Proposed improvements for the straw cutting machine
(result of discussion during meeting in HD)

1. crimping the twisters: this seems to be the weakest point at present.
    - The twisters are not well enough fixed, we need more safety → we will use 4 crimping points instead of two. We will build new solder heads with two solder points.
    - The mechanics of positioning and moving the solder heads is not good enough and needs major improvements:
        - the mechanics is not rigid (stable) enough. The heads can easily move along the straw axis due to a long lever arm.
        - the closing of the crimping tool needs too much force due to the long lever arm and the mechanics is not rigid enough
        - the pressure and endpoint are not defined.

    → a new mechanics will be build: the crimping heads will be pushed directly very near to the solder head and at the same time will be guided mechanically to guarantee a well defined position along the straw axis. This will also allow to define a well defined endpoint of the movement defining a constant depth of the hole which is melted into the twister.

2. working heads:

- all heads need smooth guidance for the straws such that the straw is automatically guided to the right place and cannot block somewhere… at present the risk that the straw is damaged during moving is too big➔ we will put guiding tunnels.
- the knives are not well enough adjusted, the cuts are therefore not always complete
- the cutting tool for the tounge will be remachined (grinded) to allow cutting a long tounge of 15 mm length instead of 12 mm. This will allow direct soldering to the ground pad.
- the punching head is only good for 1 hole (rivet). Since we want two smaller holes the tool has to be modified: punch two small holes at the right place without moving the straw or … since we don't solder on the machine- move the punching head to the other working table and punch there → this is my preferred solution
- take off the soldering head- we will not use it

3. cutting straw end and twister insertion:
    - The wire for insertion of the twister interferes with the straw when we cut the straw end.➔ we will lift the wire automatically when we pull the straw cutting tool in place.
    - The straw end has to be protected up to the last few cm → the plastic blocks which guide the wire at the end have to be moved for long straws else the risk to bend the wire during twister insert is too big. → these blocks have to be moved when we change from long to short straws.
    - At present the insertion the movement of the twister over the first cm (insertion into the straw) is too delicate because it takes too much force to pull the carriage with the wire pushing the twister. → there should be a well controlled way to move the twister over the first cm.

4. general handling:
    - the moving and especially the fixing of the working heads is requiring too much effort and care. Also there is too much risk that the heavy carriages are bumping against a fixing block leading to mechanical shocks. The blocks should slide into the right position automatically by only pulling or pushing them
    - If we cut long straws then the holes for short straws should be blocked and vice versa in order to avoid wrong positions
    - We need a well defined place to put and fix the containers for virgin straws and finished straws

5. optimization of working sequence (Ulli)
    - cut straw on tongue side
    - cut straw at the other end (after moving the straw)
    - cut tongue and leave knife down → this blocks the straw
    - insert twisters
    - punch holes to tongue