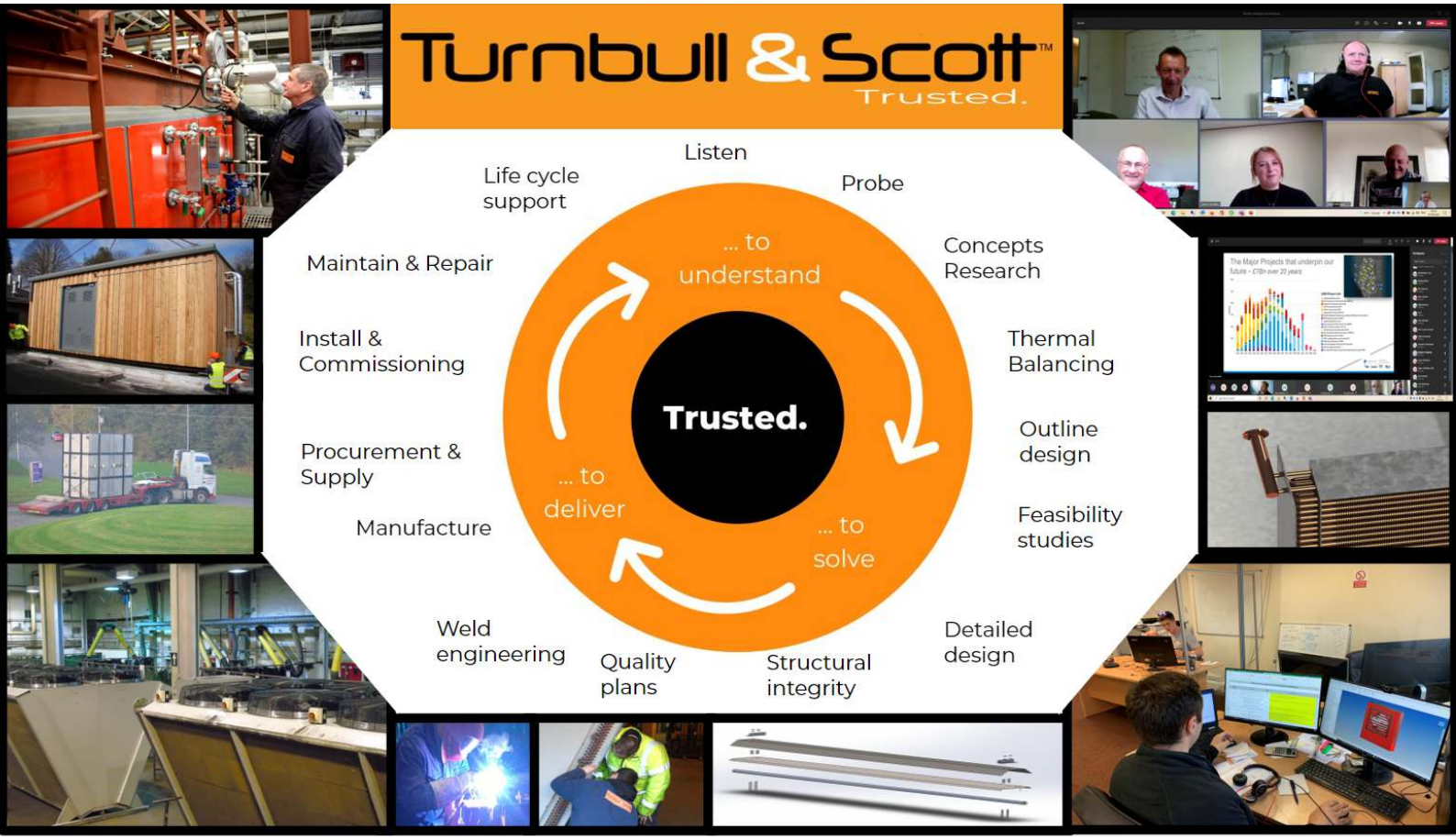
Heat Recovery for Dryer Manufacturers

Turnbull & Scott™
Trusted.

