The first one should be interpreted not as a consequence of a previous error in the application of the load (although the connection between them is direct and undeniable), but as the result of applying the simplified method of calculation related to insufficient knowledge and incorrect interpretation of the operation of capacitive structure elements.

Thus, the second main cause of the already mentioned accident of cement silo is wrongly accepted force distribution in the link-up zone of the hopper with the vertical part, resulting in a separation in this place. The same situation was observed in the hoppers of the Kuznetsk and Chelyabinsk Metallurgical Plants, known to the author from interviews with experts. Rather vulnerable area is the connections between the reinforcing plates of the hopper, which quickly wear out and that's why are always in need of repair. **Figure 2** shows an example of damage of these items, photographed by the author at one of the existing steel plants.

Figure 2. Repaired bearing stiffeners of the hoppers

The entire difficulty is in the fact that officially used at the present time engineering methodology for designing steel capacitive structures for bulk materials [1-3], however, as well as other types of plate structures, is based on the conventional division of a single design into separate simple elements with subsequent their calculation on elementary planar design circuits. Such an approach, which gives acceptable results for other types of construction structures (e.g. frames of industrial buildings), leads to huge errors in the case of small space structures, which are the hoppers and silos.

Another example illustrating the impropriety of this approach, is quite common situation in Ukraine in recent years with the purchase and operation of foreign steel silos of large diameter (volume about 1000 m^3), performed on a standard design. The project does not include the lower delivery end of the structure, which engineers have to design as they say on-the-spot.

Such a design is carried out in strict accordance with the recommendations of current regulations and the prevailing ideas of the capacitive structures operation. As a result, almost immediately after the operation start there appear deflections and curvatures of the elements of unloading hoppers - reinforcement plates and bearing walls. Their size can reach up to several centimeters and they are viewed with the naked eye (**Figure 3**).

In such cases, there are often performed additional reinforcement of hoppers by welding the system of retaining steel strands of rolling sections. They, in turn, are also calculated in accordance with the currently accepted views on hopper unloading devices under load. However, after a while they are bent and require additional maintenance and reinforcement (**Figure 4**).

It is also interesting to note another curious moment. According to the norms [1, 2], the load of bulk material for such structures should be defined as for bunkering vessels. However, according to foreign documents such structures were calculated as the silos. And the pressure level, according to a different theory, is lower approximately in 2.5 times.

The second aspect of the error such as incorrect use of sections of structural elements of steel capacitives is associated with a quite typical situation in design practice that is "overextension of the scope of application". Thus, according to the paper [6] a steel storage hopper with capacity 650 m^3, which was a part of a grain-cleaning plant and operated only 12 days, collapsed in one of the state farms (**Figure 5**). The collapse of the hopper happened suddenly in calm weather, containing 430 tons of grain. It came down with the slope in the direction of the machine room of the grain-