

TAKING THE STRAIN

Grinding metal castings or forgings is one of the most demanding physical tasks in manufacturing. Clansman Dynamics makes a range of heavy-duty foundry and forge machinery, and has developed the G30 grinder which reduces strain and improves the view for grinding operators.

The physical strength and effectiveness of a grinding operator tends to drop away towards the end of a shift. This can compromise quality, and the repetitive nature of the work places physical demands on the operator. Clansman Dynamics, based in East Kilbride, has developed a range of grinding manipulators that have a spindle and grinding wheel attached to a robotic slave arm guided by a master arm. The master arm is controlled remotely by its operator, who is housed in a control cabin.

The company is employee-owned with 40 staff, exporting more than 90% of its production, with £12 million turnover each year. It had seen castings being produced by foundries becoming ever larger and more complex – such as locomotive frames and wind turbine castings. Operators within foundries found themselves further and further away from the action. A solution was needed.

Clansman’s solution was to clamp the larger castings in a two-axis clamp assembly and traverse a grinder with very short arms along the casting, which is able to move both vertically and rotationally. A compact ‘wrist’

that carries all requisite hoses, pipes and cables allows a six-axis grinding manipulator to operate with high power and good visibility from a cabin just feet away from the castings.

Clansman uses electric force feedback to create a tactile interface between the master and slave arms. This had not been done before; other systems used hydraulics with cylinders and high pressure oil in the cabin. This new control system allows the operator to ‘feel’ the machine grinding action. It effectively puts the grinding wheel at the operator’s fingertips and relays to them the right pressure and orientation to apply to the worked piece.

The stiff mechanical structure of the unit allows a high servo gain for the control system. It also enables the slave arm to move precisely with the operator’s manipulation of the master arm, while giving them 30 kilowatts of power to turn the spindle.

The shorter arm, that allows closer proximity to the work while enabling the operator to wield significant force, has become an export success. The G30 compact grinding manipulator has sold to foundries in the US, China and South Africa.