Our Promise

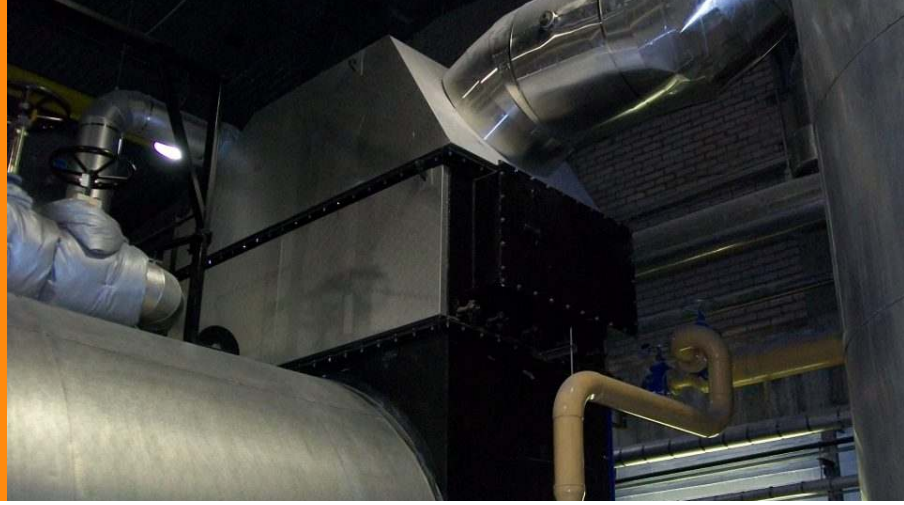
Our customers **trust** us to **understand, solve and deliver** the solution to their comfort or process heating, drying, cooling and energy saving challenges and opportunities.

Trusted.



...to Understand	...to Solve	...to Deliver
• Partnership approach to building long standing relationships • Initial enquiry and discovery calls - in person or MS Teams • Iterative design process from heat balance to detailed design • Site Surveys	• Time-tested design philosophies • Proprietary research backed software 'S-Calc' • Dedicated design centre • AutoCAD Inventor - 3D modelling & manufacturing drawings • Wide range of heat transfer media - steam, water, thermal oils, exhaust gases & wide range of liquid, gaseous & vaporous chemicals	• 60,000 sq. ft Manufacturing facility • 5t lifting capability • ISO 9000, ISO 14000 & ISO 45001 • Weld procedures to BS EN ISO 15614 • Welders to BS EN ISO 9606

Heat Recovery System Design for Dryer Manufacturers



Our long history in the design and manufacture of heat exchanger coils for drying applications began over 80 years ago supporting the textile mills in our local area.

Today we design and build custom coils for process equipment manufacturers serving many industries across Europe from our 60,000 sq. ft design & manufacturing facility in Scotland.

In recent years, in addition to supplying air heating and cooling coils for drying purposes, we increasingly produce coils to recover waste heat from the dryers.

Journey to Net Zero

Most companies have started their journey to net zero and are committing to firm carbon reduction targets and rolling out low carbon strategies. These increasingly encompass company supply chains and selection of equipment in capex projects. In a competitive environment capital equipment suppliers must increasingly incorporate an evaluation of equipment's carbon reducing credentials in order to be successful.

At an operational level, plant with heat recovery functionality that can aid the reduction of fuel consumption and costs is particularly sought after.

Our Design Approach

Our heat exchanger design team works with dryer manufacturers to assess the potential for heat recovery in their projects, the design options, and associated costs to enable them to meet their customers' heat recovery requirements.

Opportunity Assessment

In some cases dryer exhaust air is relatively uncontaminated, is hot and humid and can be captured for re-use in the drying system itself or ported elsewhere – to pre-heat boiler feedwater, for example.

Characterisation of Available Heat

High Grade Heat

In assessing the opportunity to recover heat, it's not only temperature that is important, humidity is also key to successful heat recovery. By its very nature the drying process will normally give rise to a high moisture content in the exhaust air.

In general, the higher the temperature and moisture content, the more heat energy that is recoverable. High temperature, high humidity air is commonly referred to as "high grade heat".

How hot is hot to be classed 'high grade' heat?

Air above 100°C holds more water as the water is effectively steam, however, as a rule of thumb, in the absence of the customer's airflow rate, design engineers generally regard a temperature above 140°C high enough to make heat recovery 'interesting'.

Lower Grade Heat

Lower air temperatures can provide robust opportunities for heat recovery, but there are additional factors to consider.

In general, heat transfer works well where the temperature gap between the fluid giving up the heat and the fluid receiving the heat is large. We refer to this gap as the temperature difference, commonly referred to as ΔT (delta T). A high ΔT allows significant heat recovery whilst minimising the surface area required in the heat exchanger.

How low is low to be classed as 'lower grade' heat?

Air temperatures between 105°C and 95°C would generally be regarded as 'low grade heat' and present less opportunity for heat recovery.

Temperature Floor Considerations

In certain circumstances however, while a theoretically workable temperature difference can exist between the fluids, a road-bump, referred to as a 'temperature floor' can come into play. This is where chemical species, such as acids, exist in the dryer air. These chemicals condense at particular temperatures creating corrosive conditions in the heat exchanger. The dewpoint of these chemicals is often in the 80-90°C range, creating a condensate alongside water that is hard to manage.

Existence of such a temperature floor marks a key decision point:

- Breach the temperature floor to recover maximum possible heat using a long life, heavy duty heat exchanger that can withstand the corrosion at a higher initial capital cost?
- Breach the temperature floor to recover more heat with a standard heat exchanger at standard costs accepting maintenance costs and shorter life-span?
- Not breaching the temperature floor and sacrificing some heat recovery by using a standard heat exchanger at a lower initial capital cost?

Usage of recuperated heat

A drying system provides a ready-made use for recovered heat and the design of a recuperation system. How it is used depends on the type of heat source in situ, for example, recovered heat could be used for pre-heating combustion air where dryer air was heated by an indirect gas burner, or where a hot water or steam boiler is in use, recovered heat could be used to pre-heat boiler feedwater.

Design, manufacture and installation

In designing your custom heat recovery systems, our design team will work with you to determine the optimal material selection for heat recovery at given temperatures and operating environments, working through the corrosion battlefield in line with your priorities.

Furthermore we can work with you on other required system elements including controls, pumps, pipework and valves which can be supplied as part of a package or integrated into the dryer.

About Turnbull & Scott

Custom Design Capabilities

- Time-tested design philosophies
- Proprietary research backed software S-Calc
- Wide range of heat transfer media including steam, water, thermal oils, exhaust gases & wide range of liquid, gaseous & vaporous chemicals
- Broad range of geometries for finned tube & bare tube crossflow type heat exchangers

» Materials

- Stainless steels
- Carbon Steels
- Copper
- Aluminium

» Coil Operating Parameters

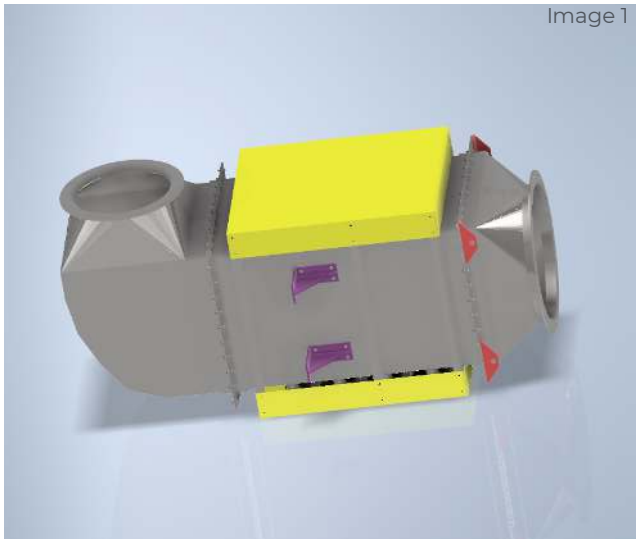
- Steam pressure to 40 bar
- HPHW pressure to 75 bar
- LPHW pressure to 15 bar

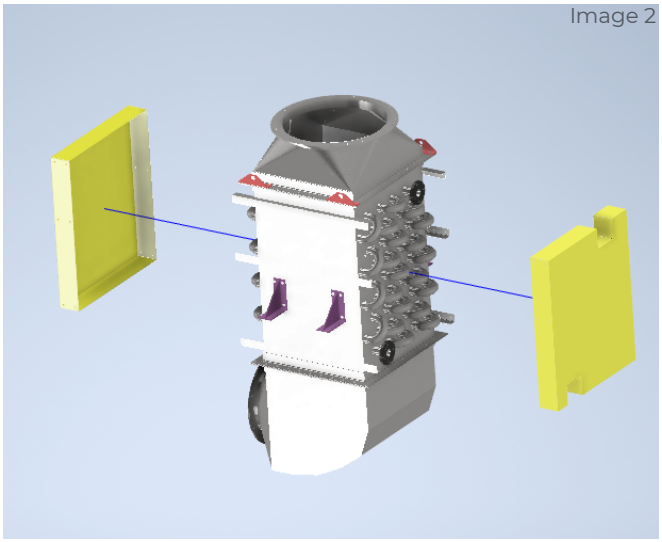
» Surface Treatments

- Hot dip galvanised
- Polyurethane coated
- Zinc plated

» Qualifications & Certifications

- ISO 9000, ISO 14000 & ISO 45001
- Weld procedures to BS EN ISO 15614
- Welders to BS EN ISO 9606





Images 1 & 2 show 3D drawings of a flue gas heat recovery unit

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