

Machineman Development Programme

Series 20

April '19 – July '19



Course Information Booklet

Welcome and Introduction

Welcome to the Machineman Development Programme Series 20 - a modular development programme aimed at production and engineering personnel in the UK papermaking industry. We are proud to say that, since 2008, over 140 people from 15 mills have attended this course: an average of eight people per course.

Incorporating the industry's National Occupational Standards, the syllabus of the Paper Technology Level 2 Certificate, and mills' specific requirements, the course is hosted by UK paper mills and the specific technology and science within each mill is used to reinforce the content of each technical module.

The four separate weeks are scheduled to run as follows:

MDP 20 Week 1 – w/c 8th April 2019 – Frogmore Mill

Mon - Morning	Course Introduction, Quiz for Week 1, CAPS Papermachine Simulator	Tim/Steve
Mon - Afternoon	CAPS cont'd Mill Visit	Tim/Steve
Tues - Morning	History and Development of Papermaking (PT2.01)	Steve
Tues - Afternoon	History and Development of Papermaking (PT2.01)	Steve
Weds - Morning	Fibrous Raw Materials (PT2.03)	Steve
Weds - Afternoon	Fibrous Raw Materials (PT2.03)	Steve
Thurs - Morning	Stock Preparation	Steve
Thurs - Afternoon	Stock Preparation	Steve
Fri - Morning	Basic Science (PT2.02)	Steve
Fri - Afternoon	Basic Science, Quiz for Week 1 (PT2.02)	Steve

MDP 20 Week 2 – w/c 20th May 2019 – Sonoco-Alcore, Stainland Mill

Mon - Morning	Test (Units 1, 2, 3), Quiz for Week 2, Papermaking Numbers	Steve/Tim
Mon - Afternoon	Plant Services (PT2.07) Mill Visit	Steve/Mill
Tue - Morning	Process Control	Steve
Tue - Afternoon	Mill Visit – To be confirmed	Steve
Weds - Morning	Water & Chemical Additives (PT2.04)	Steve
Weds - Afternoon	Water & Chemical Additives (PT2.04)	Steve
Thurs - Morning	Approach Flow	Steve
Thurs - Afternoon	Approach Flow	Steve
Fri - Morning	Sheet Formation - Paper & Board (PT2.05)	Steve
Fri - Afternoon	Sheet Formation – Paper & Board, Quiz for Week 2	Steve

MDP 20 Week 3 – w/c 10th June 2019 – Ahlstrom-Munksjo, Chirside Plant

Mon - Fri	Test (Units 4, 5, 7) Technical/Practical Papermaking Using wet lab, dry lab and microscopy equipment to deepen the understanding of papermaking and why things work the way they do.	Steve/Tim
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MDP 20 Week 4 – w/c 1st July 2019 – Sonoco-Alcore, Stainland Mill

Mon - Morning	Quiz for Week 4, Wet Pressing & Size Pressing	Steve/Tim
Mon - Afternoon	Wet Pressing & Size Pressing, Drying Processes	Steve/Tim
Tues - Morning	Energy Awareness & Optimisation	Kate
Tues - Afternoon	Energy Awareness & Optimisation	Kate
Weds - Morning	Pump Technology	Kate
Weds - Afternoon	Pump Technology	Kate
Thurs - Morning	Drying Processes – Paper, Tissue & Board (PT2.06)	Steve
Thurs - Afternoon	Finishing & Conversion, Quiz for Week 4	Steve
Fri - Morning	Revision	Tim/Steve
Fri - Afternoon	Mock Exam & Debrief, Wash-up & Depart	Tim/Steve

Course Rules and Guidelines

The venue for each of the four weeks will be a UK paper mill and as such you should regard this mill as your place of work for that week.

A structured mill visit will be included during the week, usually on Monday afternoon, and will be arranged with the mill operations team. Usual PPE will be required so please bring along your **own protective footwear** as a minimum.

Additional paper mill visits may be included where nearby mills are within easy reach, where they are able to host such visits and when time permits.

The dress code is relaxed and casual and consistent with being in and around a paper mill environment.

Personal expenses are sometimes a contentious issue with different companies having different policies, arrangements and daily allowances. We have no control over this but would ask that participants are clear about your own company's guidelines.

A course manual will be provided during Week 1 which contains **all** of the technical materials taught during the 4-week programme. It will serve as a valuable source of reference during the programme and beyond.

Each working day will run from 09.00 to 16.30, unless varied by the course trainer, by prior agreement with the participants. The exception is on Friday, when we will finish at mid-afternoon to allow for travel home.

Course Participants:

Host Mills & Suggested Hotels:

Week	Dates	Host Mill	Suggested Hotel
1	Mon 8 th Apr – Fri 12 th Apr 2019	Apsley Paper Trail Frogmore Paper Mill Fourdrinier Way Apsley Hemel Hempstead Herts HP3 9RY Tel: 01442 234600	Holiday Inn Express Stationer's Place Apsley Hemel Hempstead Herts HP3 9RH Tel: 01442 2069440
2	Mon 20 th May – Fri 24 th May 2019	Sonoco-Alcore Ltd Stainland Board Mill Holywell Green Halifax W Yorkshire HX4 9PY Tel: 01422 374741	Briar Court Hotel Halifax Road, Birchcliffe Huddersfield HD3 3NT Tel: 01484 519902
3	Mon 10 th Jun – Fri 14 th Jun 2019	To be advised	To be advised
4	Mon 1 st Jul – Fri 5 th Jul 2019	Sonoco-Alcore Ltd Stainland Board Mill Holywell Green Halifax W Yorkshire HX4 9PY Tel: 01422 374741	Briar Court Hotel Halifax Road, Birchcliffe Huddersfield HD3 3NT Tel: 01484 519902

Supporting Information for Hotels:**Week 1**

We have attempted to secure corporate rates with Holiday Inn Express but, on this occasion, better rates can be secured through other routes, e.g. website, your agents, etc.

Week 2**Week 3****Week 4**

Learning Outcomes

Overall Course Aims

- To enable course participants to appreciate and understand the many principles which apply to the science and technology of papermaking.
- To gain a better understanding of the influence that they and their work colleagues have on the performance of the paper machines within their own mill.
- As a direct result of attending this course, participants should be able to make a wider ranging contribution to the objectives and long term improvement and productivity of their company.

Week 1

- **CAPS Papermachine Simulator** – understand the effects of changes to process variables on machine efficiency, quality and unit cost of manufacture.
- **The History of Papermaking** – understand how and why papermaking was developed; how it has expanded across the globe; how the need for paper products has changed throughout history; how the processing of raw materials and manufacturing technology has evolved.
- **Fibres Used in Papermaking** - understand the fibre sources in plants; the different types of fibre used in papermaking; the physical and chemical differences of different fibre types; the main differences between new and recycled fibre; the main pulping processes.
- **Stock Preparation Systems** – understand the operation of fibre dispersing systems; how fibre characteristics are modified; storage and blending of stock; the similarities and differences between chemical pulp and recovered paper systems.
- **Basic Science of Papermaking** – understand the periodic table; different types of bonding used in papermaking; acids, bases & pH; simple chemical equations; and the forces of attraction and repulsion at the atomic level.
- **Mill Visits** – to appreciate how others apply the principles of paper manufacture using different raw materials, science and technology.

Week 2

- **Papermaking Numbers** – understand the importance of data which is presented to the papermaker; how to make simple calculations to verify observations; the language used by technical colleagues and be able to contribute to mill improvement activities.
- **Plant Services in Papermaking** – understand the colour coding of pipework; types of steam; purpose and design of lubrication systems; generation and use of vacuum; science and application of electricity; process measurement and control.
- **Process Control** – understand the nature and purpose of process control; types of control sensors; advantages of process control.
- **Water & Chemical Additives** – understand the sources of water used in papermaking, and how incoming, process, and outgoing water is treated. Chemical additives are split into two groups and participants will appreciate what 'process aids' are used and why, and what 'functional aids' are used and their effects on the final product
- **Approach Flow** – understand the control of flow and consistency; how contaminants are removed.
- **Sheet Formation** – understand the factors that affect formation and drainage; the different types of sheet formers; the range of forming fabrics; the different de-watering elements; the ancillary equipment on the forming section.
- **Mill Visits** – to appreciate how others apply the principles of paper manufacture using different raw materials, science and technology.

Week 3

- **Technical/Practical Papermaking** - Using wet lab, dry lab and microscopy equipment to deepen the understanding of papermaking and why things work the way they do.

Week 4

- **Press Section and Size Press** – understand the purpose of pressing water from paper and board; different types of press and their operation; different types of press fabrics; variables that influence water removal; ancillary equipment used in the press section; common pressing faults and problems. Understand the development of the size press, its principles and operation.
- **Energy Awareness & Optimisation** – appreciate how energy is used in the paper industry and how prices and pressures are likely to change over time. Understand why we often use more energy than required and how to spot key indicators of excess energy use. Have a basic grasp of simple calculations so that estimations can be made of energy requirements for tasks such as heating stock and water.
- **Dry End Processes in Papermaking** – understand the principles of heat and mass transfer; construction and operation of contact drying equipment; methods of optimising dryer energy usage; other methods of drying; efficient ventilation of drying section; dryer section problems and remedial action.
- **Finishing and Conversion Operations** – understand the way in which the surface of paper can be modified; the equipment and variables for applying coatings at the size press; the equipment and techniques for calendering; the purpose and function of the different types of finishing and conversion machines.
- **Mill Visits** – to appreciate how others apply the principles of paper manufacture using different raw materials, science and technology.

Mill Managers' Testimonials

Angus MacSween, General Manager, Arjo Wiggins Stoneywood Mill

As a Mill Manager a very important part of my job is to ensure that the manufacturing process is as efficient and productive as the process is capable. A large contribution to achieving the desired result are the people involved, none more so than the "Machineman". He is the guy who can turn a straight run into a horror story or a very complex order change into a seamless change. He is also the guy who is the first line problem solver, the guy who optimises the furnish and machine conditions to achieve the best possible margin. It is imperative then that he is equipped with the knowledge, skill, confidence and motivation to achieve the best in the challenges he faces. It is without question that my experience of the performance of the Machinemen who have been on the MDP is elevated to a new level on their return.

They have received a degree of training, knowledge and understanding that gives them the motivation and confidence to improve their performance in the desired areas. Another valuable part of the course is the time spent discussing problems, success, experiences with peers from other mills even from another sector. They invariably discover that they have knowledge that they can share and also learn from the other guys on the course. In my opinion every Machineman should get the opportunity to attend the MDP as part of their personal development.

I am more than convinced that the investment by the mill will be recovered many times over.

Andrew Nash, Mill Manager, De La Rue, Bathford Mill

To date we have placed 16 delegates on the MDP scheme and the benefits both to those individuals and to the company have been profound. During this period our waste levels have halved and our customer complaint numbers and claim levels are a fraction of what they were.

While it is difficult to draw direct benefit relationships between training and business performance, there is no doubt in my mind that providing key operators with high quality technical training that gives them the ability to make critical real time decisions has paid off.

In addition to bottom line improvement, the sense of individual empowerment and commitment to the company that the course engenders can bring significant benefits to the graduates.

Three of ours have been promoted to Shift Supervisory roles and another is now a member of the site Management Team. I expect this trend will continue.

The MDP Story So Far (February 2019)

Having launched in 2008, the Machineman Development Programme (MDP) has so far been used by 15 paper mills and 1 paper merchant, for the development of 143 participants.

The range of job roles and numbers attending are as follows:

Job Role	Number
Machineman (Paper Technician, Papermaker, Machine Leader)	60
Dryerman (Back Tender)	22
Assistant (Machine, Dryer)	20
Shift Manager (Shift Leader)	6
Engineer (Day & Shift)	12
Stock Preparation (Refinerman, Colourman, Pulperman)	6
Apprentice Papermaker	3
Winderman (Reelerman)	3
Utilities	3
Sales	1
Graduate Trainee	2
Production Trainee	1
Production Manager	3
Technical Trainer	1
Total	143

The support by mills (anonymous) is as follows:

Mill Identifier	Number
A	16
B	1
C	3
D	6
E	9
F	4
G	19
H	13
I	1
J	2
K	16
L	23
M	3
N	22
O	1
P	4
Total	143

Significant innovation has taken place throughout the lifetime of the course, namely:

- Course now includes the complete syllabus of the industry's national qualification – Level 2 Certificate in Paper Technology. The examination is discretionary (mills decide before hand whether they want their participants registered with the Awarding Body) and 50 people have taken it since 2014
- The whole course is aligned to the paper industry's National Occupational Standards (NOS)
- CAPS papermaking simulators are used to bring papermaking to life in the training room
- A 400-page, spiral-bound manual now accompanies the course
- QR codes are used in the manual to bring the text to life. With a smart phone QR reader, you can watch 30-second video clips of the relevant topic
- We now include a one-day module on Energy Awareness & Optimisation, taught by Kate Leach
- One of the host mills is Apsley Paper Trail, Frogmore Mill, the home of the first mechanised fourdrinier papermachine, in 1803. Here we have the option to make use of their 0.5m deckle papermachine, as well as their hand-made vat, wet and dry laboratory equipment and microscopy facilities
- Managers are sent suggestions between the weeks to encourage participants to learn more about their own mill area in relation to the week that they have just completed
- All participants sign up to PaperClassroom's e-learning (Moodle) site which helps them with their learning and revision for the L2 exam on the final Thursday
- We now have Quizlet as a revision aid available on Android, iOS or laptop/PC. This is a mixture of flash cards to be used as a memory aid, along with simple on-screen games to reinforce the learning activities. <https://quizlet.com/join/SDqEkxQzB>
- Paperwiki is a wide ranging and growing resource to help explain and illustrate everything to do with the paper board and tissue industries. This is for use by students on the course, and long after. <http://www.paperwiki.co.uk/>
- We have created an App, for iOS and Android, for our technical courses
- An expanding YouTube channel offering verbal / animated explanations of papermaking concepts to include all different learning styles.
- A practical papermaking week was added during MDP 19.
- For MDP 19, Week 4 was moved to the week before the Level 2 exam to create additional time for the practical week.
- The Level 2 examination now takes place at participating mills, under exam conditions, after the course has concluded. This is usually on Thursday in the week following Week 4.

For further information, please contact Tim at tw@twapd.com or Steve at steve@paperclassroom.com

Tim J Watts

Updated 26th February 2019