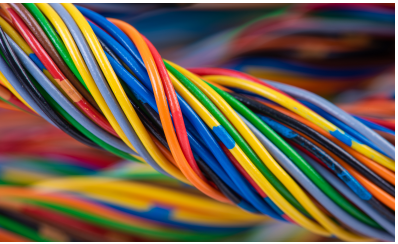
High-speed automated cable harness assembly

Wiring harness production still depends heavily on manual cable laying on formboards, a labor-intensive step that drives cost and limits throughput. Existing robotic solutions often require complex path guidance, advanced sensing, and slow pulling motions through forks. This technology enables fast, low-complexity automation of cable placement without changing harness design.



IP RIGHTS
EP filed
2025

Separated forming and placement via serial kinematics

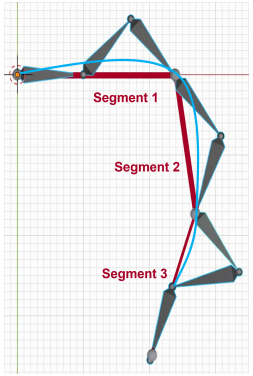
A serial kinematic chain with wire holding elements is first aligned in a straight loading configuration, then loaded with a straight cable. By adjusting joint angles, the system preforms the cable into the target routing path. The shaped chain is transferred above the formboard and releases the cable simultaneously into forks or channels.

01 Separates shaping and laying to enable faster cycle times

02 Avoids path-controlled pulling through forks and existing cable routes

03 Low-complexity mechanics with reduced sensor and gripper demands

04 Compatible with existing formboards and current harness designs



Serial kinematic chain preforms a cable off-board and deposits it in one step onto the target routing path.

CHALLENGE

Automating cable laying is difficult because each cable must follow a per-wire-specific sequence of forks, branches, and direction changes with high positional accuracy. Manual laying is slow and cost-intensive. Existing robotic approaches often depend on path-controlled pulling, optical guidance, and additional handling axes, which reduce speed, increase investment, and create friction-related positioning risks.

INNOVATION

The invention decouples cable forming from cable placement. A planar serial kinematic chain with rigid segments and selectable holding elements first shapes the cable off-board, then a holding structure transfers the preformed cable to the formboard for simultaneous release into forks or channels. This avoids continuous path-following during laying, reduces sensor and gripper complexity, and enables high-speed, low-invest automation compatible with established harness production layouts.



01 Basic principles observed · **02** Technology concept formulated · **03** Experimental proof of concept · **04** Technology validated in lab · **05** Technology validated in relevant environment · **06** Technology demonstrated in relevant environment · **07** System prototype demonstrated in operational environment · **08** System complete and qualified

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