Round point clinching with rotational tool movement is a novel technique to join endless sheets of same or different metals in a quick and economic way. The main challenges are the asymmetry of the resulting clinch points as well as the non-perpendicular impact and retraction of the tools. To address these challenges, the material flow during the joint formation is closely examined. For this purpose an experimentally validated simulation strategy was developed. The influence of the process parameters on the material flow was then analyzed using this simulation model. Based on these crucial insights, an optimization approach is presented.