A PRECISION WINDING SYSTEM FOR SUPER-FINE THREADS AND TAPE FABRICS

Project manager: S. Theilig, Dipl.-Ing. Duration: 01/99 – 12/99

Initial situation

At delivery rates from 600 m/min onwards, precision winding plus continuous delivery is not possible. The development of innovative materials and the consistent improvement of textile spinning technologies lead to increased demands for a system providing both options. The system used up to date, involving a dancing arm for compensating thread feed variations caused by the reciprocating triangle, was not able to meet these requirements.

Research target

The project was aimed at developing a winding system coping with a delivery rate of 1000 m/min, as required, and ensuring continuous delivery through the corresponding number of double lifts of the reciprocating system. Focus was also on possibilities of separating the double functions of the dancing arm (compensation of thread feed variations, diameter-dependent rotational speed control). A significant solution is based on an invention which Cetex gGmbH has filed a patent application for (file number: DE 198 33 703.5). The invention suggests to compensate short-time thread feed variations caused by the reciprocating triangle by means of short-time electronically controlled variations of the bobbin speed.

Research result

An existing winding head was continually modified, and a new driving system (servo drive) was installed. The corresponding computer software was developed and installed. The software is freely programmable allowing for prompt modifications to be applied at any time. Tests were conducted using various materials and speeds. The testing proved that the innovative winding principle presented above can reach a speed of 1000 m/min, provided that a suitable bobbin arrangement is used. The test were performed with less thread tension variations and generally lower mean winding tensions.

The winding principle examined may also be employed at lower winding velocities (from 20 m/min). The application of this principle is technically limited by the dynamics of the servo drive, on the one hand, and by the mass of the bobbins, on the other hand.

Application and economic advantages

The results obtained are evaluated by Barmag-Spinnzwirn GmbH who has planned to develop and build a prototype using the proposed winding principle.

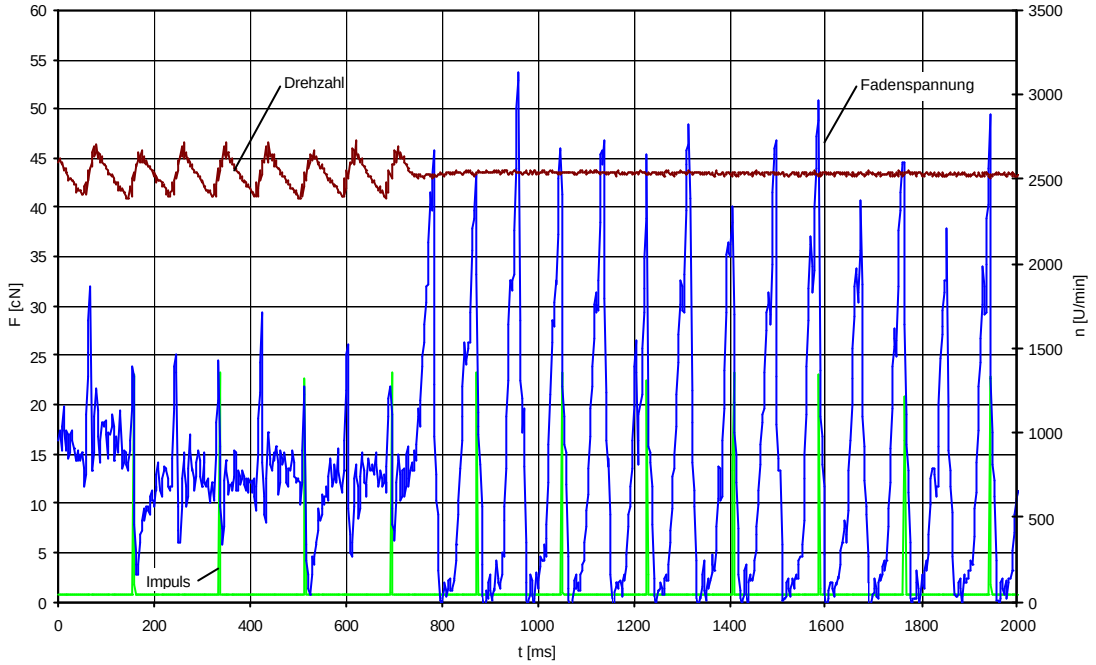

Figure 1 : Thread tension at 800 m/min, with and without additional moment.

Figure 1 illustrates the thread tension characteristic at a winding speed of 800 m/min at 100 mm diameter. The new winding principle may be compared to the conventional principle up to approximately 800 ms. At a winding speed of 600 m/min, compensation of tension is even better, whereas it is less pronounced at 1000 m/min.

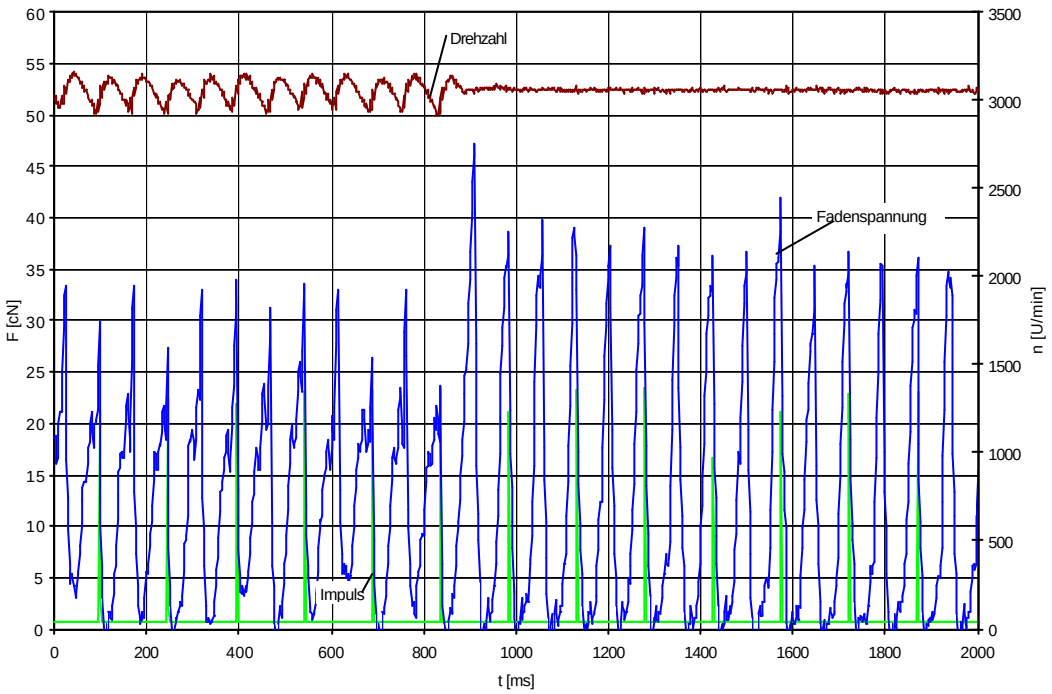

Figure 2 : Thread tension comparison at 1000m/min, with and without additional moment.

More important than the lowering of thread peak tensions is the fact that a fall of the thread tension to zero may be prevented. As a result, a bobbin without crosswise impacts could be produced. Thread peak tensions at a winding speed of 1000 m/min are lower than at 600 m/min in conventional winding.