE TRIANGULAR OPENINGS OF THE BASKET. TEAM MEMBER #2 SHALL COMPLETE THIS STEP.

1. WITH THE LAST 3"X5" NOTE CARD, CUT A SMALL PIECE, BUT LARGE ENOUGH TO COVER THE TRIANGULAR BASKET'S OPENING, AND SECURELY ATTACH WITH TAPE TO COVER THE BASKET'S OPENING.
2. TAKE THE REST OF THE 3"X5" NOTE CARD AND ATTACH SECURELY ON ONE END OF THE BASKET (THIS IS THE DOOR).
3. SECURELY ATTACH (2) PIECES OF TAPE ON THE OTHER SIDE OF THE DOOR AND FLIP A SMALL LENGTH OF TAPE ON ITSELF TO PROVIDE EASIER REMOVAL WHEN OPENING THE DOOR. ATTACH SECURELY IN MOST CONVENIENT AREA.

SEE DETAILS BELOW FOR REFERENCE (NOT TO SCALE):



VIEW OF BACKSIDE:



VIEW WITH DOOR:

CONCLUSION:

THE FINAL PRODUCT WAS TESTED THREE TIMES AT DIFFERENT HEIGHT LEVELS—TWO STORY AND THREE STORY. NOT ONCE DID THE EGG BREAK. THEREFORE, IT CAN BE CONCLUDED THAT THE DESIGN WAS A SUCCESS.

THE INTENT OF THE DESIGN WAS TO ALLOW THE DEVICE TO SPIN IN THE AIR AND SAFELY LAND THE EGG. WHILE OBSERVING THE THREE DIFFERENT TESTS, THE DROP BEGAN WITH A SLIGHT TWISTING MOTION, BUT WOULD THEN STOP. ALTHOUGH THE FALL IS GRACEFUL ENOUGH TO PROTECT THE EGG, THE IMPACT STILL SEEMS TO BE HARD.

IF THE PROTECTION DEVICE COULD SPIN MORE WHILE IN DESCENT, IT WOULD ALLOW MORE SURFACE AREA TO BE UTILIZED FOR AIR RESISTANCE. TO ACCOMPLISH THIS GOAL IN A FUTURE DESIGN, IT WOULD BE BEST TO REVISE THE BRACE ALIGNMENT AS WELL AS THE WING TILT ANGLE. THIS WOULD CATCH THE AIR BETTER AND CAUSE MORE SPINNING ON THE DEVICE, THEREFORE COVERING MORE SURFACE AREA IN AN AMOUNT OF TIME TO CREATE MORE AIR RESISTANCE.

FINISHED PRODUCT SHOULD LOOK SOMETHING SIMILAR BELOW: